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I *Acts whose publication is obligatory*

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Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

The titles of all other Acts are printed in bold type and preceded by an asterisk.

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(Acts whose publication is obligatory)

Annexes A and B to Council Directive 94/55/EC of 21 November 1994 on the approximation of the laws of the Member States with regard to the transport of dangerous goods by road [1]

[1] Publication of the codified texts of Annexes A and B, as intimated in OJ No L 319, 12. 12. 1994, p. 13.

ANNEX A

Provisions concerning dangerous substances and articles

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PART I

DEFINITIONS AND GENERAL PROVISIONS

Definitions

2000 (1) For the purposes of this Annex:

— the term 'competent authority' means the authority designated as such in each country and in each specific case by the Government;

— the term 'fragile package' means a package containing a fragile receptacle, i.e. a receptacle made of glass, porcelain, stoneware or similar materials, which is not enclosed in a packaging with complete sides protecting it effectively against shock [see also marginal 2001 (7)];

— the term 'gas' means a gas or vapour;

— the term 'dangerous substances', when used alone, means the substances and articles designated as being substances and articles of this Directive;

— the term 'carriage in bulk' means the carriage of a solid substance without packaging;

— the term 'RID' signifies Regulations concerning the international carriage of dangerous goods by rail, which are Annex I of COTIF — Convention concerning international carriage by rail, Appendix B — Uniform rules concerning the contract for international carriage of goods by rail (CIM).

(2) For the purposes of this Annex, tanks (see definitions in Annex B) are not placed on the same footing as receptacles, the term 'receptacle' being used in a restrictive sense. Provisions concerning receptacles are applicable to fixed tanks, batteries of receptacles, demountable tanks and tank-containers only if this is expressly stipulated.

(3) The term 'full load' means any load originating from one sender for which the use of a vehicle or of a large container is exclusively reserved and all operations for the loading and unloading of which are carried out in conformity with the instructions of the sender or of the consignee.

(4) For the purposes of this Directive, 'n.o.s. (not otherwise specified) entry' means a collective entry to which substances, mixtures, solutions or articles may be assigned if they:

a) are not mentioned by name under the items of the lists of substances, and

b) exhibit chemical, physical and/or dangerous properties corresponding to the class, item, letter and name of the n.o.s. entry.

(5) Wastes are substances, solutions, mixtures or articles for which no direct use is envisaged but which are transported for reprocessing, dumping, elimination by incineration or other methods of disposal.

2001 (1) The following units of measurement [1] are applicable in this Annex and in Annex B:

Measurement of	SI Unit [2]	Acceptable alternative unit	Relationship between units
Length	m (metre)	—	—
Area	m^2 (square metre)	—	—
Volume	m^3 (cubic metre)	l [3] (litre)	$1\ l = 10^{-3}\ m^3$
Time	s (second)	min (minute)	1 min = 60 s
		h (hour)	1 h = 3 600 s
		d (day)	1 d = 86 400 s
Mass	kg (kilogramme)	g (gramme)	$1\ g = 10^{-3}\ kg$
		t (ton)	$1\ t = 10^{3}\ kg$
Mass density	kg/m^3	kg/l	$1\ kg/l = 10^{3}\ kg/m^3$
Temperature	K (kelvin)	°C (degree Celsius)	0 °C = 273,15 K
Difference of temperature	K (kelvin)	°C (degree Celsius)	1 °C = 1 K
Force	N (newton)	—	$1\ N = 1\ kg \cdot m/s^2$
Pressure	Pa (pascal)	bar (bar)	$1\ bar = 10^{5}\ Pa$
			$1\ Pa = 1\ N/m^2$
Stress	N/m^2	N/mm^2	$1\ N/mm^2 = 1\ MPa$
Work	J (joule)	kWh (kilowatt hour)	1 kWh = 3,6 MJ
Energie			$1\ J = 1\ N \cdot m = 1\ W \cdot s$
Quantity of heat		eV (electronvolt)	$1\ eV = 0{,}1602 \cdot 10^{-18}\ J$
Power	W (watt)	—	$1\ W = 1\ J/s = 1\ N \cdot m/s$

2001 *(cont'd)*

Measurement of	SI Unit (2)	Acceptable alternative unit	Relationship between units
Kenematic viscosity	m^2/s	mm^2/s	1 $mm^2/s = 10^{-6}$ m^2/s
Dynamic viscosity	Pa · s	mPa · s	1 mPa · s = 10^{-3} Pa · s
Activity (4)	Bq (becquerel)		
Dose equivalent 5)	Sv (sievert)		

(1) The following round figures are applicable for the conversion of the units hitherto used into SI Units:

Force

1 kg	= 9,807 N			
1 N	= 0,102 kg			

Stress

1 kg/mm²	= 9,807 N/mm²			
1 N/mm²	= 0,102 kg/mm²			

Pressure

1 Pa	= 1 N/mm² = 10^{-5} bar	= 1,02 · 10^{-5} kg/cm²	= 0,75 · 10^{-2} torr	
1 bar	= 10^5 Pa	= 1,02 kg/cm²	= 750 torr	
1 kg/cm²	= 9,807 · 10^4 Pa	= 0,9807 bar	= 736 torr	
1 torr	= 1,33 · 10^2 Pa	= 1,33 · 10^{-3} bar	= 1,36 · 10^{-3} kg/cm²	

Energy, Work, Quantity of heat

1 J	= 1 Nm	= 0,278 · 10^{-6} kWh	= 0,102 kgm	= 0,239 · 10^{-3} kcal
1 kWh	= 3,6 · 10^6 J	= 367 · 10^3 kgm	= 860 kcal	
1 kgm	= 9,807 J	= 2,72 · 10^{-6} kWh	= 2,34 · 10^{-3} kcal	
1 kcal	= 4,19 · 10^3 J	= 1,16 · 10^{-3} kWh	= 427 kgm	

Power

1 W	= 0,102 kgm/s	= 0,86 kcal/h	
1 kgm/s	= 9,807 W	= 8,43 kcal/h	
1 kcal/h	= 1,16 W	= 0,119 kgm/s	

Kenematic viscosity

1 m²/s	= 10^4 St (stokes)
1 St	= 10^{-4} m²/s

Dynamic viscosity

1 Pa · S	= 1 Ns/m²	= 10 P (poise)	= 0,102 kgs/m²
1 P	= 0,1 Pa · s	= 0,1 Ns/m²	= 1,02 · 10^{-2} kgs/m²
1 kgs/m²	= 9,807 Pa · s	= 9,807 Ns/m²	= 98,07 P

(2) The International System of Units (SI) is the result of decisions taken at the General Conference on Weights and Measures (Address: Pavillon de Breteuil, Parc de St-Cloud, F-92 310 Sèvres).

(3) The abbreviation 'L' for litre may also be used in place of the abbreviation 'l' when a typewriter cannot distinguish between figure '1' and letter 'l'.

(4) For the sake of clarity, activity may also be indicated, in parentheses, in Ci (curie) (relationship between the units: 1 Ci = 3.7 · 10^{10} Bq). By derogation from the conversion formula, rounded values may be given.

(5) For the sake of clarity, the dose equivalent may also be indicated, in parentheses, in rem (relationship between the units: 1 rem = 0.01 Sv).

The decimal multiples and sub-multiples of a unit may be formed by prefixes or symbols, having the following meanings, placed before the name or symbol of the unit:

Factor		Prefix	Symbol
1 000 000 000 000 000 000 = 10^{18}	quintillion	exa	E
1 000 000 000 000 000 = 10^{15}	quadrillion	peta	P
1 000 000 000 000 = 10^{12}	trillion	tera	T
1 000 000 000 = 10^9	billion	giga	G
1 000 000 = 10^6	million	mega	M
1 000 = 10^3	thousand	kilo	k
100 = 10^2	hundred	hecto	h
10 = 10^1	ten	deca	da
0,1 = 10^{-1}	tenth	deci	d
0,01 = 10^{-2}	hundredth	centi	c
0,001 = 10^{-3}	thousandth	milli	m
0,000 001 = 10^{-6}	millionth	micro	µ
0,000 000 001 = 10^{-9}	billionth	nano	n
0,000 000 000 001 = 10^{-12}	trillionth	pico	P
0,000 000 000 000 001 = 10^{-15}	quadrillionth	femto	f
0,000 000 000 000 000 001 = 10^{-18}	quintillionth	atto	a

Note: 10^9 = 1 billion is United Nations usage in English. By analogy, so is 10^{-9} = 1 billionth.

2001 *(cont'd)*

(2) Whenever the word 'weight' is used in this Annex and in Annex B, it means 'mass'.

(3) Whenever the weight of a package is mentioned in this Annex and in Annex B, the gross mass is meant unless otherwise stated. The mass of containers or tanks used for the carriage of goods is not included in the gross mass.

(4) Unless expressly stated otherwise, the sign '%' in this Annex and in Annex B represents:

a) in the case of mixtures of solids or of liquids, and also in the case of solutions and of solids wetted by a liquid: a percentage mass based on the total mass of the mixture, the solution or the wetted solid;

b) in the case of mixtures of compressed gases: the proportion of the volume indicated as a percentage of the total volume of the gaseous mixture; in the case of mixtures of liquefied gases and gases dissolved under pressure: the proportion of the mass indicated as a percentage of the total mass of the mixture.

(5) Pressures of all kinds relating to receptacles (such as test pressure, internal pressure, safety-valve opening pressure) are always indicated in gauge pressure (pressure in excess of atmospheric pressure); however, the vapour pressure of substances is always expressed in absolute pressure.

(6) Where this Annex or Annex B specifies a degree of filling for receptacles or tanks, that degree of filling is always referred to a temperature of the substances of 15 °C unless some other temperature is indicated.

(7) Fragile receptacles secured, either singly or in groups, by cushioning materials in a strong receptacle are not regarded as fragile receptacles if the strong receptacle is leakproof and so designed that in the event of breakage or leakage of the fragile receptacles their contents cannot escape from the strong receptacle and the mechanical strength of the latter is not impaired by corrosion during carriage.

(8) The following approximate conversion formula is authorized until SI units have been incorporated throughout the texts of this Annex and Annex B.

$1\ kg/mm^2 = 10\ N/mm^2$,

$1\ kg/cm^2 = 1\ bar$.

General provisions

2002 (1) This Annex specifies the dangerous goods to be excluded from international carriage by road and the dangerous goods to be accepted for such carriage under certain conditions. It groups the dangerous goods in restrictive and non-restrictive classes.

Of the dangerous goods covered by the headings of the restrictive classes (Classes 1, 2 and 7), those which are listed in the clauses concerning these classes (marginals 2101, 2201 and 2701) are to be accepted for carriage only under the conditions specified in these clauses, and others are to be excluded from carriage. Some of the dangerous goods covered by the headings of the non-restrictive classes (Classes 3, 4.1, 4.2,4.3, 5.1, 5.2, 6.1, 6.2, 8 and 9) are, by notes inserted in the clauses concerning the various Classes, excluded from carriage; of the other goods covered by the headings of the non-restrictive classes, those which are mentioned in the clauses concerning these classes (marginals 2301, 2401, 2431, 2471, 2501, 2551, 2601, 2651, 2801 and 2901) are to be accepted for carriage only under the conditions specified in these clauses; those which are not mentioned or covered by one of the collective headings are not deemed to be dangerous goods for the purposes of this Agreement and are to be accepted for carriage without any special conditions.

2002 *(cont'd)*

(2) The classes of this Annex are as follows:

Class 1	Explosive substances and articles	Restrictive
Class 2	Gases: compressed, liquefied or dissolved under pressure	Restrictive
Class 3	Flammable liquids	Non-restrictive
Class 4.1	Flammable solids	Non-restrictive
Class 4.2	Substances liable to spontaneous combustion	Non-restrictive
Class 4.3	Substances which, in contact with water, emit flammable gases	Non-restrictive
Class 5.1	Oxidizing substances	Non-restrictive
Class 5.2	Organic peroxides	Non-restrictive
Class 6.1	Toxic substances	Non-restrictive
Class 6.2	Infectious substances	Non-restrictive
Class 7	Radioactive material	Restrictive
Class 8	Corrosive substances	Non-restrictive
Class 9	Miscellaneous dangerous substances and articles	Non-restrictive

(3) Any carriage of goods governed by this Annex shall be accompanied by both the following documents:

a) a transport document containing at least the following information (for Class 7, see also marginal 2709):

— a description of the goods including the substance identification number (where available) (1);

— the class (1);

— the item number together with any letter (1);

— the initials ADR or RID (1);

— the number and a description of the packages or IBCs;

— the total quantity of dangerous goods (as a volume or as a gross mass or as a net mass and, in addition, in the case of explosive substances and articles of Class 1, as a total net mass of explosive contents).

Note: 1. This information is not required in the case of uncleaned empty packagings, containers or tanks.

2. In the case of the application of marginal 10 011, the quantities of dangerous goods carried per transport unit shall be expressed as a gross mass.

— the name and address of the consignor;

— the name and address of the consignee(s);

— a declaration as required by the terms of any special agreement.

The document containing this information may be that already required by other regulations in force for carriage by another mode of transport. The consignor shall communicate this information to the carrier in writing.

The particulars to be entered in the document shall be drafted in an official language of the forwarding country, and also, if that language is not English, French or German, in English, French or German, unless international road transport tariffs, if any, or agreements concluded between the countries concerned in the transport operation, provide otherwise.

(1) These and other details can be found in section 2.B 'Particulars in the transport document' of each class or in the Schedules of Class 7.

2002 *(cont'd)*

b) instructions to be implemented in the event of an accident (see Annex B, marginal 10 385), (unless exempted under marginal 10 011).

(4) If by reason of the size of the load a consignment cannot be loaded in its entirety on a single transport unit, at least as many separate documents, or copies of the single document, shall be made out as transport units loaded. Furthermore, in all cases separate transport documents shall be made out for consignments or parts of consignments which may not be loaded together on the same vehicle by reason of the prohibitions set forth in Annex B.

(5) Outer packagings additional to those specified in this Annex may be used providing that they do not contravene the spirit of the provisions of this Annex relating to outer packagings. If such additional packagings are used, the prescribed marking and labels shall be applied to them.

(6) If the mixed packing of several dangerous substances with one another or with other goods is allowed by the provisions of section A.3 of the provisions applicable to the various classes, the inner packagings containing different dangerous substances shall be carefully and effectively separated from one another in the collective packagings if dangerous reactions, such as the production of dangerous heat, combustion, the formation of mixtures sensitive to friction or shock, and the release of flammable or toxic gases, are liable to occur as a result of damage to or destruction of the inner packagings. In particular, if fragile receptacles are used, and especially if the said receptacles contain liquids, the danger of the formation of dangerous mixtures shall be avoided and to this end all appropriate measures shall be taken, such as the use of suitable cushioning materials in sufficient quantity, securing of the receptacles in a second, strong packaging, and subdivision of the collective packaging into several compartments. For mixed packing of material of Class 7, see marginal 3711 of Appendix A.7.

(7) If mixed packing is used, the provisions of this Annex concerning the particulars in the transport document shall apply in respect of each of the different kinds of dangerous substance contained in the collective package, and the collective package shall bear all the inscriptions and all the danger labels prescribed in this Annex for the dangerous substances the collective package contains.

(8) The following provisions shall apply to substances, solutions and mixtures [such as preparations and wastes [1]] not mentioned by name in the lists of substances of the various classes:

Note: 1. Solutions and mixtures comprise two or more components. These components may be either substances of this Directive or substances which are not subject to the provisions of this Directive.

2. Solutions and mixtures containing one or more components of a restrictive Class are not to be accepted for carriage unless those components are listed by name in the list of substances of the restrictive class.

3. Solutions and mixtures having a specific activity exceeding 70 kBq/kg (2nCi/g) are substances of Class 7 [see marginal 2700 (1)].

a) A solution or mixture containing a dangerous substance listed by name in this Directive together with one or more non-dangerous substances, shall be regarded as the dangerous substance listed by name, unless:

1. The solution or mixture is specifically listed by name elsewhere in this Directive; or

2. It is quite clear from the item for the dangerous substance that it is applicable only to the pure or technically pure substance; or

3. The class, physical state or packing group (letter), of the solution or mixture is different from that of the dangerous substance.

For such solutions and mixtures, the word 'solution' or 'mixture' shall then be added as part of the name in the transport document for the purposes of clarity in the description, for example, 'acetone solution'.

[1] See marginal 2000 (5).

2002 *(cont'd)* If the class, physical state or packing group are different from that of the pure substance, the solution or mixture shall be assigned to an appropriate n.o.s. entry, depending on the degree of danger.

b) Substances having more than one danger characteristic and solutions and mixtures containing two or more components subject to this Directive shall be placed under an item and letter of the appropriate Class in accordance with their danger characteristics. Such classification according to the danger characteristics shall be carried out as follows:

1.1 The physical and chemical characteristics and physiological properties shall be determined by measurement or calculation and be classified according to the criteria of the various classes.

1.2 If this determination is not possible without disproportionate cost or effort (as for some kinds of wastes), the solutions or mixtures shall be placed in the class of the component presenting the predominant danger.

2. If a substance presents more than one danger characteristic or if a mixture or solution contains more than one component of the classes or groups of substances listed below, it shall be classified in the class or the group of substances presenting the predominant danger.

2.1 If there is no predominant danger, classification shall be based on the following order of precedence:

— substances and articles of Class 1

— substances and articles of Class 2

— self-reactive and related substances and explosive substances in non-explosive state (wetted or phlegmatized explosive substances) of Class 4.1

— pyrophoric substances of Class 4.2

— substances of Class 5.2

— substances of Class 6.1 or Class 3 which, on the basis of their inhalation toxicity, are to be classified under letter (a) of the various items (excluding substances, solutions and mixtures (such as preparations and wastes) meeting the classification criteria of Class 8 and having an inhalation toxicity of dust and mists (LC_{50}) in the range of group (a) and toxicity through oral ingestion or dermal contact only in the range of group (c) or less; such substances, solutions and mixtures (such as preparations and wastes) shall be assigned to Class 8)

— infectious substances of Class 6.2.

2.2 If the danger characteristics fall within more than one class or group of substances not listed in 2.1, the substances, mixtures or solutions shall be classified in the class or group of substances presenting the predominant danger.

2.3 If there is no predominant danger, the substance, solution or mixture shall be classified as follows:

2.3.1 Assignment to a class shall be on the basis of the various danger characteristics or components in accordance with the table below. For Classes 3, 4.1, 4.2, 4.3, 5.1, 6.1, 8 and 9, account shall be taken of the degree of danger indicated by letters (a), (b) or (c) of the various items [see marginals 2300 (3), 2400 (3), 2430 (3), 2470 (3), 2500 (3), 2600 (1), 2800 (1) and 2900].

Note: Example to explain the use of the table (1):

Description of the Mixture:

Mixture consisting of a flammable liquid classified under Class 3, letter (c), a toxic substance classified under Class 6.1, letter (b), and a corrosive substance classified under Class 8, letter (a).

Procedure:

The intersection of line 3(c) with column 6.1(b) gives 6.1(b). The intersection of line 6.1(b) with column 8(a) gives 8(a). This mixture is therefore to be classified under Class 8, letter (a).

(1) The table is reproduced on pages 10 and 11.

2002 *(cont'd)*

Table [see marginal 2002(8) (b) 2.3.1]

Class and letter	4.1 b)		4.1 c)		4.2 b)		4.2 c)		4.3 a)	4.3 b)	4.3 c)	5.1 a) (1)		5.1 b) (1)		5.1 c) (1)		6.1 a) (3) DERMAL	6.1 a) (3) ORAL	6.1 b) (3)		6.1 c) (3)		8 a) (4)		8 b) (4)		8 c) (4)		9
3 a) (2)	SOL 4.1 (5)	LIQ 3 a)	SOL 4.1 (5)	LIQ 3 a)	SOL 4.2 (5)	LIQ 3 a)	SOL 4.2 (5)	LIQ 3 a)	4,3 a)	4,3 a)	4,3 a)	SOL 5.1 a)	LIQ 3 a)	SOL 5.1 a)	LIQ 3 a)	SOL 5.1 a)	LIQ 3 a)	3 a)	3 a)	3 a)		3 a)		3 a)		3 a)		3 a)		3 a)
3 b) (2)	SOL 4.1 (5)	LIQ 3 b)	SOL 4.1 (5)	LIQ 3 b)	SOL 4.2 (5)	LIQ 3 b)	SOL 4.2 (5)	LIQ 3 b)	4.3 a)	4.3 b)	4.3 b)	SOL 5.1 a)	LIQ 3 a)	SOL 5.1 b)	LIQ 3 b)	SOL 5.1 b)	LIQ 3 b)	3 a)	3 a)	3 b)		3 b)		8 a)		3 b)		3 b)		3 b)
3 c) (2)	SOL 4.1 (5)	LIQ 3 b)	SOL 4.1 (5)	LIQ 3 c)	SOL 4.2 (5)	LIQ 3 b)	SOL 4.2 (5)	LIQ 3 c)	4.3 a)	4.3 b)	4.3 c)	SOL 5.1 a)	LIQ 3 a)	SOL 5.1 b)	LIQ 3 b)	SOL 5.1 c)	LIQ 3 c)	6.1 a)	6.1 a)	6.1 b)		3 c) (8)		8 a)		8 b)		3 c)		3 c) (6)
4.1 b)					4.2 b)		4.2 b)		4.3 a)	4.3 b)	4.3 b)	5.1 a)		4.1 b)		4.1 b)		6.1 a)	6.1 a)	SOL 4.1 b)	LIQ 6.1 b)	SOL 4.1 b)	LIQ 6.1 b)	8 a)		SOL 4.1 b)	LIQ 8 b)	SOL 4.1 b)	LIQ 8 b)	4.1 b)
4.1 c)					4.2 b)		4.2 c)		4.3 a)	4.3 b)	4.3 c)	5.1 a)		4.1 b)		4.1 c)		6.1 a)	6.1 a)	6.1 b)		SOL 4.1 c)	LIQ 6.1 c)	8 a)		8 b)		SOL 4.1 c)	LIQ 8 c)	4.1 c) (6)
4.2 b)									4.3 a)	4.3 b)	4.3 b)	5.1 a)		4.2 b)		4.2 b)		6.1 a)	6.1 a)	4.2 b)		4.2 b)		8 a)		4.2 b)		4.2 b)		4.2 b)
4.2 c)									4.3 a)	4.3 b)	4.3 c)	5.1 a)		5.1 b)		4.2 c)		6.1 a)	6.1 a)	6.1 b)		4.2 c)		8 a)		8 b)		4.2 c)		4.2 c) (6)
4.3 a)												5.1 a)		4.3 a)		4.3 a)		6.1 a)	4.3 a)	4.3 a)		4.3 a)		4.3 a)		4.3 a)		4.3 a)		4.3 a)
4.3 b)												5.1 a)		4.3 b)		4.3 b)		6.1 a)	4.3 a)	4.3 b)		4.3 b)		8 a)		4.3 b)		4.3 b)		4.3 b)
4.3 c)												5.1 a)		5.1 b)		4.3 c)		6.1 a)	6.1 a)	6.1 b)		4.3 c)		8 a)		8 b)		4.3 c)		4.3 c) (6)
5.1 a) (1)	(7)																	5.1 a)	5.1 a)	5.1 a)		5.1 a)		5.1 a)		5.1 a)		5.1 a)		5.1 a)
5.1 b) (1)	(7)																	6.1 a)	5.1 a)	5.1 b)		5.1 b)		8 a)		5.1 b)		5.1 b)		5.1 b)
5.1 c) (1)	(7)																	6.1 a)	6.1 a)	6.1 b)		5.1 c)		8 a)		8 b)		5.1 c)		5.1 c) (6)
6.1 a) (3) DERMAL																								SOL 6.1 a)	LIQ 8 a)	6.1 a)		6.1 a)		6.1 a)
6.1 a) (3) ORAL																								SOL 6.1 a)	LIQ 8 a)	6.1 a)		6.1 a)		6.1 a)
6.1 b) (3) INHAL																								SOL 6.1 a)	LIQ 8 a)	6.1 b)		6.1 b)		6.1 b)
6.1 b) (3) DERMAL																								SOL 6.1 a)	LIQ 8 a)	SOL 6.1 b)	LIQ 8 b)	6.1 b)		6.1 b)
6.1 b) (3) ORAL																								8 a)		SOL 6.1 b)	LIQ 8 b)	6.1 b)		6.1 b)
6.1 c) (3)																								8 a)		8 b)		8 c)		6.1 c) (6)
8 a) (4)																														8 a)
8 b) (4)																														8 b)
8 c) (4)																														8 c) (6)

SOL = Solid substances and mixtures.
LIQ = Liquid substances, mixtures and solutions.
DERMAL = Dermal toxicity.
ORAL = Oral toxicity.
INHAL = Inhalation toxicity.

(1) These mixtures and solutions may have explosive properties, in which case they are not to be accepted for transport unless they meet the requirements of Class 1.
(2) Solutions or mixtures containing substances of Class 3, marginal 2301, 6°, 12° or 13° shall be placed in that Class under those items.
(3) Solutions or mixtures containing substances of Class 6.1, marginal 2601, 1° to 5° shall be placed in that Class under those items.
(4) Solutions or mixtures containing substances of Class 8, marginal 2801, 6°, 14° and 15° shall be placed in that Class under those items.
(5) Assignment to a class and a letter of an item may be based on the test procedure (see Appendix A.3).
(6) Solutions or mixtures containing substances of Class 9, marginal 2901, 2°(b), shall be placed in that Class under that item, provided they do not also contain substances mentioned in footnotes (1) to (4) above. If they do contain such, they shall be classified accordingly.
(7) There is at present no test criterion for determining the degree of danger (packing group) for liquids of Class 5.1. The degree of danger (packing group) for such substances can be determined only by comparison with substances listed by name under an item and a group designated by the letters (a), (b) or (c).
(8) Class 6.1 for pesticides.

2002 *(cont'd)*

2.3.2 Classification under an n.o.s. entry of an item of a class determined in accordance with 2.3.1 on the basis of the danger characteristics of the various components of the solution or mixture. Classification under a general n.o.s. entry is permitted only when classification under a specific n.o.s. entry is not possible.

Note: Examples for the classification of mixtures and solutions under classes and items:

A phenol solution of Class 6.1, 14°(b), in benzene of Class 3, 3°(b) is to be classified in Class 3, 3°(b); this solution is to be classified under the entry *1992 flammable liquid, toxic, n.o.s.*, Class 3, 19°(b), by virtue of the toxicity of the phenol.

A solid mixture of sodium arsenate of Class 6.1, 51°(b) and sodium hydroxide of Class 8, 41°(b) is to be classified under the entry *1557 arsenic compound, solid, n.o.s.* in Class 6, 51°(b).

A solution of crude or refined naphthalene of Class 4.1, 6° (c) in petrol of Class 3, 3°(b), is to be classified under the entry *3295 hydrocarbons, liquid, n.o.s.* in Class 3, 3°(b).

A mixture of hydrocarbons of Class 3, 31°(c), and of polychlorinated biphenyls (PCB) of Class 9, 2°(b), is to be classified under the entry *2315 polychlorinated biphenyls* in Class 9, 2°(b).

A mixture of propyleneimine of Class 3, 12°, and polychlorinated biphenyls (PCB) of Class 9, 2°(b), is to be classified under the entry *1921 propyleneimine, inhibited* in Class 3, 12°.

(9) The consignor, either in the transport document or in a separate declaration incorporated into or combined with it, shall certify that the substance presented may be carried by road in conformity with the provisions of this Directive and that its condition, treatment and, as appropriate its packaging, the intermediate bulk container or tank container and the labelling conform to the provisions of this Directive. Furthermore, if several dangerous goods are packed together in a collective package or in a single container, the consignor is required to declare that this mixed packing is not prohibited.

(10) A non-radioactive substance [see the definition of radioactive material in marginal 2700 (1)] which is covered by a collective heading of any class shall be excluded from carriage if, in addition, it is covered by the heading of a restrictive class in which it is not listed.

(11) A non-radioactive substance [see the definition of radioactive material in marginal 2700 (1)] which is not listed by name in a class, but is covered by two or more collective headings of different classes, shall be subject to the conditions of carriage laid down:

a) in the restrictive class, if one of the classes concerned is a restrictive class;

b) in the class corresponding to the predominant danger exhibited by the substance during carriage, if none of the classes concerned is a restrictive class.

(12) Radioactive material whose specific activity exceeds 70 kBq/kg (2 nCi/g) and which

a) meets the criteria for carriage under Schedule 1 of Class 7; and

b) has hazardous properties covered by the title of any other class or classes,

shall be excluded from carriage if it is covered by the title of a restrictive class in which it is not listed.

(13) Radioactive material whose specific activity exceeds 70 kBq/kg (2 nCi/g) and which

a) meets the criteria for carriage under Schedule 1 of Class 7; and

b) has hazardous properties covered by the title of any other class or classes

shall, in addition to meeting the requirements of Schedule 1 of Class 7, be subject to the conditions of carriage laid down:

— in the restrictive class, if one of the classes concerned is a restrictive class, and the substance is listed in it; or

2002 *(cont'd)* — in the class corresponding to the predominant danger exhibited by the substance during carriage, if none of the classes concerned is a restrictive class.

(14) For the purposes of this Directive, substances, solutions and mixtures (such as preparations and wastes) which cannot be assigned to Classes 1 to 8 or 9, 1° to 8°, 13° and 14°, but which may be assigned to Class 9, 11° or 12°, on the basis of the test methods and criteria according to Appendix A.3, section G, marginals 3390 to 3396, shall be considered to be pollutant to the aquatic environment.

Solutions and mixtures (such as preparations and wastes) for which classification values conforming to the classification criteria are not available shall be considered to be pollutant to the aquatic environment if the LC_{50} (1) evaluated according to the following formula:

$$LC_{50} = \frac{LC_{50} \text{ of the pollutant x } 100}{\text{percentage of the pollutant (by mass)}}$$

is equal to or lower than:

a) 1 mg/l,

b) 10 mg/l if the pollutant is not readily degradable or, being degradable, has a log $P_{ow} \geq 3{,}0$.

Note: For substances of Classes 1 to 8 and Class 9, 1° to 8°, 13° and 14°, which are pollutant to the aquatic environment according to the criteria of Appendix A.3, section G, marginals 3390 to 3396, no additional condition of carriage is applicable.

2003 (1) This Annex contains for each class other than Class 7:

a) a list of the dangerous substances constituting the class and, where applicable, under a marginal ending with the letter 'a', the exemptions allowed from the provisions of this Directive for some of these substances if they comply with certain conditions;

b) provisions sub-divided as follows:

A. Packages:

1. General conditions of packing;
2. Special conditions of packing;
3. Mixed packing;
4. Marking and danger labels on packages.

B. Particulars in the transport document.

C. Empty packagings.

D. (where appropriate) Other provisions.

(2) Provisions concerning:

— consignment in bulk, in containers and in tanks,

— method of despatch and restrictions on forwarding,

— prohibitions on mixed loading, and

— transport equipment,

are to be found in Annex B and its appendices, which also contain all other pertinent provisions applying specifically to carriage by road.

(1) According to the definition contained in marginal 3396.

2003 *(cont'd)*

(3) For Class 7 the provisions are summarized in the form of schedules containing the following headings:

1. Materials.
2. Packaging Package.
3. Package maximum radiation level.
4. Contamination on packages, vehicles, containers, tanks and overpacks.
5. Decontamination and use of vehicles, equipment or parts thereof.
6. Mixed packing.
7. Mixed loading.
8. Marking and danger labels on packages, containers, tanks and overpacks.
9. Marking and danger labels on vehicles other than tank-vehicles.
10. Transport documents.
11. Storage and despatch.
12. Carriage of packages, containers, tanks and overpacks.
13. Other provisions.

(4) The appendices to this Annex contain:

Appendix A.1: Stability and safety conditions relating to explosive substances and articles, nitrated mixtures of nitrocellulose, self-reactive substances and organic peroxides, together with glossary of names in marginal 2101;

Appendix A.2: Provisions relating to the nature of aluminium-alloy receptacles for certain gases of Class 2; provisions relating to the materials and construction of receptacles, intended for the carriage of deeply-refrigerated liquefied gases of Class 2; and provisions relating to tests on aerosol dispensers and non-refillable containers for gases under pressure of Class 2, 10° and 11°;

Appendix A.3: Tests relating to flammable liquids of Classes 3, 6.1 and 8; test for determining fluidity; tests relating to flammable solids of Class 4.1; tests relating to substances liable to spontaneous combustion of Class 4.2; test relating to substances of Class 4.3 which, in contact with water, emit flammable gases; test relating to oxidizing solids of Class 5.1; tests for determining the ecotoxicity, persistence and bioaccumulation of substances in the aquatic environment for assignment to Class 9;

Appendix A.5: General packing conditions, types of packaging, requirements applicable to packagings, test requirements for packagings;

Appendix A.6: General conditions for the use of intermediate bulk containers (IBCs), types of IBCs, requirements relating to the construction of IBCs and test specifications for IBCs;

Appendix A.7: Provisions relating to radioactive material of Class 7;

Appendix A.9: Provisions relating to danger labels, and explanation of the symbols.

A.4 and A.8 are reserved.

2004

2005 Where the provisions relating to carriage as a 'full load' are applied, the competent authorities may require the vehicle or large container used for the transport operation concerned to be loaded at only one point and unloaded at only one point.

2006 (1) If the vehicle carrying out a transport operation subject to the provisions of this Directive is conveyed over a section of the journey otherwise than by road haulage, then any national or international regulations which, on the said section, govern the carriage of dangerous goods by the mode of transport used for conveying the road vehicle shall alone be applicable to the said section of the journey.

(2) In cases where a transport operation subject to the provisions of this Directive is likewise subject over the whole or a part of its road journey to the provisions of an international convention which regulates the carriage of dangerous goods by a mode of transport other than road carriage by virtue of clauses extending the applicability of the said convention to certain motor-vehicle services, then the provisions of that international convention shall apply, over the journey in question, concurrently with those of this Directive which are not incompatible therewith; the other clauses of this Directive shall not apply over the journey in question.

2007 Packages, including intermediate bulk containers (IBCs), which do not entirely meet the packing, mixed packing and labelling requirements of this Directive but are in conformity with the requirements for maritime or air transport of dangerous goods [1], shall be accepted for carriage prior to or following maritime or air carriage subject to the following conditions:

a) If the packages are not labelled in accordance with this Directive, they shall be labelled in accordance with the provisions for maritime or air transport [1];

b) The provisions for maritime or air transport [1] shall be applicable to mixed packing within a package;

c) In addition to the particulars prescribed for ADR, the words 'Carriage under marginal 2007 of ADR' shall be entered in the transport document.

2008-2009

2010 For the purpose of carrying out the trials necessary with a view to amending the provisions of this Annex in order to adapt them to technological and industrial developments, the competent authorities of the Member States may agree directly among themselves to authorize certain transport operations in their territories by temporary derogation from the provisions of this Annex. The period of validity of the temporary derogation shall be not more than five years from the date of its entry into force. The temporary derogation shall automatically come to an end from the date of the entry into force of a corresponding amendment to this annex. The authority which has taken the initiative with respect to the temporary derogation so granted shall notify the competent service of the European Commission of the derogation, which service shall bring it to the attention of the Member States.

2011-2099

[1] These requirements are set out in the International Maritime Dangerous Goods (IMDG) Code published by the International Maritime Organization (IMO), London and in the Technical Instructions for the Safe Transport of Dangerous Goods by Air published by the International Civil Aviation Organization (ICAO), Montreal.

PART II

LIST OF SUBSTANCES AND SPECIAL PROVISIONS FOR THE VARIOUS CLASSES

CLASS 1

EXPLOSIVE SUBSTANCES AND ARTICLES

1. List of substances and articles

2100 (1) Among the substances and articles covered by the title of Class 1, only those listed in marginal 2101 or assigned to an n.o.s. entry in marginal 2101 are to be accepted for carriage. These substances and articles are only to be accepted for carriage subject to conditions set out in marginals 2100 (2) to 2116, Appendix A.1 and Annex B. They are then considered as substances and articles of this Directive.

(2) Class 1 comprises:

(a) — Explosive substances: solid or liquid substances (or mixtures of substances) capable by chemical reaction of producing gases at such a temperature and pressure and at such a speed as to cause damage to the surroundings.

— Pyrotechnic substances: substances or mixtures of substances designed to produce an effect by heat, light, sound, gas or smoke or a combination of these as the result of non-detonating self-sustaining exothermic chemical reactions.

Note: 1. Explosive substances which are unduly sensitive or are liable to spontaneous reaction are not to be accepted for carriage.

2. Substances which are not themselves explosive but which may form an explosive mixture of gas, vapour or dust are not substances of Class 1.

3. Also excluded from Class 1 are: water- or alcohol-wetted explosives of which the water or alcohol content exceeds the limits indicated in marginal 2101 and those containing plasticizers — these explosives are assigned to Class 4.1 (marginal 2401, 21°, 22° and 24°) — and those explosives which, on the basis of their predominant hazard, are assigned to Class 5.2.

(b) Explosive articles: articles containing one or more explosive substances and or pyrotechnic substances.

Note: Devices containing explosive and or pyrotechnic substances in such small quantity or of such a character that their inadvertent or accidental ignition or initiation during carriage would not cause any manifestation external to the device by projection, fire, smoke, heat or loud noise are not subject to the requirements of Class 1.

(c) Substances and articles not mentioned under (a) or (b) above which are manufactured with a view to producing a practical effect by explosion or a pyrotechnic effect.

(3) Explosive substances and articles shall have been assigned to a name in marginal 2101 in accordance with the test methods for the determination of explosive properties and the classification procedures set out in Appendix A.1 and they shall meet the conditions appropriate to that name or shall be assigned to an n.o.s. entry in marginal 2101 in accordance with these test methods and classification procedures.

Assignment of substances and articles not mentioned by name to an n.o.s. entry shall be made by the competent authority of the country of origin.

Substances and articles which are assigned to an n.o.s. entry shall be carried only with the approval of the competent authority of the country of origin and under the conditions laid down by that authority.

2100 *(cont'd)*

The approval shall be issued in writing.

(4) Substances and articles of Class 1, other than empty packagings, uncleaned, of 51°, shall have been assigned to a division in accordance with paragraph (6) and to a compatibility group in accordance with paragraph (7). The division shall be based on the results of the tests described in Appendix A.1 applying the definitions in paragraph (6). The compatibility group shall be determined in accordance with the definitions in paragraph (7). The classification code shall consist of the division number and the compatibility group letter.

(5) Substances and articles of Class 1 are assigned to packing group II (see Appendix A.5).

(6) Definition of divisions

1.1. Substances and articles which have a mass explosion hazard. (A mass explosion is an explosion which affects almost the entire load virtually instantaneously).

1.2. Substances and articles which have a projection hazard but not a mass explosion hazard.

1.3. Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard,

(a) combustion of which gives rise to considerable radiant heat; or

(b) which burn one after another, producing minor blast or projection effects or both.

1.4. Substances and articles which present only a slight risk of explosion in the event of ignition or initiation during carriage. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.

1.5. Very insensitive substances having a mass explosion hazard which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of carriage. As a minimum requirement they must not explode in the external fire test.

1.6. Extremely insensitive articles which do not have a mass explosion hazard. The articles contain only extremely insensitive detonating substances and demonstrate a negligible probability of accidental initiation or propagation.

Note: The risk from articles of Division 1.6 is limited to the explosion of a single article.

(7) Definition of compatibility groups of substances and articles:

A Primary explosive substance

B Article containing a primary explosive substance and not having two or more effective protective features. Some articles, such as detonators for blasting, detonator assemblies for blasting and primers, cap-type, are included, even though they do not contain primary explosives.

C Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance

D Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and having two or more effective protective features

E Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing an inflammable liquid or gel or hypergolic liquids)

2100 *(cont'd)*

F Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge (other than one containing an inflammable liquid or gel or hypergolic liquids) or without a propelling charge

G Pyrotechnic substance, or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tearor smoke-producing substance (other than a water-activated article or one which contains white phosphorus, phosphides, a pyrophoric substance, a flammable liquid or gel or hypergolic liquids)

H Article containing both an explosive substance and white phosphorus

J Article containing both an explosive substance and an inflammable liquid or gel

K Article containing both an explosive substance and a toxic chemical agent

L Explosive substance or article containing an explosive substance and presenting a special risk (e.g. due to water activation or the presence of hypergolic liquids, phosphides or a pyrophoric substance) necessitating isolation of each type

N Articles containing only extremely insensitive detonating substances

S Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prevent fire-fighting or other emergency response efforts in the immediate vicinity of the package.

Note: 1. Each substance or article, packed in a specified packaging, may be assigned to one compatibility group only. Since the criterion of compatibility group S is empirical, assignment to this group is necessarily linked to the tests for assignment of a classification code.

2. Articles of compatibility groups D or E may be fitted or packed together with their own means of initiation provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such packages shall be assigned to compatibility groups D or E.

3. Articles of compatibility groups D or E may be packed together with their own means of initiation, which do not have two effective protective features (i.e. means of initiation assigned to compatibility group B), provided that they comply with the requirements of marginal 2104 (6). Such packages shall be assigned to compatibility groups D or E.

4. Articles may be fitted or packed together with their own means of ignition provided that the means of ignition cannot function during normal conditions of carriage.

5. Articles of compatibility groups C, D and E may be packed together. Such packages shall be assigned to compatibility group E.

(8) Substances of compatibility group A and articles of compatibility group K, in accordance with paragraph (7), shall not be accepted for carriage.

(9) For the purposes of the requirements of this Class and by derogation from marginal 3510 (3), the term 'package' shall also include an unpackaged article in so far as that article is accepted for carriage unpackaged.

2101 The substances and articles of Class 1 to be accepted for carriage are listed in Table 1 below. Explosive substances and articles listed in marginal 3170 can be assigned to the various names in marginal 2101 only if their properties, composition, construction and anticipated use correspond to one of the descriptions contained in Appendix A.1.

TABLE 1

List of substances and articles

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
1°	Articles classified as 1.1 B			
	0029 Detonators, non-electric for blasting	1.1 B	E 105	21, 22, 24
	0030 Detonators, electric for blasting	1.1 B	E 104	—
	0073 Detonators for ammunition	1.1 B	E 128	23, 36
	0106 Fuzes-detonating	1.1 B	E 137	38, 56
	0225 Boosters with detonators	1.1 B	E 108	23
	0360 Detonator assemblies, non-electric, for blasting	1.1 B	E 105 A	—
	0377 Primers, cap-type	1.1 B	E 142	41
	0461 Components, explosive train, n.o.s. (2)	1.1 B	E 103	—
2°	Substances classified as 1.1 C			
	0160 Powder, smokeless	1.1 C	E 22	8, 9, 10
	0433 Powder cake (powder paste), wetted, with not less than 17 % alcohol by mass	1.1 C	E 103	—
	0474 Substances, explosive, n.o.s. (2)	1.1 C	E 103	—
	0497 Propellant, liquid	1.1 C	E 159 a) E 159 b)	58 59
	Note: Unless it can be demonstrated by testing that its sensitivity when frozen is no greater than when liquid, the propellant shall remain liquid during normal conditions of transport and not freeze at temperatures above – 15 °C.			
	0498 Propellant, solid	1.1 C	E 22	8, 9, 10
3°	Articles classified as 1.1 C			
	0271 Charges, propelling	1.1 C	E 158	8,10
	0279 Charges, propelling for cannon	1.1 C	E 119	—
	0280 Rocket motors	1.1 C	E 146	—
	0326 Cartridges for weapons, blank	1.1 C	E 112	13
	0462 Articles, explosive, n.o.s. (2)	1.1 C	E 103	—
4°	Substances classified as 1.1 D			
	0004 Ammonium picrate, dry or wetted with less than 10 % water by mass	1.1 D	E 2	1, 2
	0027 Black powder (gunpowder) granular or as a meal	1.1 D	E 4	—
	0028 Black powder (gunpowder), compressed, or *black powder, (gunpowder),* in pellets	1.1 D	E 5	—

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.
(2) Carriage only with the approval of the competent authority [see marginal 2100 (3)].

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
4°	*0072 Cyclotrimethylenetrinitramine (cyclonite, hexogen, RDX), wetted* with not less than 15 % water by mass	1.1 D	E 6 a)	—
	0075 Diethyleneglycol dinitrate, desensitized with not less than 25 % non-volatile water-insoluble phlegmatizer by mass	1.1 D	E 103	—
	0076 Dinitrophenol, dry or wetted with less than 15 % water by mass	1.1 D	E 2	1, 2
	0078 Dinitroresorcinol, dry or wetted with less than 15 % water by mass	1.1 D	E 2	1, 2
	0079 Hexanitrodiphenylamine (dipicrylamine, hexyl)	1.1 D	E 11	—
	0081 Explosive, blasting, type A *Note:* Substances containing more than 40 % liquid nitric esters must satisfy the exudation test specified in Appendix A.1, marginal 3101 (4)	1.1 D	E 8	—
	0082 Explosive, blasting, type B	1.1 D	E 8	—
	0083 Explosive, blasting, type C	1.1 D	E 10	—
	0084 Explosive, blasting, type D	1.1 D	E 11	—
	0118 Hexolite (hexotol), dry or wetted with less than 15 % water by mass	1.1 D	E 13	—
	0133 Mannitol hexanitrate (nitromannite), wetted with not less than 40 % water by mass, or a mixture of alcohol and water	1.1 D	E 14	—
	0143 Nitroglycerine, desensitized with not less than 40 % non-volatile water-soluble phlegmatizer by mass	1.1 D	E 103	—
	0144 Nitroglycerine solution in alcohol, with more than 1 % but not more than 10 % nitroglycerine *Note:* 3064 nitroglycerine, solution in alcohol with more than 1 % but not more than 5 % nitroglycerine, carried under special conditions of packing, is a substance of Class 3 (see marginal 2301, 6°)	1.1 D	E 17	47
	0146 Nitrostarch, dry or wetted with less than 20 % water by mass,	1.1 D	E 19	7
	0147 Nitro-urea	1.1 D	E 2	1
	0150 Pentaerythrte tetranitrate, (pentaerythritol tetranitrate, PETN), wetted with not less than 25 % water by mass, or *desensitized* with not less than 15 % phlegmatizer by mass	1.1 D	E 6	—
	0151 Pentolite, dry or wetted with less than 15 % water by mass	1.1 D	E 13	—
	0153 Trinitroaniline (picramide)	1.1 D	E 2	1
	0154 Trinitrophenol (picric acid), dry or wetted with less than 30 % water by mass	1.1 D	E 2	1, 2
	0155 Trinitrochloorbenzene (picryl chloride)	1.1 D	E 2	1
	0207 Tetranitroaniline	1.1 D	E 2	1
	0208 Trinitrophenylmethylnitramine (tetryl)	1.1 D	E 11	—
	0209 Trinitrotoluene (tolite, TNT), dry or wetted with less than 30 % water by mass	1.1 D	E 26	53
	0213 Trinitranisole	1.1 D	E 2	1
	0214 Trinitrobenzene, dry or wetted with less than 30 % water by mass	1.1 D	E 2	1

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
4°	*0215 Trinitrobenzoic acid,* dry or wetted with less than 30 % water, by mass	1.1 D	E 11	—
	0216 Trinitro-m-cresol	1.1 D	E 2	1, 2
	0217 Trinitronaphthalene	1.1 D	E 2	1
	0218 Trinitrophenetole	1.1 D	E 2	1
	0219 Trinitroresorcinol (styphnic acid), dry or wetted with less than 20 % water by mass (or mixture of alcohol and water)	1.1 D	E 2	1, 2
	0220 Urea nitrate, dry or wetted with less than 20 % water by mass	1.1 D	E 2	1
	0222 Ammonium nitrate containing more than 0,2 % combustible substances, including any organic substance calculated as carbon, to the exclusion or any other added substance	1.1 D	E 1	—
	0223 Ammonium nitrate fertilizer, which is more liable to explode than ammonium nitrate with 0,2 % combustible substances, including any organic substance calculated as carbon, to the exclusion of any other substance	1.1 D	E 1	—
	0226 Cyclotetramethylenetetranitramine, (HMX, octogen), wetted with not less than 15 % water by mass	1.1 D	E 6 a)	—
	0241 Explosive, blasting, type E	1.1 D	E 8	—
	0266 Octolite (Octol), dry or wetted with less than 15 % water by mass	1.1 D	E 13	—
	0282 Nitroguanidine (picrite), dry or wetted with less than 20 % water by mass	1.1 D	E 18	—
	0340 Nitrocellulose, dry or wetted with less than 25 % water (or alcohol) by mass	1.1 D	E 103	—
	0341 Nitrocellulose, unmodified or plasticized with less than 18 % plasticizing substance by mass	1.1 D	E 103	—
	0385 5-Nitrobenzotriazol	1.1 D	E 2	1
	0386 Trinitrobenzensulphonic acid	1.1 D	E 2	1, 2
	0387 Trinitrofluorenone	1.1 D	E 2	1
	0388 Trinitrotoluene (TNT) and trinitrobenzene mixtures or *trinitrotoluene (TNT) and hexanitrostilbene mixtures*	1.1 D	E 2	1
	0389 Trinitrotoluene (TNT) mixtures containing trinitrobenzene and hexanitrostilbene	1.1 D	E 2	1
	0390 Tritonal	1.1 D	E 2	1
	0391 Cyclotrimethylenetrinitramine (cyclonite, hexogen, RDX) and cyclotetramethylenetetranitramine (HMX, octogen) mixtures wetted with not less than 15 % water by mass, or *cyclotrimethylenetrinitramine (cyclonite, hexogeen, RDX) and cyclotetramethylenetetra-nitramine (HMX, octogen) mixtures desensitized* with not less than 10 % phlegmatizer by mass	1.1 D	E 6	—
	0392 Hexanitrostilbene	1.1 D	E 11	—
	0393 Hexotonal, cast	1.1 D	E 13	—
	0394 Trinitroresorcinol (styphnic acid), wetted with not less than 20 % water by mass (or mixture of water and alcohol)	1.1 D	E 24	2
	0401 Dipicryl sulphide dry or wetted with less than 10 % water by mass	1.1 D	E 2	1

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
4°	*0402 Ammonium perchlorate* *Note:* Classification of this substance shall be in accordance with the results of the tests under Appendix 1.1. Depending on the particle size and the packaging of the substance, see also Class 5.1 [marginal 2501, 12°b)]	1.1 D	E 2	1
	0411 Pentaerythrite tetranitrate (Pentaerythritol tetranitrate; PETN) with not less than 7 % wax, by mass	1.1 D	E 22 a)	11
	0475 Substances, explosive, n.o.s. (2)	1.1 D	E 103	—
	0483 Cyclotrimethylenetrinitramine (cyclonite, hexogen, RDX) desensitized	1.1 D	E 6	—
	0484 Cyclotetramethylenetetranitramine (octogen, HMX) desensitized	1.1 D	E 6	—
	0489 Dinitroglycoluril (DINGU)	1.1 D	E 2	1
	0490 Nitrotriazolone (NTO)	1.1 D	E 2	1
	0496 Octonal	1.1 D	E 13	—
5°	Articles classified as 1.1 D			
	0034 Bombs with bursting charge	1.1 D	E 106	49
	0038 Bombs, photoflash	1.1 D	E 106	49
	0042 Boosters, without detonator	1.1 D	E 107 a)	57
			E 107 b)	—
	0043 Bursters, explosive	1.1 D	E 109	28
	0048 Charges demolition	1.1 D	E 117	57
	0056 Charges, depth	1.1 D	E 106	49
	0059 Charges, shaped, commercial, without detonator	1.1 D	E 120	30, 31
	0060 Charges, supplementary, explosive	1.1 D	E 122	—
	0065 Cord, detonating flexible	1.1 D	E 124	33
	0099 Fracturing devices, explosive, without detonator, for oil wells	1.1 D	E 134	—
	0124 Jet perforating guns, charged, oil well, without detonator	1.1 D	E 140	—
	0137 Mines with bursting charge	1.1 D	E 106	49
	0168 Projectiles with bursting charge	1.1 D	E 106	49
	0221 Warheads, torpedo, with bursting charge	1.1 D	E 106	49
	0284 Grenades, hand or rifle, with bursting charge	1.1 D	E 138	—
	0286 Warheads, rocket, with bursting charge	1.1 D	E 106	49
	0288 Charges, shaped, flexible, linear	1.1 D	E 121	32, 57
	0290 Cord (fuse), detonating, metal clad	1.1 D	E 125	34
	0374 Sounding devices, explosive	1.1 D	E 153	46
	0408 Fuzes, detonating, with protective features	1.1 D	E 137	38
	0442 Charges, explosive, commercial without detonator	1.1 D	E 156	—
	0451 Torpedoes with bursting charge	1.1 D	E 146	—
	0457 Charges, bursting, plastics bonded	1.1 D	E 157	—
	0463 Articles, explosive, n.o.s. (2)	1.1 D	E 103	—

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
6°	Articles classified as 1.1 E			
	0006 Cartridges for weapons, with bursting charge	1.1 E	E 112	13
	0181 Rockets with bursting charge	1.1 E	E 146	—
	0329 Torpedoes with bursting charge	1.1 E	E 146	—
	0464 Articles, explosive, n.o.s. (2)	1.1 E	E 103	—
7°	Articles classified as 1.1 F			
	0005 Cartridges for weapons with bursting charge	1.1 F	E 112	13
	0033 Bombs with bursting charge	1.1 F	E 106	49
	0037 Bombs, photoflash	1.1 F	E 106	49
	0136 Mines with bursting charge	1.1 F	E 106	49
	0167 Projectiles with bursting charge	1.1 F	E 106	49
	0180 Rockets with bursting charge	1.1 F	E 146	—
	0292 Grenades, hand or rifle, with bursting charge	1.1 F	E 138	—
	0296 Sounding devices, explosive	1.1 F	E 153	46
	0330 Torpedoes with bursting charge	1.1 F	E 146	—
	0369 Warheads, rocket, with bursting charge	1.1 F	E 106	49
	0465 Articles, explosive, n.o.s. (2)	1.1 F	E 103	—
8°	Substances classified 1.1 G			
	0094 Flash powder	1.1 G	E 20	E 55
	0476 Substances, explosive, n.o.s. (2)	1.1 G	E 103	—
9°	Articles classified 1.1 G			
	0049 Cartridges, flash	1.1 G	E 115	—
	0121 Igniters	1.1 G	E 139	28
	0192 Signals, railway track, explosive	1.1 G	E 151	43, 44, 45
	0194 Signals, distress, ship	1.1 G	E 150	12
	0196 Signals, smoke	1.1 G	E 150	12
	0333 Fireworks	1.1 G	E 129	37
	0418 Flares, surface	1.1 G	E 133	—
	0420 Flares, aerial	1.1 G	E 133	—
	0428 Articles, pyrotechnic technical purposes	1.1 G	E 109	28
10°	Articles classified 1.1 J			
	0397 Rockets, liquid fuelled, with bursting charge	1.1 J	E 103	—
	0399 Bombs with flammable liquid, with bursting charge	1.1 J	E 103	—
	0449 Torpedoes, liquid fuelled, with or without bursting charge	1.1 J	E 146	—

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
11°	Substances classified as 1.1 L			
	0357 Substances, explosive, n.o.s. (2)	1.1 L	E 103	—
12°	Articles classified 1.1 L			
	0354 Articles, explosive, n.o.s. (2)	1.1 L	E 103	—
13°	Articles classified 1.2 B			
	0107 Fuzes, detonating	1.2 B	E 137	38, 56
	0268 Boosters, with detonator	1.2 B	E 108	23
	0364 Detonators, for ammunition	1.2 B	E 128	23, 26
	0382 Components, explosive train, n.o.s. (2)	1.2 B	E 103	-
14°	Substances classified as 1.2 C			
	(reserved)	1.2 C		
15°	Articles classified as 1.2 C			
	0281 Rocket motors	1.2 C	E 146	—
	0328 Cartridges for weapons, inert projectile	1.2 C	E 112	13
	0381 Cartridges, power device	1.2 C	E 114	—
	0413 Cartridges for weapons, blank	1.2 C	E 112	13
	0414 Charges, propelling, for cannon	1.2 C	E 119	—
	0415 Charges, propelling	1.2 C	E 158	8,10
	0436 Rockets with expelling charge	1.2 C	E 146	—
	0466 Articles, explosive, n.o.s. (2)	1.2 C	E 103	—
16°	Substances classified as 1.2 D			
	(reserved)	1.2 D		
17°	Articles classified as 1.2 D			
	0035 Bombs with bursting charge	1.2 D	E 106	49
	0102 Cord, (fuse), detonating, metal clad	1.2 D	E 125	34
	0138 Mines with bursting charge	1.2 D	E 106	49
	0169 Projectiles with bursting charge	1.2 D	E 106	49
	0283 Boosters without detonator	1.2 D	E 107 a) E 107 b)	57
	0285 Grenades, hand or rifle, with bursting charge	1.2 D	E 138	—
	0287 Warheads, rocket, with bursting charge	1.2 D	E 106	49
	0346 Projectiles with burster or expelling charge	1.2 D	E 106	49
	0375 Sounding devices, explosive	1.2 D	E 153	46
	0409 Fuzes, detonating with protective features	1.2 D	E 137	38
	0439 Charges, shaped, commercial without detonator	1.2 D	E 120	30, 31
	0443 Charges, explosive, commercial without detonator	1.2 D	E 156	—
	0458 Charges, bursting, plastics, bonded	1.2 D	E 157	—
	0467 Articles, explosive, n.o.s. (2)	1.2 D	E 103	—

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
18°	Articles classified as 1.2 E			
	0182 Rockets with bursting charge	1.2 E	E 146	—
	0321 Cartridges for weapons with bursting charge	1.2 E	E 112	13
	0468 Articles, explosive, n.o.s. (2)	1.2 E	E 103	—
19°	Articles classified as 1.2 F			
	0007 Cartridges for weapons, with bursting charge	1.2 F	E 112	13
	0204 Sounding devices, explosive	1.2 F	E 153	46
	0291 Bombs with bursting charge	1.2 F	E 106	49
	0293 Grenades hand or rifle, with bursting charge	1.2 F	E 138	—
	0294 Mines with bursting charge	1.2 F	E 106	49
	0295 Rockets with bursting charge	1.2 F	E 146	—
	0324 Projectiles with bursting charge	1.2 F	E 106	49
	0426 Projectiles with burster or expelling charge	1.2 F	E 106	49
	0469 Articles, explosive, n.o.s. (2)	1.2 F	E 103	—
20°	Substances classified as 1.2 G			
	(reserved)	1.2 G		
21°	Articles classified as 1.2 G			
	0009 Ammunition, incendiary with or without burster, expelling charge or propelling charge	1.2 G	E 102	13, 48, 49
	0015 Ammunition, smoke with or without burster, expelling charge or propelling charge propulsive	1.2 G	E 102	13, 48, 49
	0018 Ammunition, tear-producing with burster, expelling charge or propelling charge	1.2 G	E 102	13, 48, 49
	0039 Bombs, photoflash	1.2 G	E 106	49
	0171 Ammunition, illuminating with or without burster, expelling charge or propelling charge	1.2 G	E 102	13, 48, 49
	0238 Rockets, line-throwing	1.2 G	E 147	—
	0313 Signals, smoke	1.2 G	E 150	12
	0314 Igniters	1.2 G	E 139	—
	0334 Fireworks	1.2 G	E 130	37
	0372 Grenades, practice, hand or rifle	1.2 G	E 138	—
	0419 Flares, surface	1.2 G	E 133	—
	0421 Flares, aerial	1.2 G	E 133	—
	0429 Articles, pyrotechnic for technical purposes	1.2 G	E 109	28
	0434 Projectiles with burster or expelling charge	1.2 G	E 106	—
22°	Articles classified as 1.2 H			
	0243 Ammunition, incendiary, white phosphorus, with burster, expelling charge or propelling charge	1.2 H	E 102	13, 48, 49
	0245 Ammunition, smoke, white phosphorus, with burster, expelling charge or propelling charge	1.2 H	E 102	13, 48, 49

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
23°	Articles classified as 1.2 J			
	0395 *Rocket motors, liquid fuelled*	1.2 J	E 103	—
	0398 *Rockets, liquid fuelled* with bursting charge	1.2 J	E 103	—
	0400 *Bombs with flammable liquid,* with bursting charge	1.2 J	E 103	—
24°	Substances classified as 1.2 L			
	0358 *Substances, explosive, n.o.s.* (2)	1.2 L	E 103	—
25°	Objects classified as 1.2 L			
	0248 *Contrivances, water-activated* with burster, expelling charge or propelling charge	1.2 L	E 123	35, 49
	0322 Rocket motors with hypergolic liquids with or without expelling charge	1.2 L	E 149	42, 50
	0355 *Articles, explosive, n.o.s.* (2)	1.2 L	E 103	—
	0380 *Articles, pyrophoric*	1.2 L	E 103	—
26°	Substances classified as 1.3 C			
	0077 *Dinitrophenolates* of all alkali metals, dry or wetted with less than 15 % water by mass	1.3 C	E 21	1, 2
	0132 *Deflagrating metal salts of aromatic nitro-derivatives, n.o.s.* (2)	1.3 C	E 2	1, 2
	0158 *Potassium salts of aromatic nitro-derivatives,* explosive	1.3 C	E 21	2
	0159 *Powder-cake (powder paste), wetted* with not less than 25 % water by mass	1.3 C	E 19	7
	0161 *Powder, smokeless*	1.3 C	E 22	8, 9, 10
	0203 *Sodium salts of aromatic nitro-derivatives, n.o.s.,* explosive (2)	1.3 C	E 21	2
	0234 *Sodium dinitro-o-cresolate,* dry or wetted with less than 15 % water by mass	1.3 C	E 2	1, 2
	0235 *Sodium picramate,* dry or wetted with less than 20 % water by mass	1.3 C	E 2	1, 2
	0236 *Zirconium picramate,* dry or wetted with less than 20 % water by mass	1.3 C	E 2	1, 2
	0342 *Nitrocellulose, wetted* with not less than 25 % alcohol by mass	1.3 C	E 15	—
	Note: For nitrocellulose with not less than 25 % alcohol by mass and with a nitrogen content of not more than 12,6 % by mass of the nitrocellulose, under special packing conditions, see Class 4.1 [marginal 2401, 7°]			

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
26°	*0343 Nitrocellulose, plasticized* with not less than 18 % plasticizer by mass	1.3 C	E 15	—
	Note: For nitrocellulose with not more than 12.6 % nitrogen by dry mass with plasticizer, under special conditions of packing, see Class 4.1 [marginal 2401, 24°a)]			
	0406 Dinitrosobenzene	1.3 C	E 25	—
	0477 Substances, explosive, n.o.s. (2)	1.3 C	E 103	—
	0495 Propellant, liquid	1.3 C	E 159 a) E 159 b)	58 59
	Note: Unless it can be demonstrated by testing that its sensitivity when frozen is not greater than when liquid, the propellant shall remain liquid during normal conditions of transport and not freeze at temperatures above – 15 °C.			
	0499 Propellant, solid	1.3 C	E 22	8, 9, 10
27°	Articles classified as 1.3 C			
	0183 Rockets with inert head	1.3 C	E 146	—
	0186 Rocket motors	1.3 C	E 146	—
	0242 Charges, propelling, for cannon	1.3 C	E 119	—
	0272 Charges, propelling	1.3 C	E 158	8,10
	0275 Cartridges, power device	1.3 C	E 114	—
	0277 Cartridges oil well	1.3 C	E 113	—
	0327 Cartridges for weapons, blank or *cartridges, small arms, blank*	1.3 C	E 112	13
	0417 Cartridges for weapons, inert projectile or *cartridges, small arms*	1.3 C	E 112	13
	0437 Rockets with expelling charge	1.3 C	E 146	—
	0447 Cases, combustible, empty, without primer	1.3 C	E 146	—
	0470 Articles, explosive, n.o.s. (2)	1.3 C	E 103	—
28°	Articles classified as 1.3 F			
	(reserved)	1.3 F		
29°	Substances classified as 1.3 G			
	0305 Flash powder	1.3 G	E 20	55
	0478 Substances, explosive, n.o.s. (2)	1.3 G	E 103	—
30°	Articles classified as 1.3 G			
	0010 Ammunition, incendiary with or without burster, expelling charge or propelling charge	1.3 G	E 102	13, 48, 49
	0016 Ammunition, tear-producing with burster, expelling charge or propelling charge	1.3 G	E 102	13, 48, 49

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2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
30°	*0019 Ammunition, tear-producing* with burster, expelling charge or propelling charge	1.3 G	E 102	13, 48, 49
	0050 Cartridges, flash	1.3 G	E 115	—
	0054 Cartridges, signal	1.3 G	E 115	—
	0092 Flares, surface	1.3 G	E 133	—
	0093 Flares, aerial	1.3 G	E 133	—
	0101 Fuse, instantaneous, non-detonating (quick-match)	1.3 G	E 135	—
	0195 Signals, distress, ship	1.3 G	E 150	12
	0212 Tracers for ammunition	1.3 G	E 156	—
	0240 Rockets, line-throwing	1.3 G	E 147	—
	0254 Ammunition, illuminating, with or without burster, expelling charge or propelling charge	1.3 G	E 102	13, 48, 49
	0299 Bombs, photoflash	1.3 G	E 106	49
	0315 Igniters	1.3 G	E 139	—
	0316 Fuzes, igniting	1.3 G	E 137	38
	0318 Grenades, practice, hand or rifle	1.3 G	E 138	—
	0319 Primers, tubular	1.3 G	E 143	—
	0335 Fireworks	1.3 G	E 130	37
	0424 Projectiles, inert with tracer	1.3 G	E 106	49
	0430 Articles, pyrotechnic for technical purposes	1.3 G	E 134	—
	0487 Signals, smoke	1.3 G	E 150	12
	0488 Ammunition, practice	1.3 G	E 102	13, 48, 49
	0492 Signals, railway track, explosive	1.3 G	E 151	43, 44, 45
31°	Articles classified as 1.3 H			
	0244 Ammunition, incendiary, white phosphorus with burster, expelling charge or propelling charge	1.3 H	E 102	13, 48, 49
	0246 Ammunition, smoke, white phosphorus with burster, expelling charge or propelling charge	1.3 H	E 102	13, 48, 49
32°	Articles classified as 1.3 J			
	0247 Ammunition, incendiary, liquid or gel, with burster, expelling charge or propelling charge	1.3 J	E 102	13, 48, 49
	0396 Rocket motors, liquid fuelled	1.3 J	E 103	—
	0450 Torpedoes, liquid fuelled, with inert head	1.3 J	E 146	—
33°	Substances classified as 1.3 L			
	0359 Substances, explosive, n.o.s (2)	1.3 L	E 103	—
34°	Articles classified as 1.3 L			
	0249 Contrivances, water-activated with burster, expelling charge or propelling charge	1.3 L	E 123	35, 49
	0250 Rocket motors with hypergolic liquids, with or without expelling charge	1.3 L	E 149	42, 50
	0356 Articles, explosive, n.o.s. (2)	1.3 L	E 103	—

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Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
35°	Articles classified as 1.4 B			
	0255 Detonators, electric, for blasting	1.4 B	E 104	—
	0257 Fuzes, detonating	1.4 B	E 137	38
	0267 Detonators, non-eletric, for blasting	1.4 B	E 105	21, 22, 24
	0350 Articles, explosive, n.o.s. (2)	1.4 B	E 103	—
	0361 Detonator assemblies, non-electric, for blasting	1.4 B	E 105 A	—
	0365 Detonators for ammunition	1.4 B	E 128	23, 36
	0378 Primers, cap type	1.4 B	E 142	41
	0383 Components, explosive train, n.o.s. (2)	1.4 B	E 103	—
36°	Substances classified as 1.4 C			
	0407 Tetrazol-1-acetic acid	1.4 C	E 25	—
	0448 5-Mercaptotetrazol-1-acetic acid	1.4 C	E 25	—
	0479 Substances, explosive, n.o.s. (2)	1.4 C	E 103	—
37°	Articles classified as 1.4 C			
	0276 Cartridges, power device	1.4 C	E 114	—
	0278 Cartridges, oil well	1.4 C	E 113	—
	0338 Cartridges for weapons, blank or *cartridges, small arms, blank*	1.4 C	E 112	13
	0339 Cartridges for weapons, inert projectile or *cartridges, small arms*	1.4 C	E 112	13
	0351 Articles, explosive, n.o.s. (2)	1.4 C	E 103	—
	0379 Cases, cartridge, empty with primer	1.4 C	E 116	—
	0438 Rockets with expelling charge	1.4 C	E 146	—
	0446 Cases, combustible, empty, without primer	1.4 C	E 116	—
	0491 Charges propelling	1.4 C	E 158	8, 10
38°	Substances classified as 1.4 D			
	0480 Substances, explosive, n.o.s. (2)	1.4 D	E 103	—
39°	Articles classified as 1.4 D			
	0104 Cord (fuse), detonating, mild effect, metal clad	1.4 D	E 125	34
	0237 Charges, shaped, flexible, linear	1.4 D	E 121	32, 57
	0289 Cord, detonating, flexible	1.4 D	E 124	33
	0344 Projectiles with bursting charge	1.4 D	E 106	49
	0347 Projectiles with burster or expelling charge	1.4 D	E 106	49
	0352 Articles, explosive, n.o.s. (2)	1.4 D	E 103	—
	0370 Warheads, rocket, with burster or expelling charge	1.4 D	E 106	49
	0410 Fuzes, detonating, with protective features	1.4 D	E 137	38
	0440 Charges, shaped, commercial, without detonator	1.4 D	E 120	30, 31
	0444 Charges, explosive, commercial without detonator	1.4 D	E 156	—
	0459 Charges, bursting, plastics bonded	1.4 D	E 157	—
	0494 Jet perforating guns, charged oil well, without detonator	1.4 D	E 140	—

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Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
40°	Articles classified as 1.4 E			
	0412 Cartridges for weapons, with bursting charge	1.4 E	E 112	13
	0471 Articles, explosive, n.o.s. (2)	1.4 E	E 103	—
41°	Articles classified as 1.4 F			
	0348 Cartridges for weapons, with bursting charge	1.4 F	E 112	13
	0371 Warheads, rocket, with burster or expelling charge	1.4 F	E 106	49
	0427 Projectiles, with burster or expelling charge	1.4 F	E 106	49
	0472 Articles, explosive, n.o.s. (2)	1.4 F	E 103	—
42°	Substances classified as 1.4 G			
	0485 Substances, explosive, n.o.s. (2)	1.4 G	E 103	—
43°	Articles classified as 1.4 G			
	0066 Cord, igniter	1.4 G	E 126	—
	0103 Fuse, igniter, tubular, metal clad	1.4 G	E 135	—
	0191 Signal devices, hand	1.4 G	E 150	12
	0197 Signals, smoke	1.4 G	E 150	12
	0297 Ammunition, illuminating, with or without burster, expelling charge or propelling charge	1.4 G	E 102	13, 48, 49
	0300 Ammunition, incendiary with or without burster, expelling charge or propelling charge	1.4 G	E 102	13, 48, 49
	0301 Ammunition, tear-producing, with burster, expelling charge or propelling charge	1.4 G	E 102	13, 48, 49
	0303 Ammunition, smoke with or without burster, expelling charge or propelling charge propulsive	1.4 G	E 102	13, 48, 49
	0306 Tracers for ammunition	1.4 G	E 156	—
	0312 Cartridges, signal	1.4 G	E 115	—
	0317 Fuzes, igniting	1.4 G	E 137	38
	0320 Primers, tubular	1.4 G	E 143	—
	0325 Igniters	1.4 G	E 141	—
	0336 Fireworks	1.4 G	E 130	37
	0353 Articles, explosive, n.o.s. (2)	1.4 G	E 103	—
	0362 Ammunition, practice	1.4 G	E 102	13, 48, 49
	0363 Ammunition, proof	1.4 G	E 102	13, 48, 49
	0403 Flares, aerial	1.4 G	E 133	—
	0425 Projectiles, inert with tracer	1.4 G	E 106	49
	0431 Articles, pyrotechnic for technical purposes	1.4 G	E 134	—
	0435 Projectiles with burster or expelling charge	1.4 G	E 106	—
	0452 Grenades, practice, hand or rifle	1.4 G	E 138	—
	0453 Rockets, line throwing	1.4 G	E 147	—
	0493 Signals, railway track, explosive	1.4 G	E 151	43, 44, 45

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.
(2) Carriage only with the approval of the competent authority [see marginal 2100 (3)].

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
44°	Substancces classified as 1.4 L			
	(reserved)	1.4 L		
45°	Articles classified as 1.4 L			
	(reserved)	1.4 L		
46°	Substances classified as 1.4 S			
	0481 Substances, explosive, n.o.s. (2)	1.4 S	E 103	—
47°	Articles classified as 1.4 S			
	0012 Cartridges for weapons, inert projectile or *cartridges, small arms*	1.4 S	E 112	13
	0014 Cartridges for weapons, blank or *cartridges, small arms, blank*	1.4 S	E 112	13
	0044 Primers, cap type	1.4 S	E 142	41
	0055 Cases, cartridge, empty, with primer	1.4 S	E 116	—
	0070 Cutters, cable, explosive	1.4 S	E 127	—
	0105 Fuse, safety	1.4 S	E 136	32, 49
	0110 Grenades, practice, hand or rifle	1.4 S	E 138	—
	0131 Lighters, fuse	1.4 S	E 141	—
	0173 Release devices, explosive	1.4 S	E 145	—
	0174 Rivets, explosive	1.4 S	E 145	—
	0193 Signals, railway track, explosive	1.4 S	E 151	43, 44, 45
	0323 Cartridges, power device	1.4 S	E 114	—
	0337 Fireworks	1.4 S	E 103	—
	0345 Projectiles, inert, with tracer	1.4 S	E 109	49
	0349 Articles, explosive, n.o.s. (2)	1.4 S	E 103	—
	0366 Detonators for ammunition	1.4 S	E 128	23, 36
	0367 Fuzes, detonating	1.4 S	E 137	38
	0368 Fuzes, igniting	1.4 S	E 137	38
	0373 Signal devices, hand	1.4 S	E 150	12
	0376 Primers, tubular	1.4 S	E 143	—
	0384 Components, explosive train, n.o.s. (2)	1.4 S	E 103	—
	0404 Flares, aerial	1.4 S	E 133	—
	0405 Cartridges, signal	1.4 S	E 115	—
	0432 Articles, pyrotechnic for technical purposes	1.4 S	E 134	—
	0441 Charges, shaped, commercial, without detonator	1.4 S	E 120	30, 31
	0445 Charges, explosive, commercial, without detonator	1.4 S	E 156	—
	0454 Igniters	1.4 S	E 141	—
	0455 Detonators, electric for blasting	1.4 S	E 105	21, 22, 24
	0456 Detonators, electric for blasting	1.4 S	E 104	—
	0460 Charges, bursting, plastics bonded	1.4 S	E 157	—

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.
(2) Carriage only with the approval of the competent authority [see marginal 2100 (3)].

2101 *(cont'd)*

Item	Identification number and name of the substance or article (1)	Classification code in accordance with marg. 2100 (6) and (7)	Packing	
			Packing methods [see marg. 2103 (6)]	Special packing requirements [see marg. 2103 (7)]
1	2	3	4	5
48°	Substances classified as 1.5 D			
	0331 Explosive, blasting, type B	1.5 D	E 8/9	—
	0332 Explosive blasting, type E	1.5 D	E 12	—
	0482 Substances, explosive, very insensitive, n.o.s. (Substances, EVI, n.o.s.) (2)	1.5 D	E 103	—
49°	Articles classified as 1.5 D			
	(reserved)	1.5 D		
50°	Articles classified as 1.6 N			
	0486 Articles, explosive, extremely insensitive (articles EEI)	1.6 N	E 106	49
51°	*Empty packagings,* uncleaned	—	—	—

(1) The identification numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.
(2) Carriage only with the approval of the competent authority [see marginal 2100 (3)].

2. Conditions of carriage

A. Packages

1. General conditions of packing

2102 (1) Outer packagings shall conform to the requirements of Appendix A.5.

(2) In accordance with the provisions of marginals 2100 (5) and 3511, packagings of packing group II or I, marked with the letter 'Y' or 'X' shall be used for substances and articles of Class 1.

(3) The requirements of marginal 3500 (2), shall apply to the parts of packagings which are in direct contact with the contents.

(4) Nails, staples and other closure devices made of metal having no protective coating shall not penetrate to the inside of the outer packaging unless the inner packaging adequately protects the explosive substances and articles against contact with the metal.

(5) The closure device of receptacles containing liquid explosives shall ensure a double protection against leakage.

(6) Inner packagings, fittings and cushioning materials and the positioning of explosive substances or articles in packages shall be such that no dangerous movement may occur within packages during carriage.

(7) Where significant internal pressure is likely to develop in receptacles, such receptacles shall be so constructed that detonation is not possible by reason of increase in internal pressure from internal or external causes.

(8) Cushioning materials shall be suited to the nature of the contents; in particular, they must be absorbent if the contents are liquid or might exude liquid.

2. Special conditions of packing

2103 (1) Substances and articles shall be packed as indicated in marginal 2101, Table 1, columns 4 and 5, and as set out in detail in paragraphs (5), Table 2 and (6), Table 3.

(2) If the body of steel drums is double-seamed, steps shall be taken to prevent the ingress of explosive substances into the recesses of the seams. The closure device of steel or aluminium drums shall include a suitable gasket. If the closure device includes a screw thread, the ingress of explosive substances into the screw thread shall not be possible.

(3) If metal-lined boxes are used for packing explosive substances, these boxes shall be made in such a way that the explosive substance carried cannot get between the liner and the sides or bottom of the box.

(4) Only hoops in hardwood shall be authorized for wooden barrels intended for the carriage of explosive substances.

(5) Plastics packagings shall not be liable to generate or accumulate sufficient static electricity that a discharge could cause the packaged explosive to ignite or the packaged article to function.

(6) TABLE 2

Packing methods

Note: For the packing methods to be used for the various substances and articles, see marginal 2101, Table 1, column 4.

Method	Inner packagings	Outer packagings
E 1 (a)	Not necessary	Bags paper, multiwall, water-resistant (5M2) textile, sift-proof (5L2) textile, water-resistant (5L3) woven plastics, sift-proof (5H2) woven plastics, water-resistant (5H3) plastics film (5H4)
(b)	Bags paper, kraft plastics Sheets plastics	Barrels wooden removable head (2C2) Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums steel, removable head (1A2)
E 2	Receptacles metal paper plastics Sheets plastics Bags paper, multiwall water resistant woven plastics	Barrels wooden removable head (2C2) Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) fibreboard (4G) Drums fibre (1G) steel, removable head (1A2) *Note:* In addition, for 0219 of 4° (Trinitroresorcinol) plastics drums, removable head (1H2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 4 (a)	Receptacles fibreboard metal paper plastics textile rubberized	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) natural wood, ordinary (4C1) steel (4A)
(b)		Drums aluminium, removable head (1B2) fibre (1G) steel, removable head (1A2), sift-proof
E 5	Bags plastics Sheets paper, kraft paper, waxed	Boxes fibreboard (4G) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F)
E 6 (a)	*Wetted substances* 1) Bags plastics textile, rubberized	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums steel, removable head (1A2) fibre (1G)
	2. Bags rubber textile textile, rubberized *Intermediate:* for (a)2 Bags rubber textile, rubberized plastics	Barrels wooden removable head (2C2) Drums steel, removable head (1A2) fibre (1G)
(b)	Desensitized substances Same as for wetted substances except that any fibreboard boxes may be used as inner packaging and any textile bags as intermediate packaging.	
E 8	Receptacles waterproof material Sheets waterproof	Barrels wooden removable head (2C2) Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 8		Drums fibre (1G) steel, removable head (1A2) aluminium, removable head (1B2)
E 9	Bags oil-resistant Sheets plastics Cans metal	Bags paper, multiwall, water-resistant (5M2) textile, sift-proof (5L2) textile, water-resistant (5L3) woven plastics, without inner lining or coating (5H1) woven plastics, water-resistant (5H3) woven plastics, sift-proof (5H2) plastics film (5H4) *Note:* If bags in woven plastics (5H2) or (5H3), or bags in plastics film (5H4), are used, no inner packaging is necessary. Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G) steel, removable head (1A2)
E 10	Bags paper, waxed plastics textile, rubberized Sheets paper, waxed plastics textile, rubberized	Barrels wooden removable head (2C2) Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F)
E 11	Bags paper, waxed plastics textile textile, rubberized Sheets paper, waxed plastics textile textile, rubberized	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
E 12	Bags oils-resistant Sheets plastics	Bags paper, multiwall, water-resistant (5M2) woven plastics, sift-proof (5H2) woven plastics, without inner lining or coating (5H1) woven plastics, water-resistant (5H3) plastics film (5H4) textile, sift-proof (5L2) textile, water-resistant (5L3)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 12		Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2) Drums fibre (1G) steel, removable head (1A2) aluminium, removable head (1B2) *Note:* If bags in woven plastics (5H2) or (5H3), or bags in plastics film (5H4) are used, no inner packaging is necessary.
E 13 (a)	*Wetted substances* Bags plastics woven plastics paper, multiwall, water-resistant Sheets plastics	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
(b)	*Dry substances* Bags paper plastics woven plastics paper, multiwall, water-resistant Boxes fibreboard Sheets Plastics	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
E 14	Bags rubber textile textile, rubberized *Intermediate* Bags rubber textile, rubberized	Barrels wooden removable head (2C2) Drums steel, removable head (1A2)
E 15 (a)	Not necessary	Drums aluminium, removable head (1B2) steel, removable head (1A2)
(b)	Bags paper, waterproof plastics textile, rubberized Sheets plastics textile, rubberized	Barrels wooden removable head (2C2) Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) fibreboard (4G) Drums fibre (1G)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 17	Cans metal Receptacles glass plastics	Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F)
E 18	Bags paper plastics Sheets plastics	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G) plywood (1D) steel, removable head (1A2)
E 19 (a)	Not necessary	Drums aluminium, removable head (1B2) steel, removable head (1A2) plastics, removable head (1H2)
(b)	Bags plastics Sheets plastics	Barrels wooden removable head (2C2) Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
E 20	Receptacles metal plastics wooden fibreboard	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
E 21	Boxes fibreboard Cans metal Receptacles paper, waterproof plastics, not liable to generate static electricity by contained substances	Boxes natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F)

2103 *(cont'd)*

Method		Inner packagings	Outer packagings
E 22	(a)	Bags paper, kraft plastics textile textile, rubberized	Barrels wooden removable head (2C2) Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) natural wood, sift-proof (4C2) steel (4A) Drums fibre (1G) plywood (1D)
	b)	Receptacles fibreboard metal plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) steel (4A)
	(c)	Not necessary	Drums steel, removable head (1A2) fibre (1G) plywood (1D) Jerricans steel, non-removable head (3A1) steel, removable head (3A2)
E 24	(a)	Bags rubber textile, rubberrized plastics	Boxes fibreboard (4G)
	(b)	Bags rubber textile, rubberized plastics *Intermediate:* for (b) Bags rubber textile, rubberized plastics	Drums steel, removable head (1A2)
E 25		Bags plastics	Drums fibre (1G) steel, removable head (1A2)
E 26		Receptacles metal paper plastics Sheets plastics Bags plastics	Barrels wooden removable head (2C2) Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G) Bags woven plastics, sift-proof (5H2) paper paper, multiwall, water-resistant

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 102	As specified by the competent authority in the country of origin	Boxes natural wood, ordinary (4C1) natural wood, ordinary (4C1), with liner aluminium (4B) expanded plastics (4H1) plastics, solid (4H2) steel (4A) plywood (4D) reconstituted wood (4F) fibreboard (4G) Drums steel, removable head (1A2) fibre (1G) aluminium, removable head (1B2)
E 103	As specified by the competent authority in the country of origin	
E 104	Receptacles fibreboard metal paper plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 105	Receptacles fibreboard metal plastics *Intermediate* Boxes fibreboard wooden	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 105A	Bags paper plastics Boxes fibreboard Receptacles fibreboard	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 106	Not necessary	Boxes plywood (4D) reconstituted wood (4F) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2) Drums steel, removable head (1A2)

2103 *(cont'd)*

Method		Inner packagings	Outer packagings
E 107	(a)	Boosters which are finished articles consisting of closed metal, plastics or fibreboard receptacles that contain a detonating explosive, or consisting of a plastics-bonded detonating explosive.	
		Not necessary	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B)
	(b)	Cast or pressed boosters in tubes or capsules without end closures.	
		Receptacles fibreboard metal plastics Sheets plastics paper	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B)
E 108		Dividing partitions in the outer packaging Receptacles metal plastics wooden	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 109		Receptacles metal plastics wooden paper fibreboard	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 112		Not necessary	Boxes fibreboard (4G) plywood (4D) reconstituted wood (4F) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2) Drums steel, removable head (1A2)
E 113		Receptacles fibreboard plastics metal	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) natural wood, with sift-proof walls (4C2) steel (4A)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 114	Receptacles fibreboard plastics wooden metal	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) natural wood, with sift-proof walls (4C2) Drums steel, removable head (1A2)
E 115	Receptacles fibreboard metal plastics wooden *Note:* For articles of 43°, No. 0312 and 47°, No. 0405, receptacles, paper, kraft may also be used	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) expanded plastics (4H1) plastics, solid (4H2)
E 116	Dividing partitions in the outer packaging Boxes fibreboard plastics wooden *Note:* For small cases, (cartridge), plastics or textile bags may also be used	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 117	Not necessary	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) fibreboard (4G)
E 119	Not necessary	Boxes natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B) fibreboard (4G) plastics, solid (4H2) Drums steel, removable head (1A2) aluminium, removable head (1B2) *Note:* For cased charges, boxes in natural wood, ordinary (4C1), may also be used.

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 120	Dividing partitions in the outer packaging Tubes fibreboard or equivalent material	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F)
E 121	Not necessary	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) Drums steel, removable head (1A2) aluminium, removable head (1B2)
E 122	Boxes fibreboard metal plastics wooden	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B)
E 123	Dividing partitions in the outer packaging Receptacles fibreboard metal plastics	Boxes natural wood, ordinary (4C1) with metal liner plywood (4D) with metal liner reconstituted wood (4F) with metal liner steel (4A) aluminium (4B) expanded plastics (4H1)
E 124	Reels Receptacles metal	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) aluminium (4B) Drums fibre (1G) steel, removable head (1A2) aluminium, removable head (1B2)
E 125	Bags plastics Reels Sheets paper, kraft plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B) Drums steel, removable head (1A2) aluminium, removable head (1B2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 126	Reels Receptacles fibreboard	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B) Drums steel, removable head (1A2) aluminium, removable head (1B2)
E 127	Receptacles fibreboard metal plastics	Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B) fibreboard (4G)
E 128	Boxes fitted with dividing partitions fibreboard plastics wooden Trays fitted with dividing partitions fibreboard plastics wooden Cans fitted with dividing partitions metal	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) fibreboard (4G)
E 129	Receptacles fibreboard plastics Sheets paper	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) Drums fibre (1G)
E 130	Receptacles fibreboard plastics metal Sheets paper	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) expanded plastics (4H1) Drums fibre (1G) plastics, removable head (1H2) steel, removable head (1A2) aluminium, removable head (1B2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 133	Dividing partitions in the outer packaging Receptacles metal plastics fibreboard Sheets paper, kraft	Boxes fibreboard (4G) plywood (4D) reconstituted wood (4F) natural wood, ordinary (4C1) steel (4A) plastics, solid (4H2) aluminium (4B) expanded plastics (4H1) Drums fibre (1G) plastics, removable head (1H2) steel, removable head (1A2) aluminium, removable head (1B2)
E 134	Receptacles fibreboard metal plastics wooden	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) Drums steel, removable head (1A2) aluminium, removable head (1B2)
E 135	Bags plastics Reels Sheets paper kraft plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F)
E 136	Not necessary	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) steel (4A) aluminium (4B) plastics, solid (4H2) Drums fibre (1G) steel, removable head (1A2) aluminium, removable head (1B2)
E 137	Dividing partitions in the outer packaging Receptacles fibreboard metal plastics wooden Trays plastics wooden	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) fibreboard (4G) plastics, solid (4H2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 138	As specified by the competent authority in the country of origin	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) plastics, solid (4H2)
E 139	Receptacles metal plastics wooden fibreboard	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) Drums steel, removable head (1A2)
E 140	Bags water-resistant	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 141	Receptacles fibreboard metal wooden Sheets paper Trays plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 142	Boxes fibreboard metal plastics wooden Cans metal Trays fibreboard plastics *Intermediate* (not necessary with inner boxes but mandatory with trays) Boxes fibreboard	Boxes natural wood, ordinary (4C1) steel (4A) fibreboard (4G) plywood (4D) reconstituted wood (4F) aluminium (4B)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 143	Boxes fibreboard metal wooden Tubes fibreboard Trays plastics	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 145	Receptacles fibreboard plastics wooden *Note:* For articles of 47°, No. 0174, metal receptacles may also be used	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 146	Not necessary	As specified by the competent authority in the country of origin
E 147	Receptacles fibreboard metal	Boxes plywood (4D) reconstituted wood (4F) fibreboard (4G) natural wood, ordinary (4C1) Drums fibre (1G)
E 149	As specified by the competent authority in the country of origin [1]	Boxes natural wood, ordinary (5C1) plywood (4D) reconstituted wood (4F) plastics, solid (4H2) steel (4A) aluminium (4B)
E 150	Boxes fibreboard metal Receptacles metal plastics Sheets paper, kraft	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) expanded plastics (4H1) plastics, solid (4H2) Drums fibre (1G) steel, removable head (1A2) aluminium, removable head (1B2) plastics, removable head (1H2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 151	Receptacles fibreboard metal plastics wooden	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B) Drums fibre (1G)
E 153	Sheets fibreboard corrugated Tubes fibreboard *Intermediate* Receptacles fibreboard metal plastics	Boxes natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 156	Dividing partitions in the outer packaging Bags plastics Boxes fibreboard Tubes fibreboard plastics metal	Boxes fibreboard (4G) natural wood, ordinary (4C1) steel (4A) plywood (4D) reconstituted wood (4F) aluminium (4B)
E 157	Not necessary	Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F) steel (4A) aluminium (4B)
E 158 (a)	Bags paper, kraft plastics textile textile, rubberized	Boxes fibreboard (4G) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) plastics solid (4H2) Drums steel, removable head (1A2) fibre (1G) plywood (1D)
(b)	Receptacles fibreboard metal plastics	Boxes fibreboard (4G) natural wood, ordinary (4C1) natural wood, sift-proof walls (4C2) plywood (4D) reconstituted wood (4F) plastics, solid (4H2)

2103 *(cont'd)*

Method	Inner packagings	Outer packagings
E 158 c)		Composites packagings Receptacles, plastics, in a box of solid plastics material (6HH2)
E 159 (a)	Receptacles plastics *Intermediate* Bags plastics in receptacles metal	Boxes natural wood, ordinary (4C1) plywood (4D) reconstituted wood (4F)
(b)	Receptacles plastics *Intermediate* Drums metal	Drums steel, removable head (1A2) aluminium, removable head (1B2)

(7) TABLE 3

Special packing requirements

Note: For the special packing requirements applicable to the various substances and articles, see marginal 2101, Table 1, column 5.

No.	Requirement
1	Water soluble substances must be packed in waterproof receptacles.
2	Packages must be lead free.
7	Metal drums must be so constructed that explosion is not possible by reason of increase in internal pressure from internal or external causes.
8	The inside of metal packagings shall be galvanized, painted or otherwise protected. Bare steel shall not come into contact with the propellant.
9	Drums or jerricans of steel must be made without pockets or crevices in which the substance could be trapped or nipped.
10	Metal receptacles must be so constructed that the risk of explosion, by reason of increase in internal pressure from internal or external causes, is reduced.
11	The inner packagings must be hermetically closed.
12	Outer boxes of natural wood must be provided with tin-plate liner having a hermetically closed lid.
13	Open ends of inner packagings must be fitted with padded end caps or the outer packaging must be padded.
21	Not more than 10 inner packagings may be packed in an intermediate packaging.
22	The inner or intermediate packagings must be separated from the outer packaging by a gap of at least 25 mm using spacers (battens) or cushioning material, e.g. sawdust.
23	The inner packagings must be separated from the outer packaging by a gap of not less than 25 mm filled with cushioning material, e.g. sawdust, wood wool.
24	Articles in metal inner packagings must be secured by cushioning material at both ends.

2103 *(cont'd)*

No.	Requirement
28	Metal inner packagings must be padded with cushioning material.
30	The shaped charges must be so packed that contact between them is prevented.
31	The conical cavities of the shaped charges must face inwards in pairs or groups to minimize the shaped charge (jetting) effect in the event of accidental initiation.
32	Unless the ends of the article are sealed, plastics bags shall be used as inner packaging.
33	The ends of the detonating cord must be sealed and tied fast.
34	The ends of the detonating cord must be sealed. Spaces must be filled with cushioning material.
35	Packagings should be sealed against the ingress of water.
36	The articles must be protected by cushioning to prevent any contact between them.
37	Venturis of rockets (fireworks) must be plugged and means of ignition fully protected.
38	The fuzes shall be separated from each other in the inner packaging.
41	The primers must be packed with shock absorbent layers of felt, paper or plastics to prevent propagation within the outer packaging.
42	The outer plastics packagings should be reinforced with metal at the corners and edges.
43	The articles must be separated to prevent contact between them and kept apart from the bottom, walls and lid of the outer packaging, e.g. by cushioning material.
44	Where the articles are contained in magazines for fitting into automatic units, the magazine may replace the inner packaging provided adequate cushioning material is used.
45	Tin-plate inner packagings must be sealed.
46	The articles must be wrapped singly in corrugated fibreboard sheets or inserted in fibreboard tubes.
47	Absorbent cushioning material must be inserted.
48	Large articles without propelling charge and without means of ignition or initiation may be carried unpacked.
49	Large articles without their means of initiation or with their means of initiation containing at least two effective protective features may be carried unpacked.
50	Large articles without their means of ignition may be carried unpacked.
51	Large articles may be carried unpacked.
53	Bags, woven plastics, sift-proof (5H2), may be used only for flake or prilled TNT in the dry state and with a maximum net mass of 30 kg per package.
55	Not more than 50 g of substance may be packed in an inner packaging.
56	Fibreboard boxes (4G) shall not be used as outer packaging.
57	Liner or inner coating required for metal outer packagings (e.g., 4A, 4B, 1A2, 1B2) unless another means such as the use of an inner packaging or cushioning material protects the explosive substance from contact with the metal outer packaging during normal conditions of transport.

2103 *(cont'd)*

No.	Requirement
58	Plastics receptacles shall have taped screw cap closures and be of not more than 5 litres capacity each. Each receptacle shall be contained within an intermediate packaging. Each plastics bag shall be surrounded on all sides with at least 50 mm of non-combustible absorbent cushioning material; metal cans in the outer box shall also be cushioned from each other in all directions. Net mass of propellant shall be limited to 30 kg for each package.
59	The intermediate drum shall be surrounded on all sides with at least 50 mm of non-combustible absorbent cushioning material. A composite packaging consisting of a plastics receptacle in a metal drum may be used instead of the inner and intermediate packagings. The net volume of propellant in each package shall not exceed 120 litres.

3. Mixed packing

2104 (1) Substances and articles covered by the same identification number [1], with the exception of substances and articles of Compatibility Group L and substances and articles assigned to an n.o.s. entry, may be packed together.

(2) Except where otherwise specially provided below, substances and articles having different identification numbers may not be packed together.

(3) Substances and articles of Class 1 may not be packed together with substances of other Classes or with goods which are not subject to the provisions of this Directive.

(4) Articles of compatibility groups C, D and E may be packed together.

(5) Articles of compatibility groups D or E may be packed together with their own means of initiation provided that such means have at least two effective protective features which prevent explosion of an article in the event of accidental functioning of the means of initiation.

(6) Articles of compatibility groups D or E may be packed together with their own means of initiation which do not have two effective protective features (i.e. means of initiation assigned to compatibility group B), provided that, in the opinion of the competent authority of the country of origin, the accidental functioning of the means of initiation does not cause the explosion of an article under normal conditions of carriage.

(7) Substances and articles of compatibility group L may not be packed together with a different type of substance or article of that compatibility group.

(8) Articles may be packed together with their own means of ignition provided that the means of ignition will not function under normal conditions of carriage.

(9) Goods with the identification numbers shown in table 4 may be included in the same package under the conditions indicated.

(10) For mixed packing, account must be taken of a possible amendment of the classification of packages in accordance with marginal 2100.

(11) For the description of goods in the transport document in the case of the mixed packing of substances and articles of Class 1, see marginal 2110 (4).

[1] Identification number of the substance or article according to the United Nations Recommendations on the Transport of Dangerous Goods (see marginal 2101, footnote 1).

2104 *(cont'd)*

TABLE 4

Special conditions for mixed packaging [see marginal 2104 (9)]

Item	Item	2	4		9			21			26	27	30					43					47						
	Identification No.	0160	0027	0028	0194	0333	0428	0238	0334	0429	0161	0186	0054	0195	0240	0335	0430	0191	0197	0312	0336	0431	0012	0014	0044	0337	0373	0405	0432
2	0160		B	B							B														B				
4	0027	B		B							B														B				
	0028	B	B								B														B				
9	0194						B	B		B		B	B	B	B		B	B	B	B		B					B	B	B
	0333								A							A					A					A			
	0428				B			B		B		B	B	B	B		B	B	B	B		B					B	B	B
21	0238				B		B			B		B	B	B	B		B	B	B	B		B					B	B	B
	0334					A										A					A					A			
	0429				B		B	B				B	B	B	B		B	B	B	B		B					B	B	B
26	0161	B	B	B																				B					
27	0186				B		B	B		B			B	B	B		B	B	B	B		B					B	B	B
30	0054				B		B	B		B		B		B	B		B	B	B	B		B					B	B	B
	0195				B		B	B		B		B	B		B		B	B	B	B		B					B	B	B
	0240				B		B	B		B		B	B	B			B	B	B	B		B					B	B	B
	0335					A			A												A					A			
	0430				B		B	B		B		B	B	B	B			B	B	B		B					B	B	B
43	0191				B		B	B		B		B	B	B	B		B		B	B		B					B	B	B
	0197				B		B	B		B		B	B	B	B		B	B		B		B					B	B	B
	0312				B		B	B		B		B	B	B	B		B	B	B			B					B	B	B
	0336					A			A							A											A			
	0431				B		B	B		B		B	B	B	B		B	B	B	B							B	B	B
47	0012																							A					
	0014																						A						
	0044	B	B	B							B																		
	0337					A			A							A					A								
	0373				B		B	B		B		B	B	B	B		B	B	B	B		B						B	B
	0405				B		B	B		B		B	B	B	B		B	B	B	B		B					B		B
	0432				B		B	B		B		B	B	B	B		B	B	B	B		B					B	B	

Explanations of table 4:

A: Substances and articles with these identification numbers may be included in the same package without any special limitation of mass.

B: Substances and articles with these identification numbers may be included in the same package up to a total mass of 30 kg of explosive substances.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2105 (1) Packages shall carry the identification number and one of the names of the substance or article printed in italics, in marginal 2101, Table 1, column 2. For substances and articles assigned to an n.o.s. entry, as well as for other articles of 25° and 34°, the technical name of the goods shall be given in addition to the name of the n.o.s. entry. For substances of 4°, Nos. 0081, 0082, 0083, 0084 and 0241, and substances of 48°, Nos. 0331 and 0332, the commercial name of the particular explosive shall be specified in addition to the type. For other substances and articles, the commercial or technical name may be added. The marking, which shall be clearly legible and indelible, shall be in an official language of the country of origin and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

2105 *(cont'd)* Danger labels

(2) Packages containing substances or articles of 1° to 34° shall bear a label conforming to model No 1. The classification code according to marginal 2101, Table 1, column 3, shall be shown on the lower part of the label. Packages containing substances or articles of 35° to 47° shall bear a label conforming to model No 1.4 and packages containing substances of 48° and articles of 49° shall bear a label conforming to model No 1.5 and those containing articles of item 50° shall bear a label conforming to model No 1.6. The compatibility group according to marginal 2101, Table 1, column 3, shall be shown on the lower part of the label.

(3) Packages containing substances and articles of

4°, Nos. 0076 and 0143,

21°, No. 0018,

26°, No. 0077,

30°, No. 0019 and

43°, No. 0301

shall in addition bear a label conforming to model No 6.1.

Packages containing articles of

21°, Nos. 0015 and 0018,

30°, Nos. 0016 and 0019 and

43°, No. 0301 and 0303

shall in addition bear a label conforming to model No 8.

2106-2109

B. Particulars in the transport document

2110 (1) The description of the goods in the transport document shall conform to one of the identification numbers and one of the names printed in italics in marginal 2101, Table 1, column 2. For substances and articles assigned to an n.o.s. entry, as well as for other articles of 25° and 34°, the technical name of the goods shall be given in addition to the name of the n.o.s. entry. The description of the goods shall be followed by the *classification code and Item No.* (marginal 2101, Table 1, columns 3 and 1) and *completed by the net mass in kg of the explosive substance and the initials 'ADR'* (or *'RID'*) (e.g.: 0160 Powder, smokeless, 1.1 C, 2°, 4,600 kg, ADR).

(2) For substances of 4°, Nos. 0081, 0082, 0083, 0084 and 0241 and for substances of 48°, Nos. 0331 and 0332, the commercial name of the explosive shall be specified as well as the type of explosive. For other substances and articles, the commercial name or technical name may be added.

(3) For full loads, the transport document shall indicate the number of packages, the mass of each package in kg and the total net mass in kg of explosive substance.

(4) For mixed packing of two different goods, the description of the goods in the transport document shall include the identification numbers and names printed in italics in marginal 2101, Table 1, column 2 of both substances or articles. If more than two different goods are contained in the same package in conformity with marginal 2104, the transport document shall indicate under the description of the goods the identification numbers of all the substances and articles contained in the package, in the form, 'Goods of Nos...'.

2110 *(cont'd)* (5) For the carriage of substances and articles assigned to an n.o.s. entry, a copy of the competent authority approval with the conditions of carriage shall be attached to the transport document. It shall be in an official language of the forwarding country and also, if that language is not English, French or German, in English, French or German unless agreements, if any, concluded between the countries concerned in the transport operation provide otherwise.

2111-
2114

C. Empty packagings

2115 (1) Empty packagings, uncleaned, of 51° shall be securely closed and be leakproof to the same degree as if they were full.

(2) Empty packagings, uncleaned, of 51° shall bear the same danger labels as if they were full.

(3) The entry in the transport document shall be: 'Empty packagings, 1, 51° ADR'.

D. Special provisions

2116 Substances and articles of Class 1, belonging to the armed forces of a Member State, that were packaged prior to 1 January 1990 in accordance with the provisions of ADR in effect at that time may be carried after 1 January 1990 provided the packagings maintain their integrity and are declared in the transport document as military goods packaged prior to 1 January 1990. The other provisions applicable as from 1 January 1990 for this Class shall be complied with.

2117-
2199

CLASS 2

GASES: COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE

1. List of substances

2200 (1) Among the substances and articles covered by the title of Class 2, only those listed in marginal 2201 are to be accepted for carriage, and then only subject to the requirements of this Annex and to the provisions of Annex B. These substances and articles to be accepted for carriage under certain conditions are to be considered as substances and articles of this Directive.

(2) Substances having a critical temperature lower than 50 °C or, at 50 °C, a vapour pressure greater than 300 kPa (3 bar) are deemed to be substances of Class 2.

Note: For the classification of solutions and mixtures (such as preparations and wastes) containing one or more components listed in marginal 2201, see also marginal 2002 (8).

2200 (cont'd)

(3) The substances and articles of Class 2 are classified as follows:

A. Compressed gases having a critical temperature below −10 °C;

B. Liquefied gases having a critical temperature of −10 °C or above:

a. Liquefied gases having a critical temperature of 70 °C or above;

b. Liquefied gases having a critical temperature of −10 °C or above, but below 70 °C;

C. Deeply-refrigerated liquefied gases;

D. Gases dissolved under pressure;

E. Aerosol dispensers and non-refillable containers of gas under pressure;

F. Gases subject to special requirements; and

G. Empty receptacles and empty tanks.

The substances and articles of Class 2 are subdivided according to their chemical properties, as follows:

(a) non-flammable;

(at) non-flammable, toxic;

(b) flammable;

(bt) flammable, toxic;

(c) chemically unstable;

(ct) chemically unstable, toxic.

Unless otherwise specified, chemically unstable substances shall be considered to be flammable.

The names of corrosive and oxidizing gases and of articles containing such gases shall be followed respectively by the words 'corrosive' or 'oxidizing' in brackets.

(4) Substances of Class 2 which are listed among the chemically unstable gases are to be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition, dismutation or polymerization during carriage. To this end, care should in particular be taken to ensure that receptacles and tanks do not contain any substances liable to promote these reactions.

A. Compressed gases

[see also marginal 2201a under (a). For gases of 1° (a) and (b) and 2° (a) in aerosol dispensers or in non-refillable containers for gases under pressure, see under 10° and 11°]

2201 Gases having a critical temperature below −10 °C are considered to be compressed gases for the purposes of this Directive.

1° Pure gases and technically-pure gases

(a) Non-flammable
Argon; helium; krypton; neon; nitrogen; oxygen (oxidizing); *tetrafluoromethane* (R 14).

(at) Non-flammable, toxic
Boron trifluoride; fluorine (oxidizing); *nitrogen trifluoride; silicon tetrafluoride* (corrosive).

(b) Flammable
Deuterium; hydrogen; methane.

(bt) Flammable, toxic
Carbon monoxide.

(ct) Chemically unstable, toxic
Nitric oxide (nitrogen monoxide) NO (non-flammable).

2201 *(cont'd)*

2° Mixtures of gases

(a) Non-flammable

Mixtures of two or more of the following gases: rare gases (containing not more than 10 % xenon by volume), nitrogen, oxygen, carbon dioxide (not more than 30 % by volume); non-flammable mixtures of two or more of the following gases: hydrogen, methane, nitrogen, rare gases (containing not more than 10 % xenon by volume), not more than 30 % carbon dioxide by volume; nitrogen containing not more than 6 % ethylene by volume; *air.*

Note: Mixtures containing more than 25 % (volume) oxygen are regarded as oxidizing.

(b) Flammable

Mixtures of not less than 90 % methane by volume with hydrocarbons of 3° (b) and 5° (b); flammable mixtures of two or more of the following gases: hydrogen, methane, nitrogen, rare gases (containing not more than 10 % xenon by volume), not more than 30 % carbon dioxide by volume; *natural gas* mixtures containing not more than 10 % silane by volume with one or more of the following gases: hydrogen, nitrogen, argon, helium, krypton, neon, denterium and methane.

(bt) Flammable, toxic

Town gas; mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; *water gas; synthesis gas* (e.g. from the Fischer-Tropsch process); mixtures of carbon monoxide with hydrogen or with methane.

(ct) Chemically unstable, toxic

Mixtures of hydrogen with not more than 10 % diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume.

B. Liquefied gases

[see also marginal 2201a under (b) and (e). For gases of 3° to 6° in aerosol dispensers or in non-refillable containers of gases under pressure, see under 10° and 11°]

Gases having a critical temperature of –10 °C or above are considered to be liquefied gases for the purposes of this Directive

a. Liquefied gases having a critical temperature of 70 °C or above:

3° Pure gases and technically-pure gases

(a) Non-flammable

Bromochlorodifluoromethane (R 12 B 1); *chlorodifluoromethane* (R 22); *chloropentafluoroethane* (R 115); *1-chloro-1,2,2,2-tetrafluoroethane* (R 124); *1-chloro-2,2,2-trifluoroethane* (R 133a); *dichlorodifluoromethane* (R 12); *dichlorofluoromethane* (R 21); *1,2-dichloro-1,1,2,2,-tetrafluoroethane* (R 114); *octafluorobut-2-ene* (R 1318); *octafluorocyclobutane* (RC 318); *octafluoropropane; 1,1,1,2-tetrafluoroethane* (R 134a).

(at) Non-flammable, toxic

Ammonia; boron trichloride (corrosive); *chlorine* (corrosive); *chlorine tri-fluoride* (corrosive); *hexafluoroacetone; hexafluoropropylene* (R 1216); *hydrogen bromide* (corrosive); *methyl bromide; nitrosyl chloride* (corrosive); *nitrogen dioxide* NO_2 (nitrogen peroxide, nitrogen tetroxide N_2O_4) (oxidizing); *phosgene* (corrosive); *sulphur dioxide; sulphuryl fluoride; tungsten hexafluoride.*

(b) Flammable

Butane; 1-butylene (1-butene); *1-chloro-1,1-difluoroethane* (R 142b); *cis-2-butylene* (cis-2-butene); *cyclopropane; 1,1-difluoroethane* (R 152a); *dimethyl ether; 2,2-dimethylpropane; isobutane; isobutylene* (isobutene); *methylsilane; propane; propylene; trans-2-butylene* (trans-2-butene); *1,1,1-trifluoroethane.*

(bt) Flammable, toxic

Arsine; carbonyl sulphide (corrosive); *dichlorosilane; dimethylamine; dimethylsilane; ethylamine; ethyl chloride; hydrogen selenide; hydrogen sulphide; methylamine; methyl chloride; methyl mercaptan; trimethylamine; trimethylsilane.*

2201 *(cont'd)*

(c) Chemically unstable

1,2-butadiene; 1,3-butadiene; propadiene, inhibited; vinyl chloride.

Note: In receptacles containing 1,2-butadiene, the oxygen concentration in the gaseous phase shall not exceed 50 ml/m³.

(ct) Chemically unstable, toxic

Cyanogen; cyanogen chloride (non-flammable) (corrosive); *ethylene oxide; hydrogen iodide, anhydrous* (non-flammable) (corrosive); *methyl vinyl ether; trifluorochloroethylene* (R 1113); *vinyl bromide.*

Note: In the case of halogenated hydrocarbons, the use of names customary in the trade, such as the following, is also permitted: *Algofrene, Arcton, Edifren, Flugene, Forane, Freon, Fresane, Frigen, Isceon, Kaltron,* followed by the substance identification number without the letter R.

4° Mixtures of gases

(a) Non-flammable

Mixtures of substances listed under 3° (a) with or without hexafluoropropylene of 3° (at), which as:

mixture F 1, have a vapour pressure at 70 °C not exceeding 1,3 MPa (13 bar) and a density at 50 °C not lower than that of dichlorofluoromethane (1,30);

mixture F 2, have a vapour pressure at 70 °C not exceeding 1,9 MPa (19 bar) and a density at 50 °C not lower than that of dichlorodifluoromethane (1,21);

mixture F 3, have a vapour pressure at 70 °C not exceeding 3 MPa (30 bar) and a density at 50 °C not lower than that of chlorodifluoromethane (1,09);

Notes: 1. Trichlorofluoromethane (R 11), trichlorotrifluoroethane (R 113) and chlorotrifluoroethane (R 133) are not liquefied gases within the meaning of ADR and thus are not subject to the provisions of ADR. They may, however, enter into the composition of mixtures F 1 to F 3.

2. See Note under 3°.

The azeotropic *mixture* of dichlorodifluoromethane (R 12) and 1,1-difluoro-ethane (R 152a), known as *R 500;*

the azeotropic *mixture* of chloropentafluoroethane (R 115) and chlorodifluoromethane (R 22), known as *R 502;*

the mixture of 19 to 21 % by mass dichlorodifluoromethane (R 12) and 79 to 81 % by mass bromochlorodifluoromethane (R 12 B1).

(at) Non-flammable, toxic

Mixtures of methyl bromide and chloropicrin having a vapour pressure above 300 kPa (3 bar) at 50 °C. Mixtures of dichlorodifluoromethane and ethylene oxide containing not more than 12 % (mass) ethylene oxide.

(b) Flammable

Mixtures of hydrocarbons listed under 3° (b) and of ethane and ethylene of 5° (b), which as:

mixture A, have a vapour pressure at 70 °C not exceeding 1,1 MPa (11 bar) and a relative density at 50 °C not lower than 0,525;

mixture A O, have a vapour pressure at 70 °C not exceeding 1,6 MPa (16 bar) and a relative density at 50 °C not lower than 0,495;

mixture A 1, have a vapour pressure at 70 °C not exceeding 2,1 MPa (21 bar) and a relative density at 50 °C not lower than 0,485;

mixture B, have a vapour pressure at 70 °C not exceeding 2,6 MPa (26 bar) and a relative density at 50 °C not lower than 0,450;

2201 (cont'd)

mixture C, have a vapour pressure at 70 °C not exceeding 3,1 MPa (31 bar) and a relative density at 50 °C not lower than 0,440.

Note: In the case of the foregoing mixtures, the use of the following names customary in the trade is permitted for describing these substances:

Name given under 4° (b)	Name customary in the trade
Mixture A, mixture A O	*butane*
Mixture C	*propane*

Mixtures of hydrocarbons of 3° (b) and 5° (b) containing methane.

(bt) Flammable, toxic

Mixtures of two or more of the following gases: methylsilane, dimethylsilane, trimethylsilane; methyl chloride and methylene chloride in mixtures having a vapour pressure above 300 kPa (3 bar) at 50 °C; mixtures of methyl chloride and chloropicrin and mixtures of methyl bromide and ethylene bromide having in either case a vapour pressure above 300 kPa (3 bar) at 50 °C.

(c) Chemically unstable

Mixtures of 1,3-butadiene and hydrocarbons of 3° (b) having a vapour pressure at 70 °C not exceeding 1,1 MPa (11 bar) and a density at 50 °C not lower than 0,525; propadiene with 1 % to 4 % methylacetylene, stabilized;

mixtures of methylacetylene and propadiene with the hydrocarbons of 3° (b), which as:

mixture P 1, contain not more than 63 % methylacetylene and propadiene by volume and not more than 24 % propane and propylene by volume, the percentage of C_4-saturated hydrocarbons being not less than 14 % by volume; and as

mixture P 2, contain not more than 48 % methylacetylene and propadiene by volume and not more than 50 % propane and propylene by volume, the percentage of C_4-saturated hydrocarbons being not less than 5 % by volume.

(ct) Chemically unstable, toxic

Ethylene oxide containing not more than 10 % carbon dioxide by mass; ethylene oxide containing not more than 50 % methyl formate by mass, with nitrogen up to a total pressure not exceeding 1 MPa(10 bar) at 50 °C; *ethylene oxide with nitrogen* up to a total pressure of 1 MPa(10 bar) at 50 °C.

b. Liquefied gases having a critical temperature of –10 °C or above, but below 70 °C:

5° Pure gases and technically-pure gases

(a) Non-flammable

Bromotrifluoromethane (R 13 B 1); *carbon dioxide; chlorotrifluoromethane* (R 13); *hexafluoroethane* (R 116); *nitrous oxide* N_2O (oxidizing); *pentafluoroethane* (R 125); *sulphur hexafluoride; trifluoromethane* (R 23); *xenon.*

With regard to carbon dioxide, see also marginal 2201a under (c).

Notes: 1. Nitrous oxide is to be accepted for carriage only if it is not less than 99 % pure.

2. See Note under 3°.

(at) Non-flammable, toxic

Hydrogen chloride (corrosive).

(b) Flammable

Ethane; ethylene; silane.

(bt) Flammable, toxic

Germane; phosphine.

(c) Chemically unstable

1,1-difluoroethylene; vinyl fluoride.

(ct) Chemically unstable, toxic

Diborane.

2201 (cont'd)

6° Mixtures of gases

(a) Non-flammable

Carbon dioxide containing not less than 1 % and not more than 10 % nitrogen, oxygen, air or rare gases by mass;

the azeotropic *mixture* of chlorotrifluoromethane (R 13) and trifluoromethane (R 23) known as *R 503*.

Note: Carbon dioxide containing less than 1 % nitrogen, oxygen, air or rare gases by mass is a substance of 5° (a).

(c) Chemically unstable

Carbon dioxide containing not more than 35 % ethylene oxide by mass.

(ct) Chemically unstable, toxic

Ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide by mass.

C. Deeply-refrigerated liquefied gases

7° Pure gases and technically-pure gases

(a) Non-flammable

Argon; carbon dioxide; helium; krypton; neon; nitrogen; nitrous oxide N_2O (oxidizing); *oxygen* (oxidizing); *xenon.*

(b) Flammable

Ethane; ethylene; hydrogen; methane.

8° Mixtures of gases

(a) Non-flammable

Air; mixtures of substances of 7° (a).

Note: Mixtures of 8° (a) containing more than 32 % (mass) nitrous oxide, air and mixtures containing more than 20 % (mass) oxygen are regarded as oxidizing.

(b) Flammable

Mixtures of substances of 7° (b); *natural gas,* mixture of at least 71,5 % ethylene (volume) with not more than 22,5 % acetylene (volume) and not more than 6 % propylene (volume).

D. Gases dissolved under pressure

9° Pure gases and technically-pure gases

(at) Non-flammable, toxic

Ammonia dissolved in water with more than 35 % but not more than 40 % ammonia by mass; *ammonia* dissolved in water with more than 40 % but not more than 50 % *ammonia* by mass.

Note: 2672 Ammonia solution, relative density between 0,880 and 0,957 at 15 °C in water, with more than 10 % but not more than 35 % ammonia, is a substance of Class 8 [see marginal 2801, 43° (c)].

(c) Chemically unstable

Acetylene dissolved in a solvent (e.g. acetone) absorbed by porous substances.

E. Aerosol dispensers and non-refillable containers of gas under pressure

[see also marginal 2201a under (d)]

Notes: 1. Aerosol dispensers are receptacles which can be used only once, are equipped with a release valve or dispersal device, and contain, under pressure, a gas or mixture of gases listed in marginal 2208 (2) or contain an active substance (insecticide, cosmetic, etc.) together with such a gas or mixture of gases as a propellent.

2. Non-refillable containers of gas under pressure are receptacles which can be used only once and contain a gas or a mixture of gases listed in marginal 2208 (2) and (3) (e.g. butane for camp-cookers, refrigerant gases, etc.), but are not equipped with a release valve.

2201 *(cont'd)*

3. The term 'flammable substances' means:
   (i) gases (propellent in aerosol dispensers; contents of non-refillable containers of gas under pressure) whose mixtures with air can be ignited and have a lower and an upper flammability limit;
   (ii) liquids (active substances in aerosol dispensers) of Class 3.
4. The term 'chemically unstable' is applied to contents which in the absence of special precautions undergo dangerous decomposition or self- polymerization at a temperature of not more than 70 °C.

10° Aerosol dispensers

(a) Non-flammable
With non-flammable contents.

(at) Non-flammable, toxic
With non-flammable toxic contents.

(b) Flammable
1. With not more than 45 % of flammable contents by mass.
2. With more than 45 % of flammable contents by mass.

(bt) Flammable, toxic
1. With toxic contents and not more than 45 % of flammable contents by mass.
2. With toxic contents and more than 45 % of flammable contents by mass.

(c) Chemically unstable
With chemically-unstable contents.

(ct) Chemically unstable, toxic
With chemically-unstable toxic contents.

11° Non-refillable containers of gas under pressure

(a) Non-flammable
With non-flammable contents.

(at) Non-flammable, toxic
With non-flammable toxic contents.

(b) Flammable
With flammable contents.

(bt) Flammable, toxic
With flammable toxic contents.

(c) Chemically unstable
With chemically-unstable contents.

(ct) Chemically unstable, toxic
With chemically-unstable toxic contents.

F. Gases subject to special requirements

2202 Various mixtures of gases

Mixtures containing gases listed under other item numbers of this Class, and mixtures of one or more gases listed under other item numbers of this Class with one or more vapours of substances not excluded from carriage under this Directive, on condition that during carriage:
1. the mixture remains entirely gaseous; and
2. all possibility of a dangerous reaction is excluded.

13° Test gases

Gases and mixtures of gases not listed under other item numbers of this Class and used only in laboratory tests, on condition that during carriage:
1. the gas or mixture of gases remains entirely gaseous; and
2. all possibility of a dangerous reaction is excluded.

2201 (cont'd)

G. Empty receptacles and empty tanks

Empty receptacles, empty tank-vehicles or empty tank-containers uncleaned, which have contained substances of Class 2.

Note: Receptacles and tanks which after being emptied of substances of Class 2 still contain small residual amounts are regarded as empty receptacles or empty tanks, uncleaned.

2201a Gases and articles handed over for carriage in conformity with the following provisions are not subject to the requirements or provisions relating to this Class set out elsewhere in this Annex or in Annex B:

(a) compressed gases which are neither flammable nor toxic nor corrosive and whose pressure in the receptacle, referred to a temperature of 15 °C, does not exceed 200 kPa (2 bar); the same rule applies to mixtures of gases containing not more than 2 % flammable components;

(b) liquefied gases contained, in quantities not exceeding 60 l, or in quantities of less than 5 l with not more than 25 g hydrogen, in freezing appliances (refrigerators, ice machines, etc.) and necessary for their operation. These freezing appliances shall be protected and loaded in such a way as to prevent any change to their freezing circuit;

(c) carbon dioxide and nitrous oxide (N_2O) of 5° (a) in metal capsules (sodors, sparklets, cream capsules), if the carbon dioxide and nitrous oxide in the gaseous state do not contain more than 0.5 % air and the capsules contain not more than 25 g carbon dioxide or nitrous oxide per cm^3 of capacity;

(d) articles of 10° and 11° of a capacity not exceeding 50 cm^3. A package of such articles shall not weigh more than 10 kg;

(e) liquefied petroleum gases contained in motor-vehicle tanks firmly secured to the vehicles; the fuel cock between tank and engine must be closed and the electrical contact open.

2. Provisions

A. Packages

1. General conditions of packing

2202 (1) The materials of which the receptacles and their closures are made must not be liable to attack by the contents or form harmful or dangerous compounds therewith.

Note: Care must be taken not to allow any moisture to enter receptacles when they are being filled, and to dry receptacles completely after hydraulic pressure tests (see marginal 2216) carried out with water or with aqueous solutions.

(2) Packagings, including their closures, shall be sufficiently rigid and strong in all their parts to prevent any loosening during carriage and to meet the normal requirements of carriage. When outer packagings are prescribed, the receptacles shall be firmly secured therein. Unless otherwise specified in the section entitled 'Packing of a single substance or of articles of the same kind', inner packagings may be enclosed in outer packagings either singly or in groups.

(3) Metal receptacles intended for the carriage of gases of 1° to 6° and 9° shall contain only the gas for which they have been tested and whose name is inscribed on the receptacle [see marginal 2218 (1) (a)].

Derogations are allowed:

1. for metal receptacles tested for one of the substances of 3° (a) or 4° (a) or for bromotrifluoromethane, chlorotrifluoromethane or trifluoromethane of 5° (a). These receptacles may also be filled with some other substance of the aforesaid items on condition that the minimum test pressure prescribed for that substance does not exceed the test pressure of the receptacle and that the name of the substance and its permissible maximum filling mass are inscribed on the receptacle;

2202 *(cont'd)* 2. for metal receptacles tested for hydrocarbons of 3° (b) or 4° (b). These receptacles may also be filled with some other hydrocarbon on condition that the minimum test pressure prescribed for that substance does not exceed the test pressure of the receptacle and that the name of the substance and its permissible maximum filling mass are inscribed on the receptacle.

For 1. and 2., see also marginals 2215, 2218 (1) (a) and 2220, (1) to (3).

(4) A change in the use to which a receptacle is assigned is allowed in principle if it does not conflict with national regulations; it requires, however, the approval of the competent authority and replacement of the former markings by markings relating to the new use.

2. Packing of a single substance or of articles of the same kind

Note: or carbon dioxide and nitrous oxide of 7° (a), mixtures containing carbon dioxide and nitrous oxide of 8° (a) and the gases of 7° (b) and 8° (b), see Annex B, marginal 21 105.

a. Nature of receptacles

2203 (1) Receptacles intended for the carriage of gases of 1° to 6°, 9°, 12° and 13° shall be so closed and leak proof as to prevent any escape of the gases.

(2) These receptacles shall be made of carbon steel or of alloy steel (special steels).

The following may, however, be used:

(a) copper receptacles for:

1. compressed gases of 1°, (a), (b) and (bt), and 2°, (a) and (b), whose filling pressure referred to a temperature of 15 °C does not exceed 2 MPa (20 bar); and

2. liquefied gases of 3° (a); sulphur dioxide of 3° (at); dimethyl ether of 3° (b); ethyl chloride and methyl chloride of 3° (bt); vinyl chloride of 3° (c); vinyl bromide of 3° (ct); mixtures F 1, F 2 and F 3 of 4° (a); and ethylene oxide containing not more than 10 % carbon dioxide by mass of 4° (ct);

(b) aluminium-alloy receptacles (see Appendix A.2) for:

1. compressed gases of 1°, (a), (b) and (bt); nitric oxide (nitrogen monoxide) NO of 1° (ct); and compressed gases of 2°, (a), (b) and (bt);

2. liquefied gases of 3° (a); sulphur dioxide of 3° (at); liquefied gases of 3° (b) other than methylsilane; hydrogen selenide, and methyl mercaptan of 3° (bt); ethylene oxide of 3° (ct); liquefied gases of 4°, (a) and (b); ethylene oxide containing not more than 10 % carbon dioxide by mass, of 4° (ct); and liquefied gases of 5°, (a) and (b), and 6°, (a) and (c). Sulphur dioxide of 3° (at) and substances of 3° (a) and 4° (a) shall be dry; and

3. dissolved acetylene of 9° (c).

All gases which are to be carried in aluminium-alloy receptacles shall be free from alkaline impurities.

2204 (1) Receptacles for dissolved acetylene of 9° (c) shall be entirely filled with a porous material, uniformly distributed, of a type approved by the competent authority and which:

(a) does not attack the receptacles or form harmful or dangerous compounds either with acetylene or with the solvent;

(b) does not shake down, even after prolonged use or through jolting, at temperatures up to 60 °C;

(c) is capable of preventing the spread of decomposition of the acetylene in the mass.

(2) The solvent must not attack the receptacles.

2205 (1) The following liquefied gases may, in addition, be carried in thick-walled glass tubes on condition that the quantity of substance in each tube and the degree of filling of the tubes do not exceed the figures indicated below:

Names of gases	Quantity of substance	Degree of filling tube
Carbon dioxide, nitrous oxide N_2O of 5° (a) ethane, ethylene of 5° (b)	3 g	one-half of capacity
Ammonia, chlorine, methyl bromide of 3° (at), cyclopropane of 3° (b), ethyl chloride of 3° (bt)	20 g	two-thirds of capacity
Phosgene, sulphur dioxide of 3° (at)	100 g	three-quarters of capacity

(2) The glass tubes shall be flame-sealed and secured separately by infusorial-earth cushioning in closed sheet-metal capsules which shall be placed in a wooden case or in some other outer packaging of sufficient strength (see also marginal 2222).

(3) For sulphur dioxide of 3° (at) stout glass siphons containing not more than 1,5 kg of substance and filled to not more than 88 % of their capacity are also allowed. The siphons shall be secured by infusorial earth, sawdust or powdered carbonate of lime, or by a mixture of the two latter, in strong wooden cases or in some other outer packaging of sufficient strength. A package shall not weigh more than 100 kg. If it weighs more than 30 kg, it shall be fitted with means of handling.

2206 (1) Gases of 3° (a); 3° (b) other than methylsilane; 3° (bt) other than arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane; 3° (c); 3° (ct) other than cyanogen chloride; and mixtures of 4° (a) and 4° (b), may also, on condition that the mass of liquid per litre of capacity does not exceed either the maximum mass of contents indicated in marginal 2220 or 150 g per tube, be contained in thick-walled glass tubes, or in thick-walled metal tubes made of a metal allowed by marginal 2203 (2). The tubes shall be free from faults liable to impair their strength; in particular, internal stresses in glass tubes shall have been suitably relieved and the thickness of the tube walls shall not be less than 2 mm. The leakproofness of the closure system shall be ensured by an additional device (cap, crown, seal, binding, etc.) capable of preventing any loosening of the closure system during carriage. The tubes shall be secured by cushioning material in small boxes made of wood or fibreboard, the number of tubes per box being such that the mass of the liquid contained in a box does not exceed 600 g. These small boxes shall be placed in wooden cases or in some other outer packaging of sufficient strength; if the liquid contents of a case weigh more than 5 kg, the case shall be lined with soft-soldered sheet-metal.

(2) A package shall not weigh more than 75 kg.

2207 (1) Gases of 7° and 8° shall be enclosed in metal receptacles which are so insulated that they cannot become coated with dew or hoar-frost. The receptacles shall be fitted with safety valves.

(2) Gases of 7° (a) other than carbon dioxide and 8° (a) other than mixtures containing carbon dioxide may also be enclosed in receptacles which are not hermetically closed and which are:

(a) double-walled vacuum-jacketed glass receptacles surrounded by an absorbent insulating material; these receptacles shall be protected by iron-wire baskets and placed in metal cases; or

(b) metal receptacles protected against heat transmission in such a way that they cannot become coated with dew or hoar-frost; the capacity of these receptacles shall not exceed 100 litres.

(3) The metal cases referred to in subparagraph (2) (a) and the receptacles referred to in subparagraph (2) (b) above shall be fitted with means of handling. The openings of the receptacles referred to in subparagraphs (2) (a) and (b) shall be fitted with devices allowing gases to escape, preventing any splashing out of the liquid, and so fixed that they cannot fall out. In the case of oxygen of 7° (a) and mixtures containing oxygen of 8° (a), the devices referred to above and the absorbent insulating material surrounding the receptacles referred to in subparagraph (2) (a) shall be made of incombustible materials.

2208 (1) Aerosol dispensers (10°) and non-refillable containers for gas under pressure (11°) shall satisfy the following requirements:

(a) aerosol dispensers containing only a gas or a mixture of gases, and non-refillable containers for gas under pressure, shall be made of metal. This requirement shall not apply to non-refillable containers for gas under pressure with a maximum capacity of 100 ml for butane. Other aerosol dispensers shall be made of metal, a plastics material or glass. Receptacles made of metal and having an outside diameter of not less than 40 mm shall have a concave bottom;

(b) receptacles made of materials liable to shatter, such as glass or certain plastics materials, shall be enclosed in a device (close-mesh wire netting, flexible cover made of a plastics material, etc.) affording protection against fragments and their dispersal. Receptacles whose capacity does not exceed 150 cm^3 and whose internal pressure at 20 °C is below 150 kPa (1,5 bar) are exempted from this requirement;

(c) the capacity of receptacles made of metal shall not exceed 1 000 cm^3; that of receptacles made of a plastics material or of glass shall not exceed 500 cm^3;

(d) each model of receptacle shall, before being put into service, satisfy a hydraulic pressure test carried out in conformity with Appendix A.2, marginal 3291. The internal pressure to be applied (test pressure) shall be 1,5 times the internal pressure at 50 °C, with a minimum pressure of 1 MPa (10 bar);

(e) the release valves of aerosol dispensers, and their dispersal devices, shall ensure that the dispensers are so closed as to be leak proof and shall be protected against accidental opening. Valves and dispersal devices which close only by the action of the internal pressure are not to be accepted.

(2) The following gases shall be accepted as propellants, or as constituents of propellants, or as filler gases, for aerosol dispensers: gases of 1°, (a) and (b); 2°, (a) and (b); 3°, (a) and (b) other than methylsilane; ethyl chloride of 3° (bt); 1,3-butadiene of 3° (c); trifluorochloroethylene of 3° (ct); gases of 4°, (a), (b) and (c); gases of 5°, (a) and (b) other than silane; gases of 5° (c) and 6° (a) and (c).

(3) All the gases listed under (2) and, in addition, the following gases shall be accepted as filling gases for non-refillable containers for gas under pressure; methyl bromide of 3° (at); dimethylamine, ethylamine, methylamine, methyl mercaptan and trimethylamine of 3° (bt); ethylene oxide, methyl vinyl ether and vinyl bromide of 3° (ct); ethylene oxide containing not more than 10 % carbon dioxide by mass, of 4° (ct).

2209 (1) The internal pressure at 50 °C of aerosol dispensers and of non-refillable containers of gas under pressure shall exceed neither two-thirds of the test pressure of the receptacle nor 1,2 MPa (1,2 bar).

(2) Aerosol dispensers and non-refillable containers of gas under pressure shall be so filled that at 50 °C the liquid phase does not exceed 95 % of their capacity. The capacity of aerosol dispensers is the available volume in a closed dispenser fitted with the valve support, the valve and the dip tube.

(3) All aerosol dispensers and non-refillable containers for gas under pressure shall satisfy a tightness (leakproofness) test in conformity with Appendix A.2, marginal 3292.

2210 (1) Aerosol dispensers and non-refillable containers of gas under pressure shall be placed in wooden cases or strong fibreboard or metal boxes; aerosol dispensers made of glass or a plastics material and liable to shatter shall be separated from one another by interposed sheets of fibreboard or of another suitable material.

(2) A package shall not weigh more than 50 kg if fibreboard boxes are used or more than 75 kg if other packagings are used.

(3) In the case of carriage by full load, metal aerosol dispensers may also be packed as follows: the aerosol dispensers shall be grouped together in units on trays and held in position with an appropriate plastics cover; these units shall be stacked and suitably secured on pallets.

b. Conditions governing metal receptacles

(These conditions are not applicable to the metal tubes referred to in marginal 2206, to the receptacles referred to in marginal 2207 (2) (b), or to the aerosol dispensers or non-refillable metal containers for gas under pressure referred to in marginal 2208.)

1. Construction and fittings (see also marginal 2238).

2211 (1) At the test pressure, the stress in the metal at the most severely stressed point of the receptacle (marginals 2215, 2219 and 2220) shall not exceed three-quarters of the guaranteed minimum yield stress (Re). By 'yield stress' is meant the stress at which a permanent elongation of 2 ‰ (i.e. 0,2 %) or, for austenitic steels, 1 % of the gauge length on the test-piece, has been produced.

Note: In the case of sheet-metal the axis of the tensile test-piece shall be at right angles to the direction of rolling. The permanent elongation at fracture (l = 5 d) shall be measured on a test-piece of circular cross-section in which the gauge length l is equal to five times the diameter d; if test-pieces of rectangular cross-section are used, the gauge length shall be calculated by the formula $l = 5{,}65\sqrt{F_o}$ where F_o indicates the initial cross-sectional area of the test-piece.

(2) (a) Steel receptacles whose test pressure exceeds 6 MPa (60 bar) shall be of seamless construction or welded. For welded receptacles, steels (carbon or alloy) of fully satisfactory weldability shall be used.

(b) Receptacles whose test pressure does not exceed 6 MPa (60 bar) shall either conform to the provisions of subparagraph (a) above, or be riveted or hard-soldered on condition that the manufacturer guarantees the workmanship of the riveting and hard-soldering and that the competent authorities of the country of origin have given their approval.

(3) Aluminium-alloy receptacles shall be seamless or welded.

(4) Welded receptacles are to be accepted only on condition that the manufacturer guarantees the workmanship of the welding and that the competent authorities of the country of origin have given their approval.

2212 (1) A distinction is made between the following types of receptacles:

(a) cylinders of a capacity not exceeding 150 litres;

(b) receptacles of a capacity of not less than 100 litres [with the exception of cylinders in conformity with subparagraph (a)] and not more than 1 000 litres (e.g. cylindrical receptacles equipped with rolling hoops, and receptacles on skids), with the exception of receptacles in conformity with (e);

(c) tanks (see Annex B);

(d) assemblies, known as 'frames', of cylinders in conformity with subparagraph (1) (a), the cylinders being interconnected by a manifold and held firmly together by a metal fitting.

(e) receptacles in conformity with marginal 2207, of a capacity of not more than 1 000 litres.

(2) (a) If under the regulations of the country of departure the cylinders referred to in subparagraph (1) (a) are required to be fitted with a device to prevent rolling, this device shall not be integral with the valve cap [marginal 2213 (2)];

(b) Receptacles in conformity with subparagraph (1) (b) which are capable of being rolled shall be equipped with rolling hoops or be otherwise protected against damage due to rolling (e.g. by corrosion-resistant metal sprayed on to the receptacle's outer surface). Receptacles in conformity with subparagraphs (1) (b) and (1) (c) which are not capable of being rolled shall be fitted with devices (skids, rings, straps) ensuring that they can be safely handled by mechanical means and so arranged as not to impair the strength of, nor cause undue stresses in, the wall of the receptacle.

(c) Frames of cylinders in conformity with subparagraph (1) (d) shall be fitted with devices ensuring that they can be handled safely. The manifold and the master cock shall be situated within the frame and be so mounted as to be protected against any damage.

(3) (a) With the exceptions of gases of 7° and 8°, gases of Class 2 may be carried in cylinders in conformity with subparagraph (1) (a).

Note: For possible limitations on the capacity of cylinders for certain gases, see marginal 2219.

2212 *(cont'd)*

(b) With the exception of fluorine, nitrogen trifluoride and silicon tetrafluoride of 1° (at); nitric oxide (NO) of 1° (ct); mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume of 2° (bt); mixtures of hydrogen with not more than 10 % diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume of 2° (ct); octafluorobut-2-ene (R 1318) and octafluoropropane of 3° (a); boron trichloride, chlorine trifluoride, hexafluoroacetone, nitrosyl chloride, sulphuryl fluoride and tungsten hexafluoride of 3° (at); 2,2-dimethylpropane and methylsilane of 3° (b); arsine, carbonyl sulphide, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane of 3° (bt); propadiene, inhibited, of 3° (c); cyanogen chloride, cyanogen, ethylene oxide and hydrogen iodide, anhydrous, of 3° (ct); mixtures of methylsilanes of 4° (bt); propadiene with 1 % to 4 % methylacetylene, stabilized, of 4° (c); ethylene oxide containing not more than 50 % methyl formate by mass, of 4° (ct); nitrous oxide of 5° (a); silane of 5° (b); and substances of 5° (bt), 5° (ct), 7°, 8°, 12° and 13°, gases of Class 2 may be carried in receptacles in conformity with subparagraph (1) (b).

(c) With the exception of nitrogen trifluoride and silicon tetrafluoride of 1° (at); nitric oxide of 1° (ct); mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume of 2° (bt); mixtures of hydrogen with not more than 10 % diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume of 2° (ct); octafluorobut-2-ene (R 1318) and octafluoropropane of 3° (a); boron trichloride, chlorine trifluoride, nitrosyl chloride, hexafluoroacetone, sulphuryl fluoride and tungsten hexafluoride of 3° (at); 2,2-dimethylpropane and methylsilane of 3° (b); arsine, carbonyl sulphide, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane of 3° (bt); propadiene, inhibited, of 3° (c); cyanogen chloride, cyanogen, ethylene oxide and hydrogen iodide, anhydrous of 3° (ct); mixtures of methylsilanes of 4° (bt); substances of 4° (c) and 4° (ct); nitrous oxide of 5° (a); silane of 5° (b); and substances of 5° (bt), 5° (ct), 7°, 8°, 12° and 13°, gases of Class 2 may be carried in frames of cylinders in conformity with subparagraph (1) (d). The individual cylinders in a frame of cylinders shall contain only one and the same compressed gas, liquefied gas or gas dissolved under pressure. Each cylinder in a frame of cylinders for fluorine of 1° (at) or dissolved acetylene of 9° (c) shall, however, be fitted with a cock. The cylinders in a frame of cylinders for acetylene shall all contain the same porous material (marginal 2204).

(d) For receptacles conforming to (1) (e), see marginal 2207.

2213 (1) Openings for filling and emptying receptacles shall be fitted with flap valves or needle-valves. Valves of other types may, however, be allowed if they present equivalent guarantees of safety and have been approved in the country of origin. Nevertheless, whatever the type of valve adopted, its system of attachment shall be strong and such that its satisfactory condition can be verified easily before each filling.

Apart from a manhole, which if provided shall be closed by an effective closure, and from the necessary orifice for the removal of deposits, receptacles and tanks in conformity with marginal 2212 (1) (b) and (c) shall not be equipped with more than two openings, for filling and discharge respectively. Nevertheless, receptacles of a capacity of not less than 100 litres intended for the carriage of dissolved acetylene of 9° (c) may have more than two openings for filling and discharge.

Similarly, receptacles and tanks in conformity with marginal 2212 (1), (b) and (c), intended for the carriage of substances of 3° (b) and 4° (b) may be provided with other openings intended in particular for verifying the level of the liquid and the gauge pressure.

(2) Valves (cocks) shall be effectively protected by caps or fixed flanges. Caps shall possess vent-holes of sufficient cross-sectional area to evacuate gases if leakage occurs at the valves. The caps or flanges shall adequately protect the valve if the cylinder falls and during carriage and stacking. Valves placed inside the neck of the receptacles and protected by a screw-threaded plug, and receptacles carried packed in protective cases, shall not require a cap. Likewise, no protective cap shall be required for valves (cocks) on frames of cylinders.

2213 (cont'd) (3) Receptacles containing fluorine of 1° (at); chlorine trifluoride of 3° (at); or cyanogen chloride of 3° (ct) shall, whether or not they are carried packed in protective cases, be fitted with steel caps. These caps shall have no openings and shall, throughout carriage, be fitted with a gasket ensuring gas-tightness and made of a material not liable to attack by the contents of the receptacle.

2214 (1) In the case of receptacles containing boron trifluoride or fluorine of 1° (at); chlorine trifluoride or liquefied ammonia of 3° (at); ammonia dissolved in water of 9° (at); nitrosyl chloride of 3° (at); or dimethylamine, ethylamine, methylamine or trimethylamine of 3° (bt), valves made of copper or of any other metal liable to be attacked by these gases are not to be accepted.

(2) The use of substances containing grease or oil for ensuring the leakproofness of joints (seams) or for maintaining the closure devices of receptacles used for oxygen of 1° (a); fluorine of 1° (at); mixtures with oxygen of 2° (a); nitrogen dioxide, chlorine trifluoride of 3° (at); nitrous oxide of 5° (a); or mixtures of 12° containing more than 10 % oxygen by volume is prohibited.

(3) The following requirements shall apply to the construction of the receptacles referred to in marginal 2207 (1):

(a) The materials and construction of the receptacles shall be in conformity with the requirements of Appendix A.2, B, marginals 3250 to 3254. All the mechanical and technological characteristics of the material used shall be established for each receptacle at the first test; with regard to the impact strength and the bending coefficient, see Appendix A.2, B, marginals 3265 to 3285.

(b) Receptacles shall be fitted with a safety valve which shall be capable of opening at the working pressure shown on the receptacle. The valves shall be so constructed as to work perfectly even at their lowest working temperature. Their reliability of functioning at that temperature shall be established and checked by testing each valve or a sample of valves of the same type of construction.

(c) The vents and safety valves of receptacles shall be so designed as to prevent the liquid from splashing out.

(d) The closing devices shall be so arranged that they cannot be opened by unqualified persons.

(e) Receptacles whose filling is measured by volume shall be provided with a level indicator.

(f) The receptacles shall be thermally insulated. The thermal insulation shall be protected against impact by means of continuous metal sheathing. If the space between the receptacle and the metal sheathing is airless (vacuum insulation), the protective sheathing shall be designed to withstand without deformation an external pressure of at least 100 kPa (1 bar). If the sheathing is so closed as to be gas-tight (e.g. in the case of vacuum insulation), a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the receptacle or its fittings. The device shall prevent moisture from penetrating into the insulation.

(4) In the case of receptacles containing mixtures P1 or P2 of 4° (c), mixture of ethylene with acetylene and propylene of 8° (b) or dissolved acetylene of 9° (c), metal parts of closing devices in contact with the contents shall not contain more than 70 % copper. Receptacles for dissolved acetylene of 9° (c) may also have stop-valves taking yoke connectors.

(5) Receptacles containing oxygen of 1° (a) or 7° (a) and fitted in fish-tanks are likewise to be accepted if they are provided with appliances enabling the oxygen to escape gradually.

2. Official test of receptacles (for aluminium-alloy receptacles, see also Appendix A.2)

2215 (1) Metal receptacles shall be subjected to initial and periodic tests under the supervision of an expert approved by the competent authority. The nature of these tests is specified in marginals 2216 and 2217.

(2) In order to ensure compliance with the requirements of marginals 2204 and 2221 (2), tests of receptacles intended to contain dissolved acetylene of 9° (c) shall include, in addition, examination of the nature of the porous material and of the quantity of solvent.

2216 (1) The *initial test* of new or unused receptacles shall comprise:

A. On an adequate sample of receptacles:

(a) testing of the material of construction in respect at least of yield stress, tensile stength, and permanent elongation at fracture; the values yielded by these tests shall comply with national regulations;

(b) measurement of wall thickness at the thinnest point, and calculation of the stress;

(c) checking the homogeneity of the material for each manufacturing batch, and inspection of the external and internal condition of the receptacles;

B. For all receptacles:

(d) a hydraulic pressure test in conformity with the provisions of marginals 2219 to 2221;

Note: With the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by a test using a gas, where such an operation does not entail any danger.

(e) an inspection of the markings on the receptacles (see marginal 2218);

C. In addition, for receptacles intended for the carriage of dissolved acetylene of 9° (c):

(f) an inspection as required by national regulations.

(2) Receptacles shall withstand the test pressure without undergoing permanent deformation or exhibiting cracks.

(3) At the *periodic inspections* the following shall be repeated: the hydraulic pressure test; check of the external and internal condition of the receptacle (e.g. by weighing, internal inspection, checks of wall thickness); verification of the equipment and markings and, if necessary, verification of the characteristics of the material by suitable tests.

Note: With the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by an equivalent method based on ultrasound.

Periodic inspections shall be carried out:

(a) every 2 years in the case of receptacles intended for the carriage of gases of 1° (at) and 1° (ct); town gas of 2° (bt); gases of 3° (at) other than ammonia, hexafluoropropylene and methyl bromide; cyanogen chloride of 3° (ct); and substances of 5° (at);

(b) every 5 years in the case of receptacles intended for the carriage of other compressed and liquefied gases (subject to the provisions of subparagraph (c) below) and of receptacles for the carriage of ammonia dissolved under pressure of 9° (at);

(c) every 10 years in the case of receptacles intended for the carriage of gases of 1° (a) other than oxygen; of mixtures of nitrogen with rare gases, of 2° (a); of gases of 3° (a) and 3° (b) other than 1-chloro-1,1-difluoroethane, 1,1-difluoroethane, dimethyl ether, methylsilane and 1,1,1-trifluoroethane, and of mixtures of gases of 4° (a) and 4° (b), if the receptacles have a capacity of not more than 150 litres and the country of origin does not prescribe a shorter interval;

(d) in the case of receptacles intended for the carriage of dissolved acetylene of 9° (c), marginal 2217 (1) shall apply, and in that of receptacles conforming to marginal 2207 (1), marginal 2217 (2) shall apply.

2217 (1) The external condition (corrosion, deformation) of, and the condition (loosening, settlement) of the porous material in, receptacles intended for the carriage of dissolved acetylene of 9° (c) shall be examined every 5 years. Sampling shall be performed by cutting up, if considered necessary, a suitable number of receptacles and inspecting them internally for corrosion and for any changes that may have occurred in the constituent materials and in the porous material.

(2) Receptacles conforming to marginal 2207 (1) shall be subjected every 5 years to external inspection and to a tightness (leakproofness) test. The tightness (leakproofness) test shall be carried out with the gas contained in the receptacle or with an inert gas at a pressure of 200 kPa (2 bar). Checking shall be performed by means of a pressure gauge or by vacuum measurement. The thermal insulation shall not be removed. The pressure shall not decline during the 8-hour test period. Changes resulting from the nature of the test gas or from variations in temperature shall be taken into account.

2217 *(cont'd)* (3) The cylinders referred to in marginal 2212 (1) (a) may be carried after the expiry of the time-limit set for the periodic test prescribed in marginal 2215 for the purpose of undergoing the test.

3. Marks on receptacles

2218 (1) Metal receptacles shall bear the following particulars in clearly legible and durable characters:

(a) one of the names of the gas or of the mixture of gases in full, as given in marginal 2201, 1° to 9°; the name or mark of the maker or owner; and the number of the receptacle [see also marginal 2202 (3)]. In the case of halogenated hydrocarbons of 1° (a), 3° (a), 3° (at), 3° (b), 3° (ct), 4° (a), 5° (a) and 6° (a), the use of the letter R followed by the substance identification number is also permitted;

(b) the tare of the receptacle without fittings and accessories;

(c) in addition, in the case of receptacles intended for liquefied gases, the tare of the receptacle including such fittings and accessories as valves, metal plugs, etc., but excluding the protective cap;

Note to (b) and (c): Those particulars of the mass, in so far as they are not already marked on the receptacle, shall be so marked at the next periodic test.

(d) the test pressure (see marginals 2219 to 2221) and the date (month, year) of the last test undergone (see marginals 2216 and 2217);

(e) the stamp of the expert who carried out the tests and inspections; and, in addition;

(f) in the case of compressed gases or mixtures of compressed gases of 1°, 2°, 12° and 13°: the maximum filling pressure at 15 °C allowed for the receptacle in question (see marginal 2219);

(g) in the case of boron trifluoride of 1° (at), liquefied gases of 3° to 6° and ammonia dissolved in water of 9° (at): the maximum filling allowed, and the capacity. In the case of deeply-refrigerated gases of 7° and 8°: the capacity;

(h) in the case of acetylene dissolved in a solvent of 9° (c): the permitted filling pressure [see marginal 2221 (2)], and the mass of the empty receptacle, including the mass of the fittings and accessories, of the porous material, and of the solvent;

(i) in the case of mixtures of gases of 12° and test gases of 13°, the words 'mixtures of gases' or 'test gases', as the case may be, shall be engraved on the receptacle as a general indication of the contents. An exact description of the contents shall be shown in a durable form throughout carriage;

(k) in the case of metal receptacles which, under marginal 2202 (3), are accepted for the carriage of a number of different gases (multi-purpose receptacles), an exact description of the contents shall be shown in a durable form during carriage.

(2) The marks shall be engraved either on a reinforced part of the receptacle, or on a ring, or on a data plate, immovably affixed to the receptacle. In addition, the name of the substance may be indicated on the receptacle by an adherent and clearly-visible inscription applied by painting or by any other, equivalent process.

c. Test pressure, degree of filling, and limitation of capacity, of receptacles (see also marginals 2238, 211 180, 211 184 and 212 180)

2219 (1) In the case of receptacles intended for the carriage of compressed gases of 1°, 2° and 12°, the internal pressure (test pressure) to be applied in the hydraulic pressure test shall be at least one and one-half times the filling pressure at 15 °C indicated on the receptacle, but shall not be less than 1 MPa (10 bar).

(2) In the case of receptacles used for the carriage of substances of 1° (a) other than tetrafluoromethane; of deuterium and hydrogen of 1° (b); or of gases of 2° (a), the filling pressure shall not exceed 30 MPa (300 bar) referred to a temperature of 15 °C. In the case of tanks, the filling pressure shall not exceed 25 MPa (250 bar) referred to a temperature of 15 °C.

In the case of receptacles and tanks intended for the carriage of other gases of 1° and 2°, the filling pressure shall not exceed 20 MPa (200 bar) referred to a temperature of 15 °C.

2219 *(cont'd)*

(3) In the case of receptacles intended for the carriage of fluorine of 1° (at), the internal pressure (test pressure) to be applied in the hydraulic pressure test shall be 20 MPa (200 bar) and the filling pressure shall not exceed 2,8 MPa (28 bar) at a temperature of 15 °C; in addition, no receptacle may contain more than 5 kg fluorine.

In the case of receptacles intended for the carriage of boron trifluoride of 1° (at), the hydraulic pressure to be applied in the test (test pressure) shall be either 30 MPa (300 bar), in which case the maximum mass of the contents per litre of capacity shall not exceed 0,86 kg, or 22,5 MPa (225 bar), in which case the maximum mass of the contents per litre of capacity shall not exceed 0,715 kg.

(4) In the case of receptacles intended for the carriage of nitric oxide NO of 1° (ct), the capacity shall be limited to 50 l; the hydraulic pressure to be applied in the test (test pressure) shall be 20 MPa (200 bar); and the filling pressure shall not exceed 5 MPa (50 bar) at a temperature of 15 °C.

(5) In the case of receptacles intended for the carriage of mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; of mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume, of 2° (bt); of mixtures of hydrogen with not more than 10 % diborane by volume; or of mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume, of 2° (ct), the capacity shall be limited to 50 l; the hydraulic pressure to be applied in the test (test pressure) shall be not less than 20 MPa (200 bar); and the filling pressure shall not exceed 5 MPa (50 bar) at a temperature of 15 °C.

(6) The degree of filling of receptacles in conformity with marginal 2207 (1) intended for the carriage of gases of 7° (b) and 8° (b) shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the valve-opening pressure, the volume of the liquid would reach 95 % of the capacity of the receptacle at that temperature. Receptacles intended for the carriage of gases of 7° (a) and 8° (a) may be filled to 98 % at the 2219 loading temperature and the loading pressure. Where oxygen of 7° (a) is carried, steps shall be taken to prevent any spillage of the liquid phase.

(7) Where dissolved acetylene of 9° (c) is carried in receptacles in conformity with marginal 2212 (1) (b), the capacity of the receptacles shall not exceed 150 l.

(8) The capacity of receptacles intended for the carriage of mixtures of gases of 12° shall not exceed 50 l. The pressure of the mixture shall not exceed 15 MPa (150 bar) at a temperature of 15 °C.

(9) The capacity of receptacles intended for the carriage of test gases of 13° shall not exceed 50 l. The filling pressure at a temperature of 15 °C shall not exceed 7 % of the test pressure of the receptacle.

(10) In the case of tungsten hexafluoride of 3° (at), the capacity of the receptacles shall be limited to 60 l.

The capacity of receptacles for silicon tetrafluoride of 1° (at); boron trichloride, nitrosyl chloride and sulphuryl fluoride of 3° (at); methylsilane of 3° (b); arsine, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane, of 3° (bt); cyanogen chloride and cyanogen of 3° (ct); mixtures of methylsilanes of 4° (bt); ethylene oxide containing not more than 50 % methyl formate by mass, of 4° (ct); silane, of 5° (b); and substances of 5° (bt) and (ct), shall be limited to 50 l.

(11) In the case of receptacles intended for chlorine trifluoride of 3° (at), the capacity shall be limited to 40 l. After filling, a receptacle containing chlorine trifluoride of 3° (at) shall, before being handed over for carriage, be held back for not less than seven days in order to verify that it is leak proof.

2220

(1) In the case of receptacles intended for the carriage of liquefied gases of 3° to 6°, and of receptacles intended for the carriage of gases dissolved under pressure of 9°, the hydraulic pressure to be applied in the test (test pressure) shall be not less than 1 MPa (10 bar).

2220 *(cont'd)*

(2) In the case of liquefied gases of 3° and 4°, the following values shall be complied with for the hydraulic pressure to be applied to the receptacles in the test (test pressure) and for the maximum degree of filling allowed (1):

Description of substance	Item No	Minimum test pressure MPa	Maximum mass of contents per litre of capacity (kg)
Bromochlorodifluoromethane (R12 B1)	3° (a)	1	1,61
Chlorodifluoromethane (R 22)	3° (a)	2,9	1,03
Chloropentafluoroethane (R 115)	3° (a)	2,5	1,06
1-chloro-1,2,2,2-tetrafluoroethane (R 124)	3° (a)	1,2	1,20
1-chloro-2,2,2-trifluoroethane (R 133a)	3° (a)	1	1,18
Dichlorodifluoromethane (R 12)	3° (a)	1,8	1,15
Dichlorofluoromethane (R 21)	3° (a)	1	1,23
1,2-Dichloro-1,1,2,2-tetrafluoroethane (R 114)	3° (a)	1	1,30
Octafluorobut-2-ene (R 1318)	3° (a)	1,2	1,34
Octafluorocyclobutane (RC 318)	3° (a)	1,1	1,34
Octafluoropropane	3° (a)	2,5	1,09
1,1,1,2-tetrafluoroethane (R 134a)	3° (a)	2,2	1,04
Ammonia	3° (at)	3,3	0,53
Boron trichloride	3° (at)	1	1,19
Chlorine	3° (at)	2,2	1,25
Chlorine trifluoride	3° (at)	3	1,40
Hexafluoroacetone	3° (at)	2,2	1,08
Hexafluoropropylene (R 1216)	3° (at)	2,2	1,11
Hydrogen bromide	3° (at)	6	1,54
Methyl bromide	3° (at)	1	1,51
Nitrogen dioxide	3° (at)	1	1,30
Nitrosyl chloride	3° (at)	1,3	1,10
Phosgene	3° (at)	2	1,23
Sulphur dioxide	3° (at)	1,4	1,23
Sulphuryl fluoride	3° (at)	5	1,10
Tungsten hexafluoride	3° (at)	1	2,70
Butane	3° (b)	1	0,51
1-Butene	3° (b)	1	0,53
1-Chloro-1,1-difluoroethane (R 142b)	3° (b)	1	0,99
Cis-2-butene	3° (b)	1	0,55
Cyclopropane	3° (b)	2	0,53
1,1-Difluoroethane (R 152a)	3° (b)	1,8	0,79
Dimethyl ether	3° (b)	1,8	0,58
2,2-Dimethylpropane	3° (b)	1,0	0,53
Isobutane	3° (b)	1	0,49
Isobutene	3° (b)	1	0,52
Methylsilane	3° (b)	22,5	0,39
Propane	3° (b)	2,5	0,42
Propylene	3° (b)	3	0,43
Trans-2-butene	3° (b)	1	0,54
1,1,1-Trifluoroethane	3° (b)	3,5	0,75
Arsine	3° (bt)	4,2	1,10
Carbonyl sulphide	3° (bt)	2,6	0,84
Dichlorosilane	3° (bt)	1	0,90
Dimethylamine	3° (bt)	1	0,59

(1) 1. The test pressures prescribed are at least equal to the vapour pressures of the liquids at 70 °C, reduced by 100 kPa (1 bar), the minimum test pressure required being, however, 1 MPa (10 bar).

2. In view of the high degree of toxicity of phosgene of 3° (at) and of cyanogen chloride of 3° (ct), the minimum test pressure for these gases has been fixed at 2 MPa (20 bar).

3. The maximum values prescribed for the degree of filling in kg/litre have been determined as follows: maximum mass of contents per litre of capacity = 0,95 times the density of the liquid phase at 50 °C; in addition, the vapour phase must not disappear below 60 °C.

2220 *(cont'd)*

Description of substance	Item No	Minimum test pressure MPa	Maximum mass of contents per litre of capacity (kg)
Dimethysilane	3° (bt)	22,5	0,39
Ethylamine	3° (bt)	1	0,61
Ethyl chloride	3° (bt)	1	0,80
Hydrogen selenide	3° (bt)	3,1	1,60
Hydrogen sulphide	3° (bt)	5,5	0,67
Methylamine	3° (bt)	1,3	0,58
Methyl chloride	3° (bt)	1,7	0,81
Methyl mercaptan	3° (bt)	1	0,78
Trimethylamine	3° (bt)	1	0,56
Trimethylsilane	3° (bt)	22,5	0,39
1,2-Butadiene	3° (c)	1	0,59
1,3-Butadiene	3° (c)	1	0,55
Propadiene, inhibited	3° (c)	2,2	0,50
Vinyl chloride	3° (c)	1,2	0,81
Cyanogen	3° (ct)	10	0,70
Cyanogen chloride	3° (ct)	2	1,03
Ethylene oxide	3° (ct)	1	0,78
Hydrogen iodide, anhydrous	3° (ct)	2,3	2,25
Methyl vinyl ether	3° (ct)	1	0,67
Trifluorochloroethylene (R 1113)	3° (ct)	1,9	1,13
Vinyl bromide	3° (ct)	1	1,37
Mixture F 1	4° (a)	1,2	1,23
Mixture F 2	4° (a)	1,8	1,15
Mixture F 3	4° (a)	2,9	1,03
Mixture of gases R 500	4° (a)	2,2	1,01
Mixture of gases R 502	4° (a)	3,1	1,05
Mixture of 19 to 21 % by mass dichlorodifluoromethane (R12) and 79 to 81 % by mass bromochlorodifluoromethane (R 12 B 1)	4° (a)	1,2	1,50
Mixtures of dichlorodifluoromethane and ethylene oxide containing not more than 12 % ethylene oxide by mass	4° (at)	1,8	1,09
Mixtures of methyl bromide and chloropicrin	4° (at)	1	1,51
Mixture A (trade name: butane)	4° (b)	1	0,50
Mixture A O (trade name: butane)	4° (b)	1,5	0,47
Mixture A 1	4° (b)	2	0,46
Mixture B	4° (b)	2,5	0,43
Mixture C (trade name: propane)	4° (b)	3	0,42
Mixtures of hydrocarbons containing methane	4° (b)	22,5	0,187
		30	0,244
Mixtures of methylsilanes	4° (bt)	22,5	0,39
Mixtures of methyl chloride and methylene chloride	4° (bt)	1,7	0,81
Mixtures of methyl chloride and chloropicrin	4° (bt)	1,7	0,81
Mixtures of methyl bromide and ethylene bromide	4° (bt)	1	1,51
Mixtures of 1,3-butadiene and hydrocarbons of 3° (b)	4° (c)	1	0,50
Mixtures of methylacetylene/propadiene and hydrocarbons	3° (c)		
Mixture P 1	4° (c)	3	0,49
Mixture P 2	4° (c)	2,4	0,47
Propadiene with 1 % to 4 % methyl acetylene, stabilized	4° (c)	2,2	0,50
Ethylene oxide containing not more than 10 % carbon dioxide by mass	4° (ct)	2,8	0,73
Ethylene oxide containing not more than 50 % methyl formate by mass with nitrogen up to a maximum total pressure of 1 MPa (10 bar) at 50 °C	4° (ct)	2,5	0,80
Ethylene oxide with nitrogen up to a total pressure of 1 MPa (10 bar) at 50 °C	4° (ct)	1,5	0,78

2220 *(cont'd)*

(3) In the case of receptacles intended to contain liquefied gases of 5° and 6°, the degree of filling shall be such that the internal pressure at 65 °C does not exceed the test pressure of the receptacles. The following values shall be complied with, see also paragraph (4):

Description of substance	Item No	Minimum test pressure MPa	Maximum mass of contents per litre of capacity (kg)
Bromotrifluoromethane (R 13 B 1)		4,2	1,13
		12	1,44
	5° (a)	25	1,60
Carbon dioxide		19	0,66
	5° (a)	25	0,75
Chlorotrifluoromethane (R 13)		10	0,83
		12	0,90
		19	1,04
	5° (a)	25	1,10
Hexafluoroethane (R 116)	5° (a)	20	1,10
Nitrous oxide N_2O		18	0,68
		22,5	0,74
	5° (a)	25	0,75
Pentafluoroethane (R 125)	5° (a)	3,6	0,95
Sulphur hexafluoride		7	1,04
		14	1,33
	5° (a)	16	1,37
Trifluoromethane (R 23)		19	0,87
	5° (a)	25	0,95
Xenon	5° (a)	13	1,24
Hydrogen chloride		10	0,30
		12	0,56
		15	0,67
	5° (at)	20	0,74
Ethane		9,5	0,25
		12	0,29
	5° (b)	30	0,39
Ethylene		22,5	0,34
	5° (b)	30	0,37
Silane		22,5	0,32
	5° (b)	25	0,41
Germane	5° (bt)	25	1,02
Phosphine		22,5	0,30
	5° (bt)	25	0,51
1,1-Difluoroethylene	5° (c)	25	0,77
Vinyl fluoride	5° (c)	25	0,64
Diborane	5° (ct)	25	0,072

Description of substance	Item No	Minimum test pressure MPa	Constituents (mass %)	Maximum mass of contents per litre capacity (kg)
Carbon dioxide containing 1-10 % nitrogen, oxygen, air or rare gases by mass	6a)	19	1	0,64
		19	1-10	0,48
		25	1	0,73
		25	1-10	0,59

2220 *(cont'd)*

Description of substance	Item No	Minimum test pressure MPa	Maximum mass of contents per litre capacity (kg)
Mixture of gases R 503	6a)	3,1 4,2 10	0,11 0,20 0,66
Carbon dioxide containing not more than 35 % ethylene oxide by mass	6c)	19 25	0,66 0,75
Ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide by mass	6ct)	19 25	0,66 0,75

(4) For substances of 5° other than hydrogen chloride of 5° (at); germane and phosphine of 5° (bt); and diborane of 5° (ct), and for substances of 6°, the use of receptacles tested at a lower pressure than that indicated in paragraph (3) for the substance in question is allowed, but the quantity of substance per receptacle shall not exceed that which at 65 °C would produce inside the receptacle a pressure equal to the test pressure. In such a case the permissible maximum load shall be prescribed by the expert approved by the competent authority.

2221 (1) In the case of gases dissolved under pressure, of 9°, the following values shall be complied with for the hydraulic pressure to be applied to the receptacles in the test (test pressure), and for the maximum degree of filling allowed:

Description of substance	Item No	Minimum test pressure MPa	Maximum mass of contents per litre capacity (kg)
Ammonia dissolved under pressure in water			
with more than 35 % but not more than 40 % amonia by mass	9° (at)	1	0,80
with more than 40 % but not more than 50 % amonia by mass	9° (at)	1,2	0,77
Dissolved acetylene	9° (c)	6	see under (2)

(2) In the case of dissolved acetylene of 9° (c), once equilibrium has been achieved at 15 °C the cylinder-filling pressure shall not exceed the value prescribed by the competent authority for the porous mass, which value shall be engraved on the cylinder. The quantity of solvent and the quantity of acetylene shall likewise correspond to the figures specified in the approval.

3. Mixed packing

2222 (1) Substances of this Class other than substances of 7° and 8° may be enclosed in the same package with one another if they are contained:

(a) in metal pressure-receptacles of a volume not exceeding 10 litres;

(b) in thick-walled glass tubes or glass syphons in accordance with marginals 2205 and 2206, on condition that these fragile receptacles are secured in accordance with the provisions of marginal 2001 (7). The cushioning materials shall be suited to the properties of the contents. Inner packagings shall be placed in an outer packaging in which they shall be effectively kept apart from one another.

2222 *(cont'd)* (2) Articles of 10° and 11° may be enclosed in the same package with one another under the conditions prescribed in marginal 2210.

(3) In addition, substances packed in accordance with marginal 2205 and 2206 may be enclosed in the same package with one another subject to the following special conditions.

(4) A package which meets the requirements of (1) and (3) shall not weigh more than 100 kg, or more than 75 kg if it contains fragile receptacles.

Special conditions:

Item No or letter	Description of substance	Maximum quantity		Special Provisions
		per receptacle	per package	
	Gases packed in accordance with marginal 2205: All gases listed in this marginal	In the quantities prescribed in marginal 2205	6 kg	Chlorine of 3° (at) shall not be packed together with sulphur dioxide of 3° (at)
a) at)	Non-flammable gases Non-flammable toxic gases			Shall not be packed together with substances of Classes 1, 3, 4.2, 5.2 or 7
b)	Flammable gases			Shall not be packed together with substances of Classes 1, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 7 or 8
	Gases packed in accordance with marginal 2206: All gases listed in the marginal except ammonia and cyclopropane	150 g	6 kg	
a) at)	Non-flammable gases Non-flammable toxic gases			Shall not be packed together with substances of Classes 1, 3, 4.2, 5.2 or 7
(b) (bt) (c) (ct)	Flammable gases Flammable toxic gases Chemically unstable gases Chemically unstable toxic gases			Shall not be packed together with substances of Classes 1, 3, 4.1, 4.2, 4.3, 5.1, 5.2 or 7
3° (at) 3° (b)	Ammonia Cyclopropane	20 g	6 kg	Shall not be packed together with substances of Classes 1, 3, 4.1, 4.2, 4.3, 5.1, 5.2, or 7

4. Markings and labels on packages (see Appendix A.9)

Marking

2223 (1) Every package containing receptacles holding gases of 1° to 9°, 12° or 13° or non-refillable containers of gas under pressure of 11° shall be marked legibly and indelibly with an indication of its contents, with the addition: 'Class 2'. This marking shall be in an official language of the Member State of departure, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the Member States concerned in the transport operation provide otherwise. This provision need not be complied with if the receptacles and their markings are clearly visible.

2223 *(cont'd)* (2) Packages containing aerosol dispensers of 10° shall be marked with the word 'AEROSOL' in clearly legible and indelible characters.

(3) Where a consignment constitutes a full load, the markings referred to in paragraph (1) are not mandatory.

Danger labels

2224 *Note:* A package is any packaging containing receptacles, aerosol dispensers or non-refillable containers of gas under pressure, or any receptacle without outer packaging.

(1) Packages containing substances and articles of Class 2 other than those mentioned in paragraph (2), Table 2 and in paragraph (3) of this marginal, shall bear the labels indicated below:

TABLE 1

Substances and articles	Label model Nos
Classified under (a)	2
Classified under (at)	6.1
Classified under (b)	3
Classified under (bt)	6.1, + 3
Classified under (c)	3
Classified under (ct)	6.1, + 3

(2) Packages containing substances and articles described in Table 2 below shall bear the labels indicated:

TABLE 2

Item No	Substances and articles	Label model Nos
1° (a)	Oxygen	2 + 05
1° (at)	Fluorine	6.1 + 05
1° (at)	Silicon tetrafluoride	6.1 + 8
1° (ct)	Nitric oxide	6.1
2° (a)	Mixtures with more than 25 % oxygen (volume)	2 + 05
3° (at)	Boron chloride, chlorine, chlorine trifluoride, hydrogen bromide, nitrosyl chloride and phosgene	6.1 + 8
3° (at)	Nitrogen dioxide	6.1 + 05
3° (bt)	Carbonyl sulphide	3 + 6.1 + 8
3° (ct)	Cyanogen chloride, hydrogen iodide, anhydrous	6.1 + 8
5° (a)	Nitrous oxide	2 + 05
5° (at)	Hydrogen chloride	6.1 + 8
7° (a)	Oxygen, nitrous oxide	2 + 05
8° (a)	Air and mixtures containing more than 20 % oxygen (mass), mixtures containing more than 32 % nitrous oxide (mass)	2 + 05
10° (a)	Aerosol dispensers	No label
10° (b)1	Aerosol dispensers	No label
10° (bt)1	Aerosol dispensers	6.1

(3) In conformity with the dangerous properties of the substances, packages containing substances of 12° and 13° shall bear:

— a label conforming to model No 3 for flammable gases,

— a label conforming to model No 6.1 for toxic gases,

— labels conforming to model Nos 6.1 and 8 for corrosive gases,

— labels conforming to model Nos 2 and 05 for oxidizing gases,

— labels conforming to model Nos 6.1 and 3 for flammable toxic gases,

2224 (cont'd)
— labels conforming to model Nos 3, 6.1 and 8 for flammable corrosive gases,
— a label conforming to model No 2 for gases which are not flammable, toxic, corrosive or oxidizing,
— labels conforming to model Nos 6.1 and 05 for mixtures containing fluorine and those containing nitrogen dioxide.

(4) Packages which contain receptacles made of materials liable to shatter, such as glass or certain plastics materials, shall bear a label conforming to model No 12,

(5) Every package containing gases of 7° or 8° shall bear, on two opposite sides, labels conforming to model No 11, and if the substances it contains are enclosed in glass receptacles [marginal 2207 (2) (a)], it shall, in addition, bear a label conforming to model No 12,

(6) Labels on gas cylinders may be attached to the shoulder of the cylinder and may have smaller dimensions accordingly, provided that they remain clearly visible.

2225

B. Particulars in the transport document

2226 (1) The description of the goods in the transport document must be:

(a) in the case of pure and technically-pure gases of 1°, 3°, 5°, 7° or 9°, of aerosol dispensers of 10°, of non-refillable containers of gas under pressure of 11°: one of the names printed in italics in marginal 2201;

(b) in the case of mixtures of gases of 2°, 4°, 6°, 8°, 12° or 13°: 'mixture of gases'. This description must be supplemented by an indication of the composition of the mixture of gases in volume per cent or mass per cent. Constituents below 1 % need not be indicated. In the case of mixtures of gases of 2° (a), 2° (b), 2° (bt), 4° (a), 4° (b), 4° (c), 4° (ct), 6° (a), 8° (a) or 8° (b), the descriptions or names customary in the trade which are printed in italics in marginal 2201 may likewise be used, without indication of the composition.

In the case of mixtures A, AO and C of 4° (b) carried in tanks or tank-containers, however, the names customary in the trade mentioned in the Note may be used only as a complement.

These descriptions must be followed by *particulars of the class, the item number (together with the letter, if any), and the initials 'ADR'* (or *'RID'*) e.g. 2, 5° (at), ADR.

(2) In the case of tanks containing gases of 7° (a) or 8° (a), other than carbon dioxide and nitrous oxide, the transport document shall bear the following entry:

'The tank is in permanent communication with the atmosphere'.

(3) For the carriage of cylinders in conformity with marginal 2212 (1) (a) under the conditions of marginal 2217 (3), the following entry shall be included in the transport document:

'Carriage in conformity with marginal 2217 (3)'.

2227-
2236

C. Empty packagings

2237 (1) Receptacles and tanks of 14° shall be closed in the same manner as if they were full.

(2) Uncleaned empty receptacles of 14° shall bear the same danger labels as if they were full.

2237 *(cont'd)* (3) The description in the transport document shall conform to one of the names given in 14°, e.g. 'Empty receptacle, uncleaned, 2, 14°, ADR'. The description shall be completed by adding the words 'Last load', together with the name and item number of the goods last loaded e.g. 'Last load: chlorine, 3° (at)'.

(4) The receptacles of 14° referred to in marginal 2212 (1) (a), (b) and (d) may be transported after the expiry of the time-limit set for the periodic test prescribed in marginal 2215, for the purpose of undergoing the tests.

D. Transitional provisions

2238 The following transitional provisions shall apply to receptacles for compressed or liquefied gases or gases dissolved under pressure:

(a) receptacles already in service shall, subject to the following exceptions, be accepted so long as the requirements of the Member States in which the tests in accordance with marginal 2216 were carried out so permit and as the intervals prescribed in marginals 2216 (3) and 2217 for the periodic inspections are observed;

(b) in the case of receptacles manufactured under the previous system (permissible stress two-thirds, instead of three-quarters, of the yield stress), no increase in either the test pressure or the filling pressure shall be permitted [see marginal 2211 (1)];

(c) transitional measures for tanks: see marginals 211 180 and 211 184.

(d) transitional measures for tank-containers: see marginal 212 180.

2239-2299

CLASS 3

FLAMMABLE LIQUIDS

1. List of substances

2300 (1) Among the substances and mixtures covered by the heading of Class 3, those listed in marginal 2301 or which fall under a collective heading of that marginal, and articles containing such substances, are subject to the conditions prescribed in marginals 2300 (2) to 2322 and to the provisions of this Annex and of Annex B and are consequently substances of this Directive.

Note: For the quantities of substances listed in marginal 2301 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2301a.

(2) The heading of Class 3 covers substances and articles containing substances of this Class which:

— are liquid at a maximum temperature of 20 °C, or for viscous substances for which a specific melting point cannot be determined, are highly viscous according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310), or are liquid according to the ASTM D 4359-90 test method;

— have at 50 °C a vapour pressure of not more than 300 kPa (3 bar);

— have a flashpoint of not more than 61 °C.

The heading of Class 3 also covers flammable liquid substances and molten solid substances with a flashpoint of more than 61 °C and which are carried or handed over for carriage whilst heated at temperatures equal to or higher than their flashpoint.

2300 *(cont'd)* Substances having a flashpoint above 35 °C, non-toxic and non-corrosive, which, under the test conditions given, do not sustain combustion (see Appendix A.3, marginal 3304) are excluded; if however these substances are handed over for carriage and carried whilst heated at temperatures equal to or higher than their flashpoint, they are substances of this Class.

Flammable liquids which, because of supplementary dangerous properties, are listed in, or assigned to, other classes are also excluded. The flashpoint shall be determined as indicated in Appendix A.3, marginals 3300 to 3302.

Notes: 1. For gasoil, diesel fuel, heating oil (light) (identification number 1202) having a flashpoint above 61 °C see, however, note under marginal 2301, 31° (c).

2. For substances having a flashpoint above 61 °C which are carried or handed over for carriage at or above their flashpoint, see however marginal 2301, 61° (c).

(3) The substances and articles of Class 3 are subdivided as follows:

A. Substances having a flashpoint below 23 °C not toxic, not corrosive;

B. Substances having a flashpoint below 23 °C and toxic;

C. Substances having a flashpoint below 23 °C and corrosive;

D. Substances having a flashpoint below 23 °C, toxic and corrosive and articles containing those substances;

E. Substances having a flashpoint between 23 °C and 61 °C inclusive which might be slightly toxic and/or slightly corrosive;

F. Substances and preparations used as pesticides having a flashpoint below 23 °C;

G. Substances having a flashpoint above 61 °C which are carried or handed over for carriage at or above their flashpoint;

H. Empty packagings.

Substances and articles of Class 3, other than those of 6°, 12°, 13°, and 28° classified under the various item numbers of marginal 2301 shall be assigned to one of the following groups designated by the letter (a), (b) or (c) according to their degree of danger:

letter (a): *very dangerous substances:* flammable liquids having a boiling point or initial boiling point not exceeding 35 °C, and flammable liquids having a flash-point below 23 °C, which are either highly toxic according to the criteria of marginal 2600 or highly corrosive according to the criteria of marginal 2800;

letter (b): *dangerous substances:* flammable liquids having a flash-point below 23 °C which are not classified under letter (a), with the exception of substances of marginal 2301, 5° (c);

letter (c): *substances presenting a minor danger:* flammable liquids having a flashpoint of 23 °C to 61 °C inclusive and substances of marginal 2301, 5° (c).

(4) If substances of Class 3, as a result of admixtures, come into different categories of risk from those to which the substances specifically named in marginal 2301 belong, these mixtures or solutions shall be assigned to the items and letters to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(5) On the basis of the test procedures in accordance with Appendix A.3, marginals 3300 to 3302, 3304 and 3310, and the criteria set out in (2), it may also be determined whether the nature of a solution or a mixture specifically named or containing a specifically named substance is such that the solution or mixture is not subject to the provisions for this Class.

(6) Certain highly toxic flammable liquid substances having a flashpoint below 23 °C are substances of Class 6.1 (marginal 2601, 1° to 10°).

2300 *(cont'd)* (7) Substances of Class 3 which are liable to form peroxides easily (as happens with ethers or with certain heterocyclic oxygenated substances) are to be accepted for carriage only if their peroxide content, calculated as hydrogen peroxide (H_2O_2), does not exceed 0,3 %. The peroxide content shall be determined as indicated in Appendix A.3, marginal 3303.

(8) The chemically unstable substances of Class 3 are to be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall in particular be ensured that receptacles do not contain any substance liable to promote these reactions.

A. Substances having a flashpoint below 23 °C, not toxic, not corrosive

2301 1° Substances, solutions and mixtures (such as preparations and wastes) having a vapour pressure at 50 °C of more than 175 kPa (1,75 bar):

(a) *1089 acetaldehyde* (ethanal), *1108 1-pentene* (n-amylene), *1144 crotonylene* (2-butyne), *1243 methyl formate, 1265 pentanes,* liquid (isopentane), *1267 petroleum crude oil, 1303 vinylidene chloride, inhibited (1,1-dichloroethylene, inhibited), 1308 zirconium suspended in a flammable liquid, 1863 fuel, aviation, turbine engine, 2371 isopentenes, 2389 furan, 2456 2-chloropropene, 2459 2-methyl-1-butene, 2561 3-methyl-1-butene* (1-isoamylene) (isopropylethylene), *2749 tetramethylsilane, 1268 petroleum distillates, n.o.s.* or *1268 petroleum products, n.o.s, 3295 hydrocarbons, liquid, n.o.s., 1993 flammable liquid, n.o.s.*

2° Substances, solutions and mixtures (such as preparations and wastes) having a vapour pressure at 50 °C of more than 110 kPa (1,10 bar) but not more than 175 kPa (1,75 bar):

(a) *1155 diethyl ether (ethyl ether), 1167 divinyl ether inhibited, 1218 isoprene, inhibited, 1267 petroleum crude oil, 1280 propylene oxide, inhibited, 1302 vinyl ethyl ether, inhibited, 1308 zirconium suspended in a flammable liquid, 1863 fuel, aviation, turbine engine, 2356 2-chloropropane, 2363 ethyl mercaptan, 1268 petroleum distillates, n.o.s. or 1268 petroleum products, n.o.s., 3295 hydrocarbons, liquid, n.o.s., 1993 flammable liquid, n.o.s.;*

(b) *1164 dimethyl sulphide, 1234 methylal* (dimethoxymethane), *1265 pentanes,* liquid (n-pentane), *1267 petroleum crude oil, 1278 1-chloropropane* (propyl chloride), *1308 zirconium suspended in a flammable liquid, 1863 fuel, aviation, turbine engine, 2246 cyclopentene, 2460 2-methyl-2-butene, 2612 methyl propyl ether, 1224 ketones, n.o.s., 1987 alcohols, flammable, n.o.s., 1989 aldehydes, flammable, n.o.s., 1268 petroleum distillates, n.o.s.* or *1268 petroleum products, n.o.s., 3295 hydrocarbons, liquid, n.o.s., 1993 flammable liquid n.o.s.*

3° Substances, solutions and mixtures (such as preparations and wastes) having a vapour pressure at 50 °C of not more than 110 kPa (1,10 bar):

(b) *1203 motor spirit, 1267 petroleum crude oil, 1863 fuel aviation, turbine engine, 1268 petroleum distillates, n.o.s.* or *1268 petroleum products, n.o.s.*

Note: While in some climatic conditions petrol (gasoline) may have a vapour pressure at 50 °C of more than 110 kPa (1,10 bar) but not more than 150 kPa (1,50 bar), it is to continue to be classified under this item number.

Hydrocarbons:

1114 benzene, 1136 coal tar distillates, 1145 cyclohexane, 1146 cyclopentane, 1175 ethylbenzene, 1206 heptanes, 1208 hexanes, 1216 isooctenes, 1262 octanes, 1288 shale oil, 1294 toluene, 1300 turpentine substitute (white spirit), *1307 xylenes 2301* (o-xylene; dimethylbenzenes), *2050 diisobutylene, isomeric compounds, 2057 tripropylene* (propylene trimer), *2241 cycloheptane, 2242 cycloheptene, 2251 bicyclo-(2.2.1) -hepta-2,5-diene, inhibited (2,5-norbornadiene, inhibited), 2256 cyclohexene, 2263 dimethylcyclohexanes, 2278 n-heptene, 2287 isoheptenes, 2288 isohexenes, 2296 methylcyclohexane, 2298 methylcyclopentane, 2309 octadienes, 2358 cyclooctatetraene, 2370 1-hexene, 2457 2,3-dimethylbutane, 2458 hexadienes, 2461 methylpentadienes, 3295 hydrocarbons, liquid, n.o.s.;*

2301 (cont'd)

Halogenated substances:

1107 amyl chlorides, 1126 1-bromobutane, (n-butyl bromide), 1127 chlorobutanes (butyl chlorides), 1150 1,2-dichloroethylene, 1279 1,2-dichloropropane, (propylene dichloride) 2047 dichloropropenes, 2338 benzotrifluoride, 2339 2-bromobutane, 2340 2-bromoethyl ethyl ether, 2342 bromomethylpropanes, 2343 2-bromopentane, 2344 bromopropanes, 2345 3-bromopropyne, 2362 1,1-dichloroethane (ethylidene chloride), *2387 fluorobenzene, 2388 fluorotoluenes, 2390 2-iodobutane, 2391 iodomethylpropanes, 2554 methylallyl chloride;*

Alcohols:

1105 amyl alcohols, 1120 butanols, 1148 diacetone alcohol technical, *1170 ethanol (ethyl alcohol)* or *1170 ethanol (ethyl alcohol)* in aqueous *solution* containing more than 70 % alcohol by volume, *1219 isopropanol (isopropyl alcohol), 1274 n-propanol (propyl alcohol, normal), 3065 alcoholic beverages* containing more than 70 % alcohol by volume, *1987 alcohols, flammable, n.o.s.;*

Note: Alcoholic beverages containing more than 24 % and not more than 70 % alcohol by volume are substances of 31° (c).

Ethers:

1088 acetal (1,1-diethoxyethane), *1159 diisopropyl ether, 1165 dioxane, 1166 dioxolane, 1179 ethyl butyl ether, 1304 vinyl isobutyl ether, inhibited, 2056 tetrahydrofuran, 2252 1,2-dimethoxyethane, 2301 2-methylfuran, 2350 butyl methyl ether, 2352 butyl vinyl ether, inhibited, 2373 diethoxymethane, 2374 3,3-diethoxypropene, 2376 2,3-dihydropyran, 2377 1,1-dimethoxyethane, 2384 di-n-propyl ether, 2398 methyl tert-butyl ether, 2536 methyltetrahydrofuran, 2615 ethyl propyl ether, 2707 dimethyldioxanes, 3022 1,2-butylene oxide, stabilized, 3271 ethers, n.o.s.;*

Aldehydes:

1129 butyraldehyde, 1178 2-ethylbutyraldehyde, 1275 propionaldehyde, 2045 isobutyraldehyde (isobutyl aldehyde), *2058 valeraldehyde, 2367 alpha-methylvaleraldehyde, 1989 aldehydes, flammable, n.o.s.;*

Ketones:

1090 acetone, 1156 diethyl ketone, 1193 methyl ethyl ketone (ethyl methyl ketone), 1245 methyl isobutyl ketone, 1246 methyl isopropenyl ketone, inhibited, 1249 methyl propyl ketone, 1251 methyl vinyl ketone, 2346 butanedione (diacetyl), *2397 3-methylbutan-2-one, 1224. ketones, n.o.s.;*

Esters:

1123 butyl acetates, 1128 n-butyl formate, 1161 dimethyl carbonate, 1173 ethyl acetate, 1176 ethyl borate, 1190 ethyl formate, 1195 ethyl propionate, 1213 isobutyl acetate, 1220 isopropyl acetate, 1231 methyl acetate, 1237 methyl butyrate, 1247 methyl methacrylate monomer, inhibited, 1248 methyl propionate, 1276 n-propyl acetate, 1281 propyl formates, 1301 vinyl acetate, inhibited, 1862 ethyl crotonate, 1917 ethyl acrylate, inhibited, 1919 methyl acrylate inhibited, 2277 ethyl methacrylate, 2385 ethyl isobutyrate, 2393 isobutyl formate, 2394 isobutyl propionate, 2400 methyl isovalerate, 2403 isopropenyl acetate, 2406 isopropyl isobutyrate, 2409 isopropyl propionate, 2416 trimethyl borate, 2616 triisopropyl borate, 2838 vinyl butyrate, inhibited, 3272 esters, n.o.s.;

Substances containing sulphur:

1111 amyl mercaptans, 2347 butyl mercaptans, 2375 diethyl sulphide, 2381 dimethyl disulphide, 2402 propanethiols (propyl mercaptans), *2412 tetrahydrothiophene* s(thiolanne), *2414 thiophene, 2436 thioacetic acid;*

Substances containing nitrogen:

1113 amyl nitrites, 1222 isopropyl nitrate, 1261 nitromethane, 1282 pyridine, 1648 acetonitrile (methyl cyanide), *1865 n-propyl nitrate, 2351 butyl nitrites, 2372 1,2 di-(dimethylamino) ethane* (tetramethylethylenediamine), *2410 1, 2, 3, 6-tetrahydropyridine;*

Other flammable substances and mixtures and preparations containing flammable liquids:

1091 acetone oils, 1201 fusel oil, 1293 tinctures, medicinal, 1308 zirconium suspended in a flammable liquid, 2380 dimethyldiethoxysilane, 1993 flammable liquid, n.o.s.

Note: For viscous substances, mixtures and preparations, see 5°.

2301 *(cont'd)*

4° Solutions of nitrocellulose in mixtures of substances of 1° to 3° containing more than 20 % but not more than 55 % nitrocellulose with a nitrogen content not exceeding 12,6 % (by dry mass):

(a) *2059 nitrocellulose solution, flammable;*

(b) *2059 nitrocellulose solution, flammable.*

Notes: 1. Mixtures having a flashpoint below 23 °C and containing:

— more than 55 % nitrocellulose, whatever its nitrogen content, or

— containing not more than 55 % nitrocellulose with a nitrogen content above 12,6 % (by dry mass),

are substances of Class 1, (see marginal 2101, 4°, identification number 0340, or 26°, identification number 0342), or of Class 4.1 (see marginal 2401, 24°).

2. Mixtures containing 20 % or less nitrocellulose with a nitrogen content not exceeding 12.6 % (by dry mass) are substances of 5°.

5° Liquid or viscous mixtures and preparations, including those containing 20 % or less nitrocellulose with a nitrogen content not exceeding 12,6 % (by dry mass):

(a) having a boiling point or initial boiling point not exceeding 35 °C provided that they do not come under (c):

1133 adhesives, 1139 coating solution, 1169 extracts, aromatic, liquid, 1197 extracts, flavouring, liquid, 1210 printing ink, 1263 paint (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *1263 paint related material* (including paint thinning or reducing compound), *1266 perfumery products, 1286 rosin oil, 1287 rubber solution, 1866 resin solution;*

(b) having a boiling point or initial boiling point exceeding 35 °C provided that they do not come under (c):

1133 adhesives, 1139 coating solution, 1169 extracts, aromatic, liquid, 1197 extracts, flavouring, liquid, 1210 printing ink, 1263 paint (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *1263 paint related material* (including paint thinning or reducing compound), *1266 perfumery products, 1286 rosin oil, 1287 rubber solution, 1306 wood preservatives, 1866 resin solution, 1999 tars, liquid* including road asphalt and oils, bitumen and cut backs, *3269 polyester resin kit;*

(c) *1133 adhesives, 1139 coating solution, 1169 extracts, aromatic, liquid, 1197 extracts, flavouring, liquid, 1210 printing ink, 1263 paint* (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *1263 paint related material* (including paint thinning or reducing compound), *1266 perfumery products, 1286 rosin oil, 1287 rubber solution 1306 wood preservatives liquid, 1866 resin solution, 1999 tars, liquid* including road asphalt and oils, bitumen and cut backs, *3269 polyester resin kit, 1993 flammable liquid, n.o.s.*

Classification under letter (c) is only possible if the following requirements are met:

1. that the height of the separated layer of solvent is less than 3 % of the total height in the solvent-separation test; [1] and

[1] *Solvent-separation test:* This test is carried out at 23 °C using a 100 ml graduated measuring cylinder of the stoppered type of approximately 25 cm total height and of a uniform internal diameter of approximately 3 cm over the calibrated section. The substance should be stirred to obtain a uniform consistency and poured into the measuring cylinder up to the 100 ml mark. The stopper should be inserted and the cylinder left standing undisturbed for 24 hours. After 24 hours the height of the upper separated layer should be measured and layer's height as a percentage of the total height of the sample should be calculated.

2301 (cont'd)

2. that the viscosity (1) and flash-point are in accordance with the following table:

Kinematic viscosity (extrapolated) (at (near-zero shear rate) mm^2/s at 23 °C	Flow time t in accordance with ISO 2431:1984		Flashpoint in °C
	in s	Jet diameter in mm	
$20 < \gamma \leq 80$	$20 < t \leq 60$	4	above 17
$80 < \gamma \leq 135$	$60 < t \leq 100$	4	above 10
$135 < \gamma \leq 220$	$20 < t \leq 32$	6	above 5
$220 < \gamma \leq 300$	$32 < t \leq 44$	6	above – 1
$300 < \gamma \leq 700$	$44 < t \leq 100$	6	above – 5
$700 < \gamma$	$100 < t$	6	– 5 and below

Notes: 1. Mixtures containing more than 20 % but not more than 55 % nitrocellulose with a nitrogen content not exceeding 12,6 % by dry mass are substances of 4°.

Mixtures having a flashpoint below 23 °C and containing:

— more than 55 % nitrocellulose, whatever their nitrogen content; or

— not more than 55 % nitrocellulose with a nitrogen content above 12,6 % by dry mass,

are substances of Class 1 (see marginal 2101, 4°, No 0340, or 22°, No 0342) or of Class 4.1 (see marginal 2401, 24°).

2. No substances of this Directive listed by name under other entries may be carried under the entry 1263 Paint or 1263 Paint related material. Substances carried under identification number 1263 may contain not more than 20 % nitrocellulose provided that the nitrogen content does not exceed 12,6 % by dry mass.

3. 3269 Polyester resin kits have two components: a basic product [Class 3, Group (b) or (c)], and an activator (organic peroxide), each packed separately in an inner packaging. The organic peroxide shall be of types D, E or F, not requiring temperature regulation and restricted to 125 ml liquid and 500 g solid per inner packaging. The components may be placed in the same outer packaging, provided that they do not react dangerously with each other in the event of leakage.

6° *3064 nitroglycerin solution in alcohol* with more than 1 % but not more than 5 % nitroglycerin.

Note: Special packing conditions are applicable for this substance (see marginal 2303); see also Class 1, marginal 2101, 4°, identification number 0144.

7° (b) *1204 nitroglycerin solution in alcohol* with not more than 1 % nitroglycerin.

B. Substances having a flashpoint below 23 °C and toxic

Notes: 1. Toxic substances having a flashpoint of 23 °C or above, and some substances listed by name in 1° to 10° of marginal 2601 are substances of Class 6.1.

2. For toxicity criteria, see marginal 2600.

(1) *Viscosity determination:* Where the substance concerned is non-Newtonian, or where a flow cup method of viscosity determination is otherwise unsuitable, a variable shear-rate viscometer of the substance, at 23 °C, at a number of shear rates, the values obtained are plotted against shear rate and then extrapolated to zero shear rate. The dynamic viscosity thus obtained, divided by the density, gives the apparent kinematic viscosity at near-zero shear rate.

2301 *(cont'd)*

11° Nitriles or isonitriles (isocyanides):

(a) *1093 acrylonitrile, inhibited, 3079 methacrylonitrile, inhibited, 3273 nitriles, flammable, toxic, n.o.s.;*

(b) *2284 isobutyronitrile, 2378 2-dimethyl-aminoacetonitrile, 2404 propionitrile, 2411 butyronitrile, 3273 nitriles, flammable, toxic, n.o.s.*

12° *1921 propyleneimine, inhibited.*

Note: Special packing conditions are applicable for this substance (see marginal 2304).

13° *2481 Ethyl isocyanate.*

Note: Special packing conditions are applicable for this substance (see marginal 2304).

14° Other isocyanates:

(a) *2483 isopropyl isocyanate, 2605 methoxymethyl isocyanate;*

(b) *2486 isobutyl isocyanate, 2478 isocyanates, flammable, toxic, n.o.s.,* or *2478 isocyanates solution, flammable, toxic, n.o.s.*

Note: Solutions of isocyanates having a flashpoint of not less than 23 °C are substances of Class 6.1 (see marginal 2601, 18° or 19°).

15° Other substances containing nitrogen:

(a) *1194 ethyl nitrite, solution.*

16° Halogenated organic substances:

(a) *1099 allyl bromide, 1100 allyl chloride, 1991 chloroprene, inhibited;*

(b) 1184 ethylene dichloride (1,2-dichloroethane), *2354 chloromethyl ethyl ether.*

17° Oxygenated organic substances:

(a) *2336 allyl formate, 2983 ethylene oxide and propylene oxide mixture,* with not more than 30 % ethylene oxide, *1986 alcohols, flammable, toxic, n.o.s., 1988 aldehydes, flammable, toxic, n.o.s.;*

(b) 1230 methanol, 2333 allyl acetate, 2335 allyl ethyl ether, 2360 diallyl ether, 2396 methacrylaldehyde, inhibited, 2622 glycidaldehyde, 1986 alcohols, flammable, toxic, n.o.s., 1988 aldehydes, flammable, toxic, n.o.s.

18° Organic substances containing sulphur:

(a) *1131 carbon disulphide* (carbon sulphide);

(b) *1228 mercaptans, liquid, flammable, toxic, n.o.s.,* or *1228 mercaptan mixture, liquid, flammable, toxic, n.o.s.*

19° Substances, solutions and mixtures (such as preparations and wastes), having a flashpoint below 23 °C and toxic which cannot be classified under another collective heading:

(a) *1992 flammable liquid, toxic, n.o.s.;*

(b) 2603 cycloheptatriene, 3248 medicine, liquid, flammable, toxic, n.o.s., 1992 flammable liquid, toxic, n.o.s.

Note: Pharmaceutical products ready for use, e.g. cosmetics, drugs and medicines, which are substances manufactured and packed in packagings of a type intended for retail sale or distribution for personal or household consumption, which would otherwise be substances of item 19° (b), are not subject to the provisions of this Directive.

2301 (cont'd)

C. Substances having a flashpoint below 23 °C and corrosive

Notes: 1. Corrosive liquids having a flashpoint of 23 °C or above are substances of Class 8 (see marginal 2801).

2. Certain flammable corrosive liquids having a flashpoint below 23 °C and a boiling point above 35 °C are substances of Class 8 [see marginal 2800 (7) (a)].

3. For corrosivity criteria, see marginal 2800.

21° Chlorosilanes:

(a) *1250 methyltrichlorosilane, 1305 vinyltrichlorosilane, inhibited;*

(b) 1162 dimethyldichlorosilane, 1196 ethyltrichlorosilane, 1298 trimethylchlorosilane, 2985 chlorosilanes, flammable, corrosive, n.o.s.

Note: Chlorosilanes which give off flammable gases on contact with water are substances of Class 4.3, 1° (a) [see marginal 2471, 1° (a)].

22° Amines and their solutions:

(a) *1221 isopropylamine, 1297 trimethylamine, aqueous solution* containing 30 % to 50 % trimethylamine (by mass), *2733 amines, flammable, corrosive, n.o.s. or 2733 polyamines, flammable, corrosive, n.o.s.;*

(b) 1106 amylamines (n-amylamine, tert-amylamine), *1125 n-butylamine, 1154 diethylamine, 1158 diisopropylamine, 1160 dimethylamine aqueous solution, 1214 isobutylamine, 1235 methylamine, aqueous solution, 1277 propylamine, 1296 triethylamine, 1297 trimethylamine, aqueous solution* with not more than 30 % trimethylamine by mass, *2266 N,N-dimethylpropylamine* (dimethyl-N-propylamine), *2270 ethylamine aqueous solution* with not less than 50 % but not more than 70 % ethylamine (by mass), *2379 1, 3- dimethylbutylamine, 2383 dipropylamine, 2945 N-methylbutylamine, 2733 amines, flammable, corrosive, n.o.s.* or *2733 polyamines, flammable, corrosive, n.o.s.*

Note: Anhydrous dimethylamine, ethylamine, methylamine and trimethylamine are substances of Class 2 [see marginal 2201, 3° (bt)].

23° Other substances containing nitrogen:

(b) *1922 pyrrolidine, 2386 1-ethylpiperidine, 2399 1-methylpiperidine, 2401 piperidine, 2493 hexamethyleneimine, 2535 4-methylmorpholine (N-methylmorpholine).*

24° Solutions of alcoholates:

(b) *1289 sodium methylate solution* in alcohol, *3274 alcoholates solution, n.o.s.* in alcohol.

25° Other halogenated corrosive substances:

(b) *1717 acetyl chloride, 1723 allyl iodide, 1815 propionyl chloride, 2353 butyryl chloride, 2395 isobutyryl chloride.*

26° Substances, solutions and mixtures (such as preparations and wastes) having a flashpoint below 23 °C and highly corrosive, corrosive or slightly corrosive which cannot be classified under another collective heading:

(a) *2924 flammable liquid, corrosive, n.o.s.;*

(b) 2924 flammable liquid, corrosive, n.o.s.

D. Substances having a flashpoint below 23 °C, toxic and corrosive and articles containing those substances

27° (a) *3286 flammable liquid, toxic, corrosive, n.o.s.;*

(b) 2359 diallylamine, 3286 flammable liquid, toxic, corrosive, n.o.s.

28° *3165 aircraft hydraulic power unit fuel tank* containing a mixture of anhydrous hydrazine and methylhydrazine.

Note: Special packing conditions are applicable for these tanks (see marginal 2309).

2301 (cont'd)

E. Substances having a flashpoint between 23 °C and 61 °C inclusive which might be slightly toxic or slightly corrosive

Note: Non-toxic and non-corrosive solutions and homogeneous mixtures having a flashpoint of 23 °C or above (viscous substances, such as paints or varnishes, excluding substances containing more than 20 % nitrocellulose) packed in receptacles of less than 450 litres capacity, are subject only to the requirements of marginal 2314 if, in the solvent-separation test, as described in footnote [1] to 5°, the height of the separated layer of solvent is less than 3 % of the total height, and if the substances at 23 °C have, in the flow cup conforming to ISO 2431:1984 having a jet 6 mm in diameter, a flow time of:

(a) not less than 60 seconds, or

(b) not less than 40 seconds and contain not more than 60 % of substances of Class 3.

31° Substances, solutions and mixtures (such as preparations and wastes) having a flashpoint between 23 °C and 61 °C inclusive, not slightly toxic and not slightly corrosive:

(c) *1202 diesel fuel* or *1202 gasoil* or *1202 heating oil (light), 1223 kerosene, 1267 petroleum crude oil, 1863 fuel, aviation, turbine engine, 1268 petroleum distillates, n.o.s.* or *1268 petroleum products, n.o.s.*

Note: By derogation from marginal 2300 (2), diesel fuel, gasoil and heating oil (light) having a flashpoint above 61 °C shall be deemed substances of 31° (c), substance identification number 1202.

Hydrocarbons:

1136 coal tar distillates, 1147 decahydronaphthalene (decalin), *1288 shale oil, 1299 turpentine, 1300 turpentine substitute* (white spirit), *1307 xylenes* (m-xylene, p-xylene, dimethylbenzenes), *1918 isopropylbenzene* (cumene), *1920 nonanes, 1999 tars, liquid* including road asphalt and oils, bitumen and cut backs, *2046 cymenes* (o-,m-,p-) (methyl isopropyl benzenes), *2048 dicyclopentadiene, 2049 diethyl benzenes* (o-,m-,p-), *2052 dipentene* (limonene), *2055 styrene monomer, inhibited* (vinylbenzene monomer inhibited), *2057 tripropylene* (propylene trimer), *2247 n-decane, 2286 pentamethylheptane* (isododecane), *2303 isopropenylbenzene, 2324 triisobutylene, 2325 1,3,5-trimethylbenzene* (mesitylene), *2330 undecane, 2364 n-propylbenzene, 2368 alpha-pinene, 2520 cyclooctadienes, 2541 terpinolene, 2618 vinyltoluenes, inhibited* (o-,m-,p-),*2709 butylbenzenes, 2850 propylene tetramer (tetrapropylene), 2319 terpene hydrocarbons, n.o.s., 3295 hydrocarbons, liquid, n.o.s.;*

Halogenated substances:

1134 chlorobenzene (phenyl chloride), *1152 dichloropentanes, 2047 dichloropropenes, 2234 chlorobenzotrifluorides* (o-,m-,p-), *2238 chlorotoluenes* (o-,m-,p-), *2341 1-bromo-3-methylbutane, 2392 iodopropanes, 2514 bromobenzene, 2711 m-dibromobenzene;*

Alcohols:

1105 amyl alcohols, 1120 butanols, 1148 diacetone alcohol chemically pure, *1170 ethanol solution (ethyl alcohol solution)* containing more than 24 % and not more than 70 % alcohol, *1171 ethylene glycol monoethyl ether* (2-ethoxyethanol), 1188 ethylene glycol monomethyl ether (2-methoxyethanol), *1212 isobutanol* (isobutyl alcohol), *1274 n-propanol, (propyl alcohol, normal), 2053 methyl isobutyl carbinol* (methyl amyl alcohol), *2244 cyclopentanol, 2275 2-ethylbutanol, 2282 hexanols, 2560 2-methylpentan-2-ol, 2614 methallyl alcohol, 2617 methylcyclohexanols,* flammable, *2686 diethylaminoethanol, 3065 alcoholic beverages* containing not more than 24 % and not more than 70 % alcohol by volume, *3092 1-methoxy-2-propanol, 1987 alcohols, flammable, n.o.s.;*

Notes: 1. Aqueous solutions of ethyl alcohol and alcoholic beverages containing not more than 24 % alcohol by volume are not subject to the provisions of this Directive.

2. Alcoholic beverages containing more than 24 % and not more than 70 % alcohol by volume are subject to the provisions of this Directive only if carried in receptacles with a capacity of more than 250 litres or in tank-vehicles, tank-containers or demountable tanks.

2301 *(cont'd)*

Ethers:

1149 dibutyl ethers, 1153 ethylene glycol diethyl ether (1, 2-diethoxyethane), *2219 allyl glycidyl ether, 2222 anisole* (phenyl methyl ether), *2707 dimethyldioxanes, 2752 1,2-epoxy-3-ethoxypropane, 3271 ethers, n.o.s.;*

Aldehydes:

1191 octyl aldehydes (ethylhexaldehydes) (2-ethylhexaldehyde) (3-ethylhexaldehyde), *1199 furfural* (furfuraldehyde), *1207 hexaldehyde, 1264 paraldehyde, 2498 1,2,3,6-tetrahydrobenzaldehyde, 2607 acrolein dimer, stabilized, 3056 n-heptaldehyde, 1989 aldehydes, flammable, n.o.s.;*

Ketones:

1110 n-amyl methyl ketone, 1157 diisobutyl ketone, 1229 mesityl oxide, 1915 cyclohexanone, 2245 cyclopentanone, 2271 ethyl amyl ketones,2293 4-methoxy-4 methylpentan-2-one, 2297 methylcyclohexanones, 2302 5-methylhexan-2-one, 2310 pentan-2,4-dione (acetylacetone), *2621 acetyl methyl carbinol, 2710 dipropyl ketone, 1224 ketones, n.o.s.;*

Esters:

1104 amyl acetates, 1109 amyl formates, 1123 butyl acetates, 1172 ethylene glycol monoethyl ether acetate (2-ethoxyethyl acetate), *1177 ethylbutyl acetate, 1180 ethyl butyrate, 1189 ethylene glycol monomethyl ether acetate, 1192 ethyl lactate, 1233 methylamyl acetate, 1292 tetraethyl silicate, 1914 n-butyl propionate, 2227 n-butyl methacrylate, inhibited, 2243 cyclohexyl acetate, 2283 isobutyl methacrylate, inhibited, 2323 triethyl phosphite, 2329 trimethyl phosphite, 2348 n-butyl acrylate inhibited, 2366 diethyl carbonate* (ethyl carbonate), *2405 isopropyl butyrate, 2413 tetrapropyl orthotitanate, 2524 ethyl orthoformate, 2527 isobutyl acrylate inhibited, 2528 isobutyl isobutyrate, 2616 triisopropyl borate, 2620 amyl butyrates, 2708 butoxyl* (3-methoxy-1-acetoxybutane), *2933 methyl 2-chloropropionate, 2934 isopropyl 2-chloropropionate, 2935 ethyl 2-chloropropionate, 2947 isopropyl chloroacetate, 3272 esters, n.o.s;*

Substances containing nitrogen:

1112 amyl nitrates, 2054 morpholine, 2265 N,N-dimethylformamide, 2313 picolines (methylpyridines) *2332 acetaldehyde oxime, 2351 butyl nitrites, 2608 nitropropanes, 2840 butyraldoxime, 2842 nitroethane,2906 triisocyanatoisocyanurate of isophoronediisocyanate, solution* (70 % by mass), *2943 tetrahydrofurfurylamine;*

Substances containing sulphur:

3054 cyclohexyl mercaptan;

Other flammable substances, mixtures and preparations containing flammable liquids:

1130 camphor oil, 1133 adhesives, 1139 coating solution, 1169 extracts, aromatic, liquid, 1197 extracts, flavouring, liquid, 1201 fusel oil, 1210 printing ink, 1263 paint (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *1263 paint related material* (including paint thinning or reducing compound), *1266 perfumery products, 1272 pine oil, 1286 rosin oil, 1287 rubber solution, 1293 tinctures, medicinal, 1306 wood preservatives, liquid, 1308 zirconium suspended in a flammable liquid, 1866 resin solution, 3269 polyester resin kits, 1993 flammable liquid, n.o.s.*

Notes: 1. Mixtures containing more than 20 % but not more than 55 % nitrocellullose with a nitrogen content not exceeding 12,6 % (by dry mass) are substances of 34° (c).

2. For 3269 polyester resin kits, see 5° note 3.

32° Substances, solutions and mixtures (such as preparations and wastes) having a flashpoint between 23 °C and 61 °C inclusive, slightly toxic:

(c) *2841 di-n-amylamine, 1228 mercaptans, liquid, flammable, toxic, n.o.s.* or *1228 mercaptan mixture, liquid, flammable, toxic, n.o.s., 1986. alcohols flammable, toxic, n.o.s., 1988 aldehydes flammable, toxic, n.o.s., 2478 isocyanates, flammable, toxic, n.o.s.* or *2478 isocyanate solution, flammable, toxic, n.o.s., 3248 medicine, liquid, flammable, toxic, n.o.s., 1992 flammable, liquid, toxic, n.o.s.*

Note: Pharmaceutical products ready for use, e.g. cosmetics, drugs and medicines, which are substances manufactured and packed in packagings of a type intended for retail sale or distribution for personal or household consumption, which would otherwise be substances of 32° (c) are not subject to the provisions of this Directive.

2301 *(cont'd)*

33° Substances, solutions and mixtures (such as preparations and wastes) having a flashpoint between 23 °C and 61 °C inclusive, slightly corrosive:

(c) *1106 amylamine* (sec-amylamine), *1198 formaldehyde solution, flammable, 1289 sodium methylate solution* in alcohol, *1297 trimethylamine, aqueous solution* (not more than 30 % trimethylamine, by mass), *2260 tripropylamine, 2276 2-ethylhexylamine, 2361 diisobutylamine, 2526 furfurylamine, 2529 isobutyric acid, 2530 isobutyric anhydride, 2610 triallylamine, 2684 diethylaminopropylamine, 2733 amines, flammable, corrosive, n.o.s.* or *2733 polyamines, flammable, corrosive, n.o.s., 2924 flammable liquid, corrosive, n.o.s.*

34° Solutions of nitrocellulose in mixtures of substances of 31° (c) containing more than 20 % but not more than 55 % nitrocellulose with a nitrogen content not exceeding 12.6 % (by dry mass):

(c) *2059 nitrocellulose solution, flammable.*

Note: Mixtures containing more than 55 % nitrocellulose, whatever its nitrogen content, or containing not more than 55 % nitrocellulose with a nitrogen content above 12.6 % (by dry mass), are substances of Class 1 (see marginal 2101, 4°, identification number 0340 or 26°, identification number 0342) or of Class 4.1 (see marginal 2401, 24°).

F. Substances and preparations used as pesticides having a flashpoint below 23 °C

Notes: 1. Flammable liquid substances and preparation, used as pesticides, which are highly toxic, toxic or slightly toxic and have a flashpoint of 23 °C or above are substances of Class 6.1 (see marginal 2601, 71° to 87°).

2. In the tables, pesticides are subdivided into items 41° to 57° as follows:

— highly toxic substances and preparations

— toxic substances and preparations

— slightly toxic substances and preparations.

3. All active substances and their preparations used as pesticides shall be classified under 41° to 57° highly toxic, toxic and slightly toxic in accordance with marginal 2600 (3).

4. If only the LD_{50} value of the active substance is known and not that of the preparations of the active substance, the preparations may be classified under 41° to 57° highly toxic, toxic and harmful using the following tables, where the figures shown in columns 'highly toxic', 'toxic' and 'slightly toxic' of 41° to 57° represent the percentage of active pesticide substance in the preparations.

5. For substances which are not named in the list, and for which only the LD_{50} value of the active substance is known and not the LD_{50} values of the various preparations, the classification of a preparation may be determined from the table in marginal 2600(3), using an LD_{50} value obtained by multiplying the LD_{50} value of the active substance by 100, x being the percentage of active substance by mass according to the following formula:

$$LD_{50}\text{ value} = \frac{LD_{50}\text{ value of the active substance} \times 100}{\text{percentage of active substance by mass}}$$

6. The classification according to notes 4 and 5 above shall not be used when the preparations contain additives which affect the toxicity of the active substance or when a preparation contains more than one active substance. In such cases the classification shall be based on the LD_{50} value of the preparation in question according to the criteria in marginal 2600 (3). If the LD_{50} value is not known, the substance shall be classified under highly toxic of 41° to 57°.

2301 (cont'd) 41° *2784 organophosphorus pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic; such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Azinphos-ethyl	—	100->25	25-2
Azinphos-methyl	—	100->10	10-1
Bromophos-ethyl	—	—	100-14
Carbophenotion	—	100->20	20-2
Chlorfenvinphos	—	100->20	20-2
Chlormephos	—	100->15	15-1
Chlorpyriphos	—	—	100-10
Chlorthiophos	—	100->15	15-1
Crotoxyphos	—	—	100-15
Crufomate	—	—	100-90
Cyanophos	—	—	100-55
DLF	—	—	100-40
Demethion	100->0	—	—
Demeton	100->30	30->3	3->0
Demeton-O-(Systox)	100->34	34->3,4	3,4-0,34
Demeton-O-methyl	—	—	100-35
Demeton-S-methyl	—	100->80	80-10
Demeton-S-methylsulfone	—	100->74	74-7,4
Dialifos	—	100->10	10-1
Diazinon	—	—	100-15
Dichlofenthion	—	—	100-54
Dichlorvos	—	100->35	35-7
Dicrotophos	—	100->25	25-2
Dimefox	100->20	20->2	2->0
Dimethoate	—	—	100-29
Dioxathion	—	100->40	40-4
Disulfoton	100->40	40->4	4->0
Edifenphos	—	—	100-30
Endothion	—	100->45	45-4
EPN	100->62	62->12,5	12,5-2,5
Ethion	—	100->25	25-2
Ethoate-methyl	—	—	100-25
Ethoprophos	100->65	65->13	13-2
Fenaminphos	100->40	40->4	4->0
Fenitrothion	—	—	100-48
Fensulfothion	100->40	40->4	4->0
Fenthion	—	—	100-38
Fonophos	100->60	60->6	6-0,5
Formothion	—	—	100-65
Heptenophos	—	—	100-19
Iprobenfos	—	—	100-95
Isofenfos	—	100->60	60-6
Isothioate	—	—	100-25
Isoxathion	—	—	100-20
Mecarbam	—	100->30	30-3
Mephosfolan	100->25	25->5	5-0,5
Methamidophos	—	100->15	15-1,5
Methidathion	—	100->40	40-4
Methyltrithion	—	—	100-19
Mevinphos	100->60	60->5	5-0,5
Monocrotophos	—	100->25	25-2,5
Naled	—	—	100-50
Omethoate	—	—	100-10

2301 *(cont'd)*

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Oxydemeton-methyl	—	100->93	93-9
Oxydisulfoton	100->70	70->5	5-0,5
Paraoxon	100->35	35->3,5	3,5-0,35
Parathion	100->40	40->4	4-0,4
Parathion-methyl	—	100->12	12-1,2
Phenkapton	—	—	100-10
Phenthoat	—	—	100-70
Phorate	100->20	200->2	2->0
Phosalone	—	—	100-24
Phosfolan	—	100->15	15-1
Phosmet	—	—	100-18
Phosphamidon	—	100->34	34-3
Pirimiphos-ethyl	—	—	100-28
Propaphos	—	100->75	75-15
Prothoate	—	100->15	15-1
Pyrazophos	—	—	100-45
Pyrazoxon	100->80	80->8	8-0,5
Quinalphos	—	100->52	52-5
Salithion	—	—	100-25
Schradan	—	100->18	18-3,6
Sulfotep	—	100->10	10-1
Sulfprofos	—	—	100-18
Temephos	—	—	100-90
TEPP	100->10	10->0	—
Terbufos	100->15	15->3	3-0,74
Thiomethon	—	100->50	50-5
Thionazine	100->70	70->5	5-0,5
Triamiphos	—	100->20	20-1
Triazophos	—	—	100-13
Trichlorfon	—	—	100-23
Trichloronat	—	100->30	30-3
Vamidothion	—	—	100-10

42° *2762 organochlorine pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Aldrin	—	100->75	75-7
Allidochlor	—	—	100-35
Camphechlor	—	—	100-15
Chlordane	—	—	100-55
Chlordimeforme	—	—	100-50
Chlordimeforme, hydrochloride	—	—	100-70
Chlorophacinone	100->40	40->4	1-0,4
Crimidin	100->25	25->2	2->0
DDT	—	—	100-20
Dibromo-1,2-chloro-3-propane	—	—	100-34
Dieldrine	—	100->75	75-7
Endosulfan	—	100->80	80-8
Endrin	100->60	60->6	6-0,5
Heptachlor	—	100->80	80-8
Isobenzane	100->10	10->2	2-0,4
Isodrin	—	100->14	14-1
Lindane (γBHC)	—	—	100-15
Mirex	—	—	100-60
Pentachlorophenol	—	100->54	54-5

2301 (cont'd)

43° *2766 phenoxy pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
2,4-D	—	—	100-75
2,4-DB	—	—	100-40
2,4,5-T	—	—	100-60
Triadimefon	—	—	100-70

44° *2758 carbamate pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Aldicarb	100->15	15->1	1->0
Aminocarb	—	100->60	60-6
Bendiocarb	—	100->65	65-5
Benfuracarb	—	—	100-20
Butocarboxim	—	—	100-30
Carbaryl	—	—	100-10
Carbofuran	—	100->10	10-1
Cartap HCl	—	—	100-40
Diallate	—	—	100-75
Dimetan	—	—	100-24
Dimetilan	—	100->50	50-5
Dioxacarb	—	—	100-10
Formetanate	—	100->40	40-4
Isolan	—	100->20	20-2
Isoprocarb	—	—	100-35
Mercaptodimethur	—	100->70	70-7
Methasulfocarb	—	—	100-20
Methomyl	—	100->34	34-3
Mexacarbate	—	100->28	28-2
Mobam	—	—	100-14
Oxamyl	—	100->10	10-1
Pirimicarb	—	—	100-29
Promcarb	—	—	100-14
Promorit (Muritan)	100->5,6	5,6->0,56	0,56->0
Propoxur	—	—	100-18

45° *2778 mercury based pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

2301 *(cont'd)*

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Phenylmercuric acetate (PMA)	—	100->60	60-6
Mercuric chloride	—	100->70	70-7
Chloro-methoxyethyl mercury	—	100->40	40-4
Mercury oxide	—	100->35	35-3
Phenylmercury pyrocatechnin (PMB)	—	100->60	60-6

46° *2787 organotin pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or slightly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Fentin acetate	—	—	100-25
Cyhexatin	—	—	100-35
Fentine hydroxide	—	—	100-20

47° *3024 coumarin derivative pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Brodifacoum	100->5	5->0,5	0,5-0,05
Coumachlor	—	—	100-10
Coumafuryl	—	—	100-80
Coumaphos	—	100->30	30-3
Coumatetralyl (Racumin)	—	100->34	34-3,4
Dicoumarol	—	—	100-10
Difenacoum	100->35	35->3,5	3,5-0,35
Warfarin (and *salts of warfarin)*	100->60	60->6	6-0,6

48° *2782 bipyridilium pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

2301 (cont'd) such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Diquat	—	—	100-45
Paraquat	—	100->40	40-8

49° *2760 arsenical pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Arsenic trioxide	—	100->40	40-4
Calcium arsenate	—	100->40	40-4
Sodium arsenite	—	100->20	20-2

50° *2776 copper based pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Copper sulphate	—	—	100-20

51° *2780 substituted nitrophenol pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

2301 *(cont'd)* such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Binapacryl	—	—	100-25
Dinobuton	—	—	100-10
Dinoseb	—	100->40	40-8
Dinoseb acetate	—	—	100-10
Dinoterb	—	100->50	50-5
Dinoterb acetate	—	100->50	50-5
DNOC	—	100->50	50-5
Medinoterb	—	100->80	80-8

52° *2764 triazine pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Cyanazine	—	—	100-35
Terbumeton	—	—	100-95

53° *2770 benzoic derivative pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Tricamba	—	—	100-60

54° *2774 phthalimide derivative pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

2301 *(cont'd)*

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
... (1)	—	—	—

(1) No pesticide currently assigned to this item.

55° *2768 phenyl urea pesticides, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
... (1)	—	—	—

(1) No pesticide currently assigned to this item.

56° *2772 dithiocarbamate pesticide, liquid, flammable, toxic,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Metam-sodium	—	—	100-35

57° *3021 pesticide, liquid, flammable, toxic, n.o.s.,* flashpoint less than 23 °C

(a) having a boiling point or initial boiling point not exceeding 35 °C and/or highly toxic;

(b) having a boiling point or initial boiling point exceeding 35 °C and toxic or slightly toxic;

Nitrogenated organic compounds, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Benquinox	—	—	100-20
Chinomethionate	—	—	100-50
Cycloheximide	100->40	40->4	4->0
Diazoxolon	—	—	100-25

2301 *(cont'd)*

Alkaloids, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Nicotine preparations	—	100->25	25-5
Strychnine	100->20	20->0	—

Other organo-metallic compounds, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
...(1)	—	—	—

(1) No pesticide currently assigned to this item.

Inorganic compounds of fluorine, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Barium silicofluoride	—	—	100-35
Sodium silicofluoride	—	—	100-25

Inorganic compounds of thallium, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Thallium sulphate	—	100->30	30-3

Other pesticides, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
ANTU	100->40	40->4	4-0,8
Blasticidine-S-3	—	—	100-10
Bromoxynil	—	—	100-38
Dazomet	—	—	100-60
Diphacinone	100->25	25->3	3-0,2

2301 *(cont'd)*

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Difenzoquat	—	—	100-90
Dimexano	—	—	100-48
Endothal-sodium	—	100->75	75-7
Fenaminosulph	—	100->50	50-10
Fenpropathrin	—	—	100-10
Fluoracetamide	—	100->25	25-2,5
Imazalil	—	—	100-64
Ioxynil	—	—	100-20
Kelevan	—	—	100-48
Norbormide	100->88	88->8,8	8,8-0,8
Pindone (and *salts of Pindone)*	—	—	100-55
Rotenone	—	—	100-25

Pyrethrinoids, such as:

	Highly toxic	Toxic	Slightly toxic
	%	%	%
Cypermethrin	—	—	100-32

G. Substances having a flashpoint above 61 °C which are carried or handed over for carriage at or above their flashpoint

61° (c) *3256 elevated temperature liquid, flammable, n.o.s.,* with a flashpoint above 61 °C, at or above its flashpoint.

H. Empty packagings

71° *Empty packagings* including *empty intermediate bulk containers,* (IBCs), *empty tank-vehicles, empty demountable tanks, empty tank-containers,* uncleaned having contained substances of Class 3.

2301a Neither the provisions for this Class contained in this Annex nor those contained in Annex B are applicable to:

(1) Substances of 1° to 5°, 21° to 26° and 31° to 34° and slightly toxic substances of 41° to 57° carried in conformity with the following provisions:

(a) Substances classified under (a) of each item: not more than 500 ml per iner packaging and not more than 1 litre per package;

(b) Substances classified under (b) of each item except 5° (b) and alcoholic beverages of 3° (b): not more than 3 litres per inner packaging and not more than 12 litres per package;

(c) Alcoholic beverages of 3° (b): not more than 5 litres per inner packaging;

(d) Substances classified under 5° (b): not more than 5 litres per inner packaging and not more than 20 litres per package;

(e) Substances classified under (c) of each item: not more than 5 litres per inner packaging and not more than 45 litres per package.

These quantities of substances shall be carried in combination packagings conforming at least to the conditions of marginal 3538.

The 'General conditions of packing' of marginal 3500 (1), (2) and (5) to (7) shall be observed.

Note: In the case of homogeneous mixtures containing water, the quantities specified relate only to the substance of this Class contained in those mixtures.

2301a *(cont'd)* (2) Alcoholic beverages of 31° (c) in packagings containing not more than 250 litres.

(3) The motor-fuel contained in the tanks of transport vehicles for their propulsion or the operation of their specialized equipment (refrigerators, for example). The fuel cocks between the engine and the fuel tank of motor cycles and motor-assisted pedal cycles whose tanks contain fuel, shall be closed during transport; in addition, these motor cycles and motor-assisted pedal cycles shall be loaded upright and secured against falling.

2. Provisions

A. Packages

1. General conditions of packing

2302 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginals 2303 to 2310.

(2) Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 2300 (3) and 3511 (2) or 3611 (2) the following shall be used:

— packagings of packing group I, marked with the letter 'X', for the very dangerous substances classified under the letter (a) of each item;

— packagings of packing group II or I, marked with the letter 'Y', or 'X', or IBCs of packing group II, marked with the letter 'Y', for the dangerous substances classified under the letter (b) of each item;

— packagings of packing group III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing group III or II, marked with the letter 'Z' or 'Y', for the less dangerous substances classified under the letter (c) of each item.

Note: For the carriage of substances of Class 3 in tank-vehicles, demountable tanks or tank-containers, see Annex B.

2. Special conditions for packing of certain substances

2303 Nitroglycerine, solution in alcohol, of 6° shall be packed in metal cans of not more than 1 litre capacity each, overpacked in a wooden box capable of containing not more than 5 litres of solution. Metal cans shall be completely surrounded with absorbent cushioning material. Wooden boxes shall be completely lined with suitable material impervious to water and nitroglycerine.

Packages of this kind shall satisfy the test requirements for combination packagings in accordance with Appendix A.5 for packing group II.

2304 (1) Propyleneimine of 12° shall be packed:

(a) in steel receptacles of sufficient thickness, which shall be closed by a screw-threaded bung or plug rendered leakproof both to liquid and to vapour by means of a suitable gasket. The receptacles shall initially and periodically, at least every five years, be tested at a pressure of not less than 0,3 MPa (3 bar) gauge pressure in accordance with marginals 2215 (1) and 2216. Each receptacle shall be secured by absorbent cushioning materials in a strong leakproof protective metal packaging. The protective packaging shall be hermetically closed and its closure shall be secured against any inadvertent opening. The mass of the contents shall not exceed 0,67 kg per litre of capacity. A package shall not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling; or

2304 *(cont'd)*

(b) in steel receptacles of sufficient thickness, which shall be closed by a screw-threaded bung and a screw-threaded protective cap or equivalent device leakproof both to liquid and to vapour. The receptacles shall initially and periodically, at least every five years, be tested at a pressure of at least 1 MPa (10 bar) gauge pressure in accordance with marginals 2215 (1) and 2216. The mass of the contents shall not exceed 0,67 kg per litre of capacity. A package shall not weigh more than 75 kg.

(c) Receptacles in conformity with (a) and (b) shall bear, in clearly legible and durable characters:

— the name or mark of the manufacturer and the number of the receptacle;

— the word 'propyleneimine';

— the tare of the receptacle and its maximum permitted mass when filled;

— the date (month and year) of the initial test and of the most recent test undergone;

— the stamp of the expert who carried out the tests and examinations.

(2) Ethyl isocyanate of 13° shall be packed:

(a) in hermetically closed receptacles made of pure aluminium and having a capacity not exceeding 1 litre, which shall not be filled beyond 90 % of their capacity. The receptacles shall be secured, not more than 10 to a box, with appropriate cushioning material in a wooden box. Packages of this kind shall satisfy the test requirements for combination packagings conforming to marginal 3538 for packing group I, and shall not weigh more than 30 kg; or

(b) in receptacles made of pure aluminium having a wall thickness of not less than 5 mm or in receptacles of stainless steel. The receptacles shall be fully welded and shall initially and periodically, at least every five years, be tested at a pressure of at least 0,5 MPa (5 bar) gauge pressure in accordance with marginals 2215 (1) and 2216. They shall be so closed as to be leakproof by means of two closures one above the other, one of which shall be screw-threaded or secured in an equally effective manner. The degree of filling shall be not more than 90 %.

Drums weighing more than 100 kg shall be fitted with rolling hoops or stiffening ribs;

(c) Receptacles in conformity with (b) shall bear, in clearly legible and durable characters:

— the name or mark of the manufacturer and the number of the receptacle;

— the words 'ethyl isocyanate';

— the tare of the receptacle and its maximum permitted mass when filled;

— the date (month and year) of the initial test and of the most recent test undergone;

— the stamp of the expert who carried out the tests and examinations.

2305 Substances classified under (a) of the various items shall be packed:

(a) in non-removable head steel drums conforming to marginal 3520; or

(b) in non-removable head aluminium drums conforming to marginal 3521; or

(c) in non-removable head steel jerricans conforming to marginal 3522; or

(d) in non-removable head plastics drums of a capacity not exceeding 60 litres or nonremovable head plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings with inner packagings of glass, plastics material or metal conforming to marginal 3538.

2306 (1) Substances classified under (b) of the various items shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

2306 *(cont'd)*

(d) in plastics drums or jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538.

Note 1 to (a), (b), (c) and (d): Nitromethane of 3° (b) shall not be carried in removable head packagings.

Note 2 to (a), (b), (c) and (d): Simplified conditions are applicable to removable-head drums or jerricans for viscous substances having a viscosity above 200 mm^2/s at 23 °C (see marginals 3512, 3553, 3554 and 3560).

(2) Substances classified under (b) of 3°, 15°, 17°, 22°, 24° and 25° as well as the slightly toxic substances classified under (b) of 41° to 57° may also be packed in composite packagings (glass, porcelain or stoneware) conforming to marginal 3539.

(3) Substances classified under (b) of the various items with the exception of nitromethane of 3° (b) which have a vapour pressure at 50 °C of not more than 110 kPa (1.10 bar) may also be packed in metal IBCs conforming to marginal 3622, in rigid plastics IBCs conforming to marginal 3624 or in composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

2307 (1) Substances classified under (c) of the various items shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

(d) in plastics drums or jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538; or

(g) in composite packagings (glass, porcelain or stoneware) conforming to marginal 3539.

Note to (a), (b), (c) and d): Simplified conditions are applicable to removable-head drums and jerricans for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C (see marginals 3512, 3553, 3554 and 3560).

(2) Substances classified under (c) of the various items may also be packed in metal IBCs conforming to marginal 3622, in rigid plastics IBCs conforming to marginal 3624 or in composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

2308 (1) Ethyl alcohol and its aqueous solutions and alcoholic beverages of 3° (b) and 31° (c) may also be packed in bung-type wooden barrels conforming to marginal 3524.

(2) Alcoholic beverages containing more than 24 % alcohol but not more than 70 % by volume, when transported as part of the manufacturing process, may be transported in wooden casks with a capacity of not more than 500 litres, deviating from the provisions of Appendix A.5 on the following conditions:

(a) the casks shall be checked and tightened before filling;

(b) sufficient ullage (not less than 3 %) shall be left to allow for the expansion of the liquid;

2308 (cont'd)

(c) the casks shall be transported with the bungholes pointing upwards and,

(d) the casks shall be transported in containers meeting the requirements of the International Convention for Safe Containers (CSC), [1] as amended. Each cask shall be secured in custom made cradles and be wedged by appropriate means to prevent them from being displaced in any way during transport.

(3) Substances of 3° (b), 4° (b), 5° (b) and (c), 31° (c), 32° (c), 33° (c), 34° (c) and the slightly toxic substances classified under (b) of 41° to 57° may also be packed in light gauge metal packagings conforming to marginal 3540. Simplified conditions are applicable to removable-head light gauge metal packagings for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for substances of 5° (c). (See marginals 3512 and 3552 to 3554).

Note: Nitromethane of 3° (b) shall not be carried in removable-head packagings.

(4) The following substances: 1133 adhesives, 1210 printing ink, 1263 paint, 1263 paint-related material, 1866 resin solution and 3269 polyester resin kit of 5° (b), 5° (c) and 31° (c) may be carried in quantities not exceeding 5 litres in metal or plastics packagings meeting only the requirements of marginal 3500 (1), (2) and (5) to (7), provided the packagings are secured on pallets by straps, by shrink or stretch-wrapping or by other suitable means, or provided the packagings are inner packagings of a combination packaging with a maximum total gross mass of 40 kg. The information in the transport document shall conform to marginal 2314 (1) and (3).

2309 Aircraft hydraulic power unit fuel tanks of 28° are admitted subject to either of the following conditions.

(a) the unit shall consist of an aluminium pressure vessel made from tubing and having welded heads. Primary containment of the fuel within this vessel shall consist of a welded aluminium bladder having a maximum internal volume of 46 litres. The outer vessel shall have a minimum design gauge pressure of 1,275 kPa and a minimum burst gauge pressure of 2,755 kPa. Each vessel shall be leak-checked during manufacture and before shipment and shall be found leakproof. The complete inner unit shall be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which shall adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 litres; or

(b) the unit shall consist of an aluminium pressure vessel. Primary containment of the fuel within this vessel shall consist of a welded hermetically sealed fuel compartment with an elastomeric bladder having a maximum internal volume of 46 litres. The pressure vessel shall have a minimum design gauge pressure of 2,860 kPa and a minimum burst gauge pressure of 5,170 kPa. Each vessel shall be leak-checked during manufacture and before shipment and shall be found leakproof. The complete inner unit shall be securely packed in non-combustible cushioning material, such as vermiculite, in a strong outer tightly closed metal packaging which shall adequately protect all fittings. Maximum quantity of fuel per unit and package is 42 litres.

2310 Receptacles or IBCs, containing preparations of 31° (c), 32° (c), and 33° (c), which give off small quantities of carbon dioxide and/or nitrogen, shall be vented, in accordance with marginals 3500 (8) or 3601 (6).

3. Mixed packing

2311 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances or articles of different items of this Class in quantities not exceeding 5 litres per inner packaging, may be packed together and/or with goods not subject to the provisions of this Directive in a combination packaging conforming to marginal 3538, provided they do not react dangerously with one another.

(3) Substances of 6°, 7°, 12° and 13° shall not be packed with other goods.

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[1] International Convention for Safe Containers (Geneva, 1972), as amended, published by the International Maritime Organization, 4 Albert Embankment, London SE1 7SR.

2311 *(cont'd)* (4) Substances classified under (a) of the various items shall not be packed together with substances and articles of classes 1 and 5.2 (other than hardeners and compound systems) and material of class 7.

(5) Except as otherwise specially provided, substances classified under (a) of the various items, in quantities not exceeding 0,5 litre per inner packaging and 1 litre per package, and substances classified under (b) or (c) of the the various items, in quantities not exceeding 5 litres per inner packaging may be packed together in a combination packaging conforming to marginal 3538 with substances or articles of other classes, provided that mixed packing is also permitted for substances or articles of these classes, and/or with goods which are not subject to the provisions of this Directive, provided they do not react dangerously with one another.

(6) The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat;

(b) emission of flammable and/or toxic gases;

(c) formation of corrosive liquids;

(d) formation of unstable substances.

(7) The mixed packing of acid substances with basic substances in a package shall not be permitted if the two substances are packed in fragile receptacles.

(8) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2302 shall be complied with.

(9) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages (see Appendix A9)

Marking

2312 (1) Each package shall be clearly marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances or articles of this Class shall bear a label conforming to model No 3.

(3) Packages containing substances of 11° to 19°, 32° and 41° to 57° shall in addition bear a label conforming to model No 6.1.

(4) Packages containing substances of 21° to 26° and 33° shall in addition bear a label conforming to model No 8.

(5) Packages containing substances or articles of 27° and 28° shall in addition bear a label conforming to model No 6.1 and a label conforming to model No 8.

(6) Packages containing fragile receptacles not visible from the outside shall in addition bear on two opposite sides a label conforming to model No 12.

(7) Packages containing receptacles, the closures of which are not visible from the outside and packages containing vented receptacles or vented receptacles without outer packaging shall in addition bear on two opposite sides a label conforming to model No 11.

2313

B. Particulars in the transport document

2314 (1) The description of the goods in the transport document shall conform to one of the identification numbers and names printed in italics in marginal 2301.

If the substance is not mentioned by name, but is assigned to an n.o.s. entry, or to another collective entry the description of the goods shall consist of the identification number and the n.o.s. designation or the collective entry designation, followed by the chemical or technical name. (1)

The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or '*RID*'), (e.g. '3, 1° (a), ADR').

For substances and preparations of 41° to 57°, the name shall be entered for the most dangerous component, both of the pesticide element (2) and of the flammable liquid element (e.g 'parathion in hexane').

For the carriage of wastes (see marginal 2000 (5)), the description of the goods shall be: 'Waste containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste, containing 1230 methanol, 3, 17° (b)'.

For the carriage of solutions or mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which most predominantly contribute to the danger or dangers of the solutions and mixtures.

For the carriage of solutions or mixtures containing only one component subject to the provisions of this Directive, the words 'solution' or 'mixture' should be added as part of the name in the transport document [see marginal 2002 (8)].

If a solution or mixture specifically named or containing a specifically named substance is not subject to the conditions of this Class in accordance with marginal 2300 (5), the consignor may enter in the transport document: 'Not goods of Class 3'.

(2) For consignments in accordance with the Note under E of marginal 2301, the consignor shall enter in the transport document 'Transport in accordance with note under E of marginal 2301'.

(3) For consignments in accordance with marginal 2308 (4), the consignor shall enter in the transport document 'Transport in accordance with marginal 2308 (4)'.

2315-
2321

C. Empty packagings

2322 (1) Empty packagings, including empty IBCs, uncleaned, of 71°, shall be closed in the same way and with the same degree of leakproofness as if they were full.

(2) Empty packagings, including empty IBCs, uncleaned, of 71°, shall bear the same danger labels as if they were full.

(3) The description in the transport document shall conform to one of the names printed in italics in 71°, e.g. 'Empty packaging 3, 71°, ADR'.

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(1) The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

(2) For the description of the pesticide element, the name according to ISO Standard 1750:1981 (see marginal 2601) should be used, if it appears therein.

2322 *(cont'd)* In the case of empty tank-vehicles, empty demountable tanks and empty tank-containers, uncleaned, this description shall be completed by adding the words 'Last load', together with the name and item number of the goods last loaded, e.g. 'Last load 1089 acetaldehyde, 1° (a)'.

2323-2324

D. Transitional measures

2325 Substances of class 3 may be carried until 30 June 1995 in accordance with the requirements for class 3 applicable until 31 December 1994. The transport document shall, in such cases, bear the inscription 'Carriage in accordance with the ADR in force before 1 January 1995'.

2326-2399

CLASS 4.1

FLAMMABLE SOLIDS

1. List of substances

2400 (1) Among the substances and articles covered by the title of Class 4.1, those which are listed in marginal 2401 or are covered by a collective entry in that marginal are subject to the conditions set out in marginals 2400 (2) to 2422 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive.

Note: For the quantities of substances listed in marginal 2401 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2401a.

(2) The title of Class 4.1 covers substances and articles which have a melting-point greater than 20 °C or are pasty, according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310) or are not liquid according to the ASTM D 4359-90 test method, or which are selfreactive liquids. The following are assigned to Class 4.1:

— readily flammable solid substances and articles, and those which can be ignited by flying sparks or can cause fire through friction;

— self-reactive substances which (at normal or elevated temperatures), are liable to undergo strongly exothermal decomposition caused by excessively high carriage temperatures or by contact with impurities;

— substances related to self-reactive substances, which are distinguished from the latter by having a self-accelerating decomposition temperature greater that 75 °C, and are liable to undergo a strongly exothermic decomposition and may, in certain packagings, meet the criteria for explosive substances of Class 1;

— explosives, which are wetted with such a quantity of water or alcohol or which contain such a quantity of plasticizing or inerting agent, that their explosive properties are neutralized.

Notes: 1. Self-reactive substances and formulations of self-reactive substances are not considered to be self-reactive substances of Class 4.1 if:

— they are explosives according to the criteria of Class 1;

— they are oxidizing substances according to the assignment procedure of Class 5.1;

— they are organic peroxides according to the criteria of Class 5.2;

— their heat of decomposition is less than 300 J/g;

— their self-accelerating decomposition temperature (SADT) is greater than 75 °C for a 50 kg package;

— tests have proved that they are exempted as type G [see Appendix A.1, marginal 3104 (2) (g)].

2400 *(cont'd)*

2. The heat of decomposition can be determined using any internationally recognized method e.g. Differential Scanning Calorimetry and adiabatic calorimetry.

3. The self-accelerating decomposition temperature (SADT) is the lowest temperature at which self-accelerating decomposition may occur with a substance in the packaging as used during carriage. Requirements for the determination of the SADT are given in Appendix A.1, marginal 3103.

(3) The substances and articles of Class 4.1 are subdivided as follows:

A. Solid organic flammable substances and articles

B. Solid inorganic flammable substances and articles

C. Explosive substances in non-explosive state

D. Substances related to self-reactive substances

E. Self-reactive substances not requiring temperature control

F. Self-reactive substances requiring temperature control

G. Empty packagings

Substances and articles of Class 4.1, with the exception of substances of 5° and 15°, classified under the various items of marginal 2401, shall be assigned to one of the following groups designated by the letter (a), (b) or (c) according to their degree of danger:

(a) very dangerous

(b) dangerous

(c) less dangerous

All solid substances, normally wetted, which, if in the dry state, would be classified as explosives, are assigned to letter (a) of the various items.

Self-reactive substances are assigned to letter (b) of the various items.

Substances related to self-reactive substances are assigned to letters (b) or (c) of the various items.

(4) The assignment of substances and articles not specifically named to 3° to 8° of marginal 2401, as well as within these items to the letters, can be based on experience or on the results of the test procedures in accordance with Appendix A.3, marginals 3320 and 3321. Assignment to 11° to 14°, 16° and 17° as well as within these items to the letters, shall be based on the results of the test procedure in accordance with Appendix A.3, marginals 3320 and 3321; experience shall also be taken into account when it leads to a more strictly-based assignment.

(5) When substances or articles not specifically named are assigned to the items of marginal 2401 on the basis of the test procedures in accordance with Appendix A.3, marginals 3320 and 3321, the following criteria apply:

(a) Readily flammable powdery, granular or pasty substances of 1°, 4°, 6° to 8°, 11°, 12°, 14°, 16° and 17°, shall be assigned to Class 4.1 if they can be easily ignited by brief contact with an ignition source (e.g a burning match), or if, in the event of ignition, the flame spreads rapidly, the combustion time is less than 45 seconds for a measured distance of 100 mm or the speed of combustion is greater than 2,2 mm/s.

(b) Metal powders or powders of metal alloys of 13° shall be assigned to Class 4.1 if they can be ignited by a flame and the reaction spreads over the whole sample in less than 10 minutes.

2400 *(cont'd)*

(6) When substances and articles not specifically named are assigned to the letters of the items of marginal 2401 on the basis of test procedures in accordance with Appendix A.3, marginals 3320 and 3321, the following criteria apply:

(a) Flammable solids of 4°, 6° to 8°, 11°, 12°, 14°, 16° and 17°, which, when tested, have a combustion time of less than 45 seconds over a measured distance of 100 mm shall be assigned to:

(i) letter (b) if the flame passes the wetted zone;

(ii) letter (c) if the wetted zone stops the flame for at least four minutes;

(b) Metal powders or powders of metal alloys of 13° in which, when tested, the reaction:

(i) spreads over the whole length of the sample in five minutes or less, shall be assigned to letter (b);

(ii) spreads over the whole length of the sample in more than five minutes shall be assigned to letter (c).

(7) If substances of Class 4.1, as a result of admixtures, come into different categories of risk from those to which the substances of marginal 2401 belong, these mixtures shall be assigned to the items and letters to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes) see also marginal 2002 (8).

(8) When substances and articles are specifically named under more than one letter of the same item of marginal 2401, the relevant letter may be determined on the basis of the results of the test procedures in accordance with Appendix A.3, marginals 3320 and 3321 and the criteria set out in (6).

(9) On the basis of the test procedures in accordance with Appendix A.3, marginals 3320 and 3321 and the criteria set out in (6), it may also be determined whether the nature of a specifically named substance is such that the substance is not subject to the provisions for this Class (see marginal 2414).

(10) The chemically unstable substances of Class 4.1 are to be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall in particular be ensured that receptacles do not contain any substance liable to promote these reactions.

(11) Flammable solids, oxidizing, assigned to identification number 3097 of the United Nations Recommendations on the Transport of Dangerous Goods, are not to be accepted for carriage (see, however, marginal 2002 (8), footnote (1) to the table in paragraph 2.3.1).

Self-reactive substances

(12) The decomposition of self-reactive substances can be initiated by heat, contact with catalytic impurities (e.g. acids, heavy-metal compounds, bases), friction or impact. The rate of decomposition increases with temperature and varies with the substance. Decomposition, particularly if no ignition occurs, may result in the evolution of toxic gases or vapours. For certain self-reactive substances, the temperature should be controlled. Some self-reactive substances may decompose explosively, particularly if confined.

This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Some self-reactive substances burn vigorously. Self-reactive substances are, for example, some compounds of the types listed below:

aliphatic azo compounds (-C-N=N-C-);

organic azides (-C-N_3);

diazonium salts (-CN_2^+ Z^-);

N-nitroso compounds (-N-N=O); and

aromatic sulphohydrazides (-SO_2-NH-NH_2).

This list is not exhaustive and substances with other reactive groups and some mixtures of substances may have similar properties.

2400 *(cont'd)*

(13) Self-reactive substances are classified into seven types according to the degree of danger. The principles to be applied to the classification of substances not listed in marginal 2401 are set out in Appendix A.1, marginal 3104. The types of self-reactive substance range from type A, which is not accepted for carriage in the packaging in which it is tested, to type G, which is not subject to the provisions for self-reactive substances of Class 4.1 [see marginal 2414 (5)]. The classification of types B to F is directly related to the maximum quantity allowed in one packaging.

(14) The following self-reactive substances shall not be permitted for carriage:

— self-reactive substances type A [see Appendix A.1, marginal 3104 (2) (a)];

(15) Self-reactive substances and formulations of self-reactive substances listed in marginal 2401 are assigned to 31° to 50°, identification numbers 3221 to 3240.

The classifications for substances of 31° to 50° are based on the technically pure substance (except where a concentration of less than 100 % is specified). For other concentrations, the substance may be classified differently following the procedures in Appendix A.1, marginal 3104.

The collective entries specify:

— self-reactive substances types B to F, see paragraph (13) above;

— physical state (liquid-solid); and

— temperature control (when required), see paragraph (20) below.

(16) Classification of self-reactive substances or formulations of self-reactive substances not listed in marginal 2401 and assignment to a collective entry shall be made by the competent authority of the Member State.

(17) Activators, such as zinc compounds, may be added to some self-reactive substances to change their reactivity. Depending on both the type and the concentration of the activator, this may result in a decrease in thermal stability and a change in explosive properties. If either of these properties is altered, the new formulation shall be assessed in accordance with the classification procedure.

(18) Samples of self-reactive substances or formulations of self-reactive substances not listed in marginal 2401, for which a complete set of test results is not available and which are to be carried for further testing or evaluation, shall be assigned to one of the appropriate entries for self-reactive substances type C provided the following conditions are met:

— the available data indicates that the sample would be no more dangerous than selfreactive substances type B;

— the sample is packaged in accordance with packing method OP2A or OP2B and the quantity per transport unit is limited to 10 kg;

— the available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

(19) In order to ensure safety during carriage, self-reactive substances are in many cases desensitized by use of a diluent. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. If a diluent is used, the self-reactive substance shall be tested with the diluant present in the concentration and form used in carriage. Diluents which may allow a self-reactive substance to concentrate to a dangerous extent in the event of leakage from a packaging shall not be used. Any diluent shall be compatible with the selfreactive substance. In this regard, compatible diluents are those solids or liquids which have no detrimental influence on the thermal stability and hazard type of the self-reactive substance. Liquid diluents in formulations requiring temperature control [see paragraph (20)] shall have a boiling point of at least 60 °C and a flashpoint not less than 5 °C. The boiling point of the liquid shall be at least 50 °C higher than the control temperature of the self-reactive substance.

2400 *(cont'd)*

(20) The control temperature is the maximum temperature at which the self-reactive substance can be safely carried. It is assumed that the temperature of the immediate surroundings of a package only exceeds 55 °C during carriage for a relatively short time in a 24 hours period. In the event of loss of temperature control, it may be necessary to implement emergency procedures. The emergency temperature is the temperature at which such procedures shall be implemented.

The control and emergency temperatures are derived from the SADT (see Table 1). The SADT shall be determined in order to decide whether a substance shall be subjected to temperature control during carriage. Provisions for the determination of the SADT are given in Appendix A.1, marginal 3103.

TABLE 1

Derivation of control and emergency temperatures

SADT	Control temperature	Emergency temperature
20 °C or less	20 °C below SADT	10 °C below SADT
over 20 °C to 35 °C	15 °C below SADT	10 °C below SADT
over 35 °C	10 °C below SADT	5 °C below SADT

Self-reactive substances with an SADT not greater than 55 °C shall be subject to temperature control during carriage. Where applicable, control and emergency temperatures are listed in marginal 2401. The actual temperature during carriage may be lower than the control temperature but shall be selected so as to avoid dangerous separation of phases.

A. Solid organic flammable substances and articles

2401

1° Substances obtained from the processing of rubber in flammable form:

(b) *1345 rubber scrap,* ground or *1345 rubber shoddy,* powdered or granulated.

2° Flammable articles in commercial form:

(c) *1331 matches, 'strike anywhere', 1944 matches, safety* (book, card or box), *1945 matches, wax, 2254 matches, fusee, 2623 firelighters, solid,* with flammable liquid.

3° Articles made from weakly nitrated nitrocellulose:

(c) *1324 films, nitrocellulose base,* gelatin-coated, except scrap, *2000 celluloid* in block, rods, rolls, sheets, tubes, etc., except scrap, *1353 fibres impregnated with weakly nitrated nitrocellulose, n.o.s.* or *1353 fabrics impregnated with weakly nitrated nitrocellulose, n.o.s.*

Note: 2006 plastics, nitrocellulose-based, self-heating, n.o.s., and 2002 celluloid scrap are substances of Class 4.2 (see marginal 2431, 4°).

4° (c) *3175 solids* or mixtures of solids (such as preparations and wastes) *containing flammable liquid n.o.s.* having a flash-point up to 100 °C.

5° Organic flammable substances in the molten state:

2304 naphthalene, molten,

3176 flammable solid, organic, molten, n.o.s.

Note: 1334 naphthalene, crude or refined, is a substance of 6°.

2401 (cont'd)

6° Organic flammable solids, non-toxic and non-corrosive, and mixtures of organic flammable solids, non-toxic and non-corrosive (such as preparations and wastes), which cannot be classified under other collective entries:

(b) *1325 flammable solid, organic, n.o.s.;*

(c) *1312 borneol, 1328 hexamethylenetetramine, 1332 metaldehyde, 1334 naphthalene, crude* or *1334 naphthalene, refined, 2213 paraformaldehyde, 2538 nitronaphthalene, 2717 camphor,* synthetic, *1325 flammable solid, organic, n.o.s.*

Note: 2304 naphthalene, molten, is a substance of 5°.

7° Organic flammable solids, toxic, and mixtures of organic flammable solids, toxic (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *2926 flammable solid, toxic, organic, n.o.s.;*

(c) *2926 flammable solid, toxic, organic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

8° Organic flammable solids, corrosive, and mixtures of organic flammable solids, corrosive (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *2925 flammable solid, corrosive, organic, n.o.s.;*

(c) *2925 flammable solid, corrosive, organic, n.o.s.*

Note: For corrosivity criteria see marginal 2800 (3).

B. Solid inorganic flammable substances and articles

11° Inorganic non-metallic substances in flammable form:

(b) *1339 phosphorus heptasulphide* (P_4S_7) free from yellow and white phosphorus, *1341 phosphorus sesquisulphide* (P_4S_3) free from yellow and white phosphorus, *1343 phosphorus trisulphide* (P_4S_6) free from yellow and white phosphorus, *2989 lead phosphite, dibasic, 3178 flammable solid, inorganic, n.o.s.;*

Note: Phosphorus sulphides which are not free from yellow and white phosphorus are not to be accepted for carriage.

(c) *1338 phosphorus, amorphous, 1350 sulphur* (also flowers of sulphur), *2989 lead phosphite, dibasic, 2687 dicyclohexylammonium nitrate, 3178 flammable solid, inorganic, n.o.s.*

Note: 2448 sulphur, molten, is a substance of 15°.

12° Flammable metal salts of organic compounds:

(b) *3181 metal salts of organic compounds, flammable, n.o.s.;*

(c) *1313 calcium resinate, 1314 calcium resinate, fused, 1318 cobalt resinate, precipitated, 1330 manganese resinate, 2001 cobalt naphthenates, powder, 2714 zinc resinate, 2715 aluminium resinate, metal salts of organic compounds, flammable, n.o.s.*

13° Metals and metal alloys in powdered or other flammable form:

Notes: 1. Metals and metal alloys in powdered or other flammable form, liable to spontaneous combustion, are substances of Class 4.2 (see marginal 2431, 12°).

2. Metals and metal alloys in powdered or other flammable form which, in contact with water, emit flammable gases are substances of Class 4.3 (see marginal 2471, 11° to 15°).

(b) *1309 aluminium powder, coated, 1323 ferrocerium, 1326 hafnium powder, wetted* with not less than 25 % (mass) water, *1333 cerium,* slabs, rods, ingots, *1352 titanium powder, wetted* with not less than 25 % (mass) water, *1358 zirconium powder, wetted* with not less than 25 % (mass) water, *3089 metal powder, flammable, n.o.s.;*

2401 (cont'd)

Notes: 1. Hafnium, titanium and zirconium powders shall contain a visible excess of water.

2. Hafnium, titanium and zirconium powders, wetted, mechanically produced, of a particle size of 53 microns and over, or chemically produced, of a particle size of 840 microns and over, are not subject to the provisions of this Directive.

(c) *1309 aluminium powder, coated, 1346 silicon powder, amorphous, 1869 magnesium* or *1869 magnesium alloys*, pellets, turnings or ribbons, *2858 zirconium, dry*, coiled wire, finished metal sheets, strip (thinner than 254 microns but not thinner than 18 microns), *2878 titanium sponge granules* or *2878 titanium sponge powder, 3089 metal powder, flammable, n.o.s.*

Notes: 1. Magnesium alloys with not more than 50 % magnesium are not subject to the provisions of this Directive.

2. Silicon powder in any other form is not subject to the provisions of this Directive.

3. 2009 zirconium, dry, finished sheets, strip or coiled wire, in thicknesses of less than 18 microns, is a substance of Class 4.2 [see marginal 2431, 12° (c)]. Zirconium, dry, finished sheets, strip or coiled wire, in thicknesses of 254 microns or more, is not subject to the provisions of this Directive.

14° Flammable metal hydrides:

(b) *1437 zirconium hydride, 1871 titanium hydride, 3182 metal hydrides, flammable, n.o.s.;*

(c) *3182 metal hydrides, flammable, n.o.s.*

Notes: 1. Metal hydrides which, in contact with water, emit flammable gases are substances of Class 4.3 (see marginal 2471, 16°).

2. 2870 aluminium borohydride or 2870 aluminium borohydride in devices is a substance of Class 4.2 [see marginal 2431, 17° (a)].

15° The following inorganic flammable substance in molten form:

2448 sulphur, molten.

Notes: 1. 1350 solid sulphur is a substance of 11° (c).

2. Other inorganic flammable substances in molten form are not to be accepted for carriage.

16° Inorganic flammable solids, toxic, and mixtures of inorganic flammable solids, toxic (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *1868 decaborane, 3179 flammable solid, toxic, inorganic, n.o.s.;*

(c) *3179 flammable solid, toxic, inorganic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

17° Inorganic flammable solids, corrosive, and mixtures of inorganic flammable solids, corrosive (such as preparations and wastes), which cannot be classified under other collective headings:

(b) 3180 flammable solid, corrosive, inorganic, n.o.s.;

(c) *3180 flammable solid, corrosive, inorganic, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

C. Explosive substances in the non-explosive state

Notes: 1. Explosive substances in the non-explosive state, other than those listed in 21° to 25°, are not to be accepted for carriage as substances of Class 4.1.

2. Special packing requirements are applicable for substances of 21° to 26° (see marginal 2404).

2401 (cont'd)

21° The following water-wetted explosive substances:

(a) *1310 ammonium picrate, wetted* with not less than 10 % (mass) water, *1322 dinitroresorcinol, wetted* with not less than 15 % (mass) water, *1336 nitroguanidine (picrite), wetted* with not less than 20 % (mass) water, *1337 nitrostarch, wetted* with not less than 20 % (mass) water, *1344 trinitrophenol, wetted* with not less than 30 % (mass) water, *1347 silver picrate, wetted* with not less than 30 % (mass) water, *1349 sodium picramate, wetted* with not less than 20 % (mass) water, *1354 trinitrobenzene, wetted* with not less than 30 % (mass) water, *1355 trinitrobenzoic acid, wetted* with not less than 30 % (mass) water, *1356 trinitrotoluene, wetted* with not less than 30 % (mass) water, *1357 urea nitrate, wetted* with not less than 20 % (mass) water, *1517 zirconium picramate, wetted* with not less than 20 % (mass) water, *2852 dipicryl sulphide, wetted* with not less than 10 % (mass) water.

22° The following toxic water-wetted explosive substances:

(a) *1320 dinitrophenol, wetted* with not less than 15 % (mass) water, *1321 dinitrophenolates, wetted* with not less than 15 % (mass) water, *1348 sodium dininitro-o-cresolate, wetted* with not less than 15 % (mass) water.

Notes to 21° and 22°: 1. Explosive substances with a water content lower than the stated limits are substances of Class 1.

2. The water shall be homogeneously distributed over the entire explosive substance. During carriage there shall not be any separation of the mixture which reduces the inerting effect.

3. Water-wetted explosives shall not be capable of being brought to detonation by the action of the standard detonator [1], and they shall not be capable of being brought to mass explosion by the effect of a powerful booster.

23° The following explosive substance rendered inert:

(b) *2907 isosorbide dinitrate mixture* with not less than 60 % lactose, mannose, starch or calcium hydrogen phosphate or with other phlegmatizers, provided that such phlegmatizer has inerting properties which are at least as effective.

24° The following nitrated cellulose mixtures:

(a) *2555 nitrocellulose with* not less than 25 % (mass) *water, 2556 nitrocellulose with* not less than 25 % (mass) *alcohol* and not more than 12.6 % nitrogen in the dry mass, *2557 nitrocellulose,* with not more than 12.6 % nitrogen, by dry mass, *mixture with* or *without platicizer, with* or *without pigment.*

Notes: 1. 2556 nitrocellulose with not less than 25 % (mass) alcohol, or 2557 nitrocellulose with not more than 12.6 % nitrogen, by dry mass, mixture with or without plasticizer, with or without pigment, shall be packed in receptacles so constructed that explosion by reason of increased internal pressure is not possible.

2. Nitrocellulose mixtures with a water content, alcohol content or plasticizer content lower than the stated limits are substances of Class 1 (see marginal 2101, 4° and 26°).

25° The following toxic azide:

(a) *1571 barium azide, wetted* with not less than 50 % (mass) water.

Note: Barium azide with a water content lower than the stated limit is not to be accepted for carriage.

D. Substances related to self-reactive substances

26° The following substances related to self-reactive substances:

(b) *3242 azodicarbonamide*

(c) *2956 5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene), 3251 isosorbide-5-mononitrate.*

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[1] See 'Recommendations on the Transport of Dangerous Goods, Tests and Criteria', Part I, Appendix 1, ST/SG/AC.10/11/Rev. 1.

2401 (cont'd)

Notes: 1. Special packing requirements are applicable for substances of 26° [see marginal 2404 (3)].

2. Isosorbide-5-mononitrate or formulations of this substance which have been shown by the performance of tests series 2 of the Class 1 assignment procedure [see Appendix A.1, marginal 3101 (1)] to be too insensitive for inclusion in Class 1 are not subject to the provisions of this Directive.

E. Self-reactive substances not requiring temperature control

31° (b) *3221 self-reactive liquid type B* (1)

32° (b) *3222 self-reactive liquid type B, such as:*

Substance	Concentration (%)	Packing method (see marginal 2405)
2-diazo-1-naphthol-4-sulphonylchloride	100	OP5B
2-diazo-1-naphthol-5-sulphonylchloride	100	OP5B

33° (b) *3223 self-reactive liquid type C,* such as

Substance	Packing method (see marginal 2405)
Self-reactive liquid, *sample* (1)	OP2A

(1) See marginal 2400 (18).

34° (b) *3224 self-reactive solid, type C,* such as:

Substance	Concentration (%)	Packing method (see marginal 2405)
N,N'-dinitroso-N,N'-dimethyl-terephthalamide, as a paste	72	OP6B
N,N'-dinitrosopentamethyleentetramine (1)	82	OP6B
self-reactive solid, *sample* (2)		OP2B

(1) With a compatible diluent having a boiling point of not less than 150 °C.
(2) See marginal 2400 (18).

35° (b) *3225 self-reactive liquid type D* (1).

36° (b) *3226 self-reactive solid type D,* such as:

Substance	Concentration (%)	Packing method (see marginal 2405)
1,1'-azodi-(hexahydrobenzonitrile)	100	OP7B
benzene-1,3-disulphonylhydrazide, as a paste	52	OP7B
benzene sulphonylhydrazide	100	OP7B
4-(benzyl(ethyl)amino)-3-ethoxybenzenediazonium zinc chloride	100	OP7B
3-chloro-4-diethylaminobenzenediazonium zinc chloride	100	OP7B
diphenyloxide-4,4'-disulphonylhydrazide	100	OP7B
4-dipropylaminobenzenediazonium zinc chloride	100	OP7B
4-methylbenzenesulphonylhydrazide	100	OP7B
sodium-2-diazo-1-naphthol-4-sulphonate	100	OP7B
sodium-2-diazo-1-naphthol-5-sulfonate	100	OP7B

(1) No self-reactive substances are currently included under this item.

2401 (cont'd)

37° (b) *3227 self-reactive liquid type E* (1).

38° (b) *3228 self-reactive solid type E* (1).

39° (b) *3229 self-reactive liquid type F* (1).

40° (b) *3230 self-reactive solid type F* (1).

F. Self-reactive substances requiring temperature control

Note: Substances of 41° to 50° are self-reactive substances which decompose easily at normal temperatures and shall therefore be carried only under conditions of adequate refrigeration. For these self-reactive substances, the maximum temperature during carriage shall not exceed the control temperature indicated.

41° (b) *3231 self-reactive liquid type B, temperature controlled* (1),

42° (b) *3232 self-reactive solid type B, temperature controlled, such as:*

Substance	Concentration (%)	Packing method (see marginal 2405)
azodicarbonamide formulation type type B (1)	< 100	OP5B

(1) Azodicarbonamide formulations which fulfil the criteria of Appendix A.1, marginal 3104 (2) (b). The control and emergency temperatures shall be determined by the procedure in marginal 2400 (20).

43° (b) *3233 self-reactive liquid type C, temperature controlled,* such as:

Substance	Packing method (see marginal 2405)
self-reactive liquid, *sample,* temperature controlled (1)	OP2A

(1) See marginal 2400 (18).

44° (b) *3234 self-reactive solid type C, temperature controlled,* such as:

Substance	Concentration (%)	Packing method (see marginal 2405)	Control temperature (°C)	Emergency temperature (°C)
azodicarbonamide, formulation type C (1)	< 100	OP6B		
2,2'-azodi(isobutyronitrile)	100	OP6B	+ 40	+ 45
3-methyl-4-(pyrrolidin-1-yl)benzenediazonium tetrafluorborate	95	OP6B	+ 45	+ 50
self-reactive solid, *sample,* temperature controlled (2)		OP2B		
tetramine palladium (II) nitrate	100	OP6B	+ 30	+ 35

(1) Azodicarbonamide formulations which fulfil the criteria of Appendix A.1, marginal 3104 (2) (b). The control and emergency temperatures shall be determined by the procedure in marginal 2400 (20).
(2) See marginal 2400 (18).

45° (b) *3235 self-reactive liquid type D, temperature controlled,* such as:

Substance	Concentration (%)	Packing method (see marginal 2405)	Control temperature (°C)	Emergency temperature (°C)
2,2'-azodi(ethyl-2-methylpropionate)	100	OP7A	+ 20	+ 25

(1) No self-reactive substances are currently included under this item.

2401 (cont'd)

46° (b) *3236 self-reactive solid type D, temperature controlled*, such as:

Substance	Concentration (%)	Packing method (see marginal 2405)	Control temperature (°C)	Emergency temperature (°C)
azodicarbonamide, formulation type D (1)	< 100	OP7B		
2,2'-azodi(2,4-di-methyl-4-methoxyvaleronitrile)	100	OP7B	− 5	+ 5
2,2'-azodi(2,4-dimethylvaleronitrile)	100	OP7B	+ 10	+ 15
2,2'-azodi(2-methylbutyronitrile)	100	OP7B	+ 35	+ 40
4-(benzyl(methyl)amino]-3-ethoxybenzenediazonium zinc chloride	100	OP7B	+ 40	+ 45
2,5-diethoxy-4-morfolinobenzenediazonium zinc chloride	67-100	OP7B	+ 35	+ 40
2,5-diethoxy-4-morfolinobenzenediazonium zinc chloride	66	OP7B	+ 40	+ 45
2,5-diethoxy-4-morfolinobenzenediazonium tetrafluoroborate	100	OP7B	+ 30	+ 35
2,5-diethoxy-4-(phenylsulphonyl) benzene-diazonium chloride	67	OP7B	+ 40	+ 45
2,5-dimethoxy-4-(4-methylphenylsuphonyl)-benzenediazonium zinc chloride	79	OP7B	+ 40	+ 45
4-dimethylamino-6-(2-di-methyl-aminoethoxy)-toluene-2-diazonium zinc chloride	100	OP7B	+ 40	+ 45
2-(2-hydroxyethoxy)-1-(pyrrolidin-1-yl)-benzene-4-diazonium zinc chloride	100	OP7B	+ 45	+ 50
3-(2-hydroxyethoxy)-4-pyrrolidin-1-yl-benzene-diazonium zinc chloride	100	OP7B	+ 40	+ 45
N-formyl-2-(nitromethylene)-1,3-perhydrothiazine	100	OP7B	+ 45	+ 50
4-nitrosophenol	100	OP7B	+ 35	+ 40
2-(N,N-ethoxycarbonylphenylamino)-3-methoxy-4-(N-methyl-N-cyclohexylamino)-benzenediazonium zinc chloride	63-92	OP7B	+ 40	+ 45
2-(N,N-ethoxycarbonylphenylamino)-3-methoxy-4-(N-methyl-N-cyclohexylamino)-benzenediazonium zinc chloride	62	OP7B	+ 35	+ 40
2-(N,N-methylaminothylcarbonyl)-4-(3,4-dimethylphenylsulfonyl)-benzenediazonium hydrogen sulphate	96	OP7B	+ 45	+ 50

(1) Azodicarbonamide formulations which fulfil the criteria of Appendix A.1, marginal 3104 (2) (b). The control and emergency temperatures shall be determined by the procedure in marginal 2400 (20).

47° (b) *3237 self-reactive liquid type E, temperature controlled* (1),

48° (b) *3238 self-reactive solid type E, temperature controlled* (1),

49° (b) *3239 self-reactive liquid type F, temperature controlled* (1),

50° (b) *3240 self-reactive solid type F, temperature controlled* (1),

G. Empty packagings

51° *Empty packagings*, including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks*, and *empty tank-containers*, uncleaned, as well as *empty vehicles* for carriage in bulk and *empty small* bulk *containers*, uncleaned which have contained substances of Class 4.1.

(1) No self-reactive substances are currently included under this item.

2401a Substances of 1° to 4°, 6° and 11° to 14°, carried in accordance with the following provisions shall not be subject to the conditions for this Class contained in this Annex and in Annex B):

(a) Substances classified under (b) of each item, up to 3 kg per inner packaging and 12 kg per package;

(b) Substances classified under (c) of each item, up to 6 kg per inner packaging and 24 kg per package.

These quantities of substances shall be carried in combination packagings which at least meet the conditions of marginal 3538.

The 'General packing conditions' of marginal 3500 (1) and (2) as well as (5) to (7) shall be observed.

2. Provisions

A. Packages

1. General conditions of packing

2402 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions are prescribed in marginals 2403 to 2405 and 2408 for the packing of certain substances.

Intermediate bulk containers (IBCs) shall conform to the conditions of Appendix A.6.

(2) In accordance with the provisions of marginals 2400 (3) and 3511 (2) or 3611 (2) respectively, the following shall be used:

packagings of packing group I, marked with the letter 'X', for very dangerous substances classified under (a) of each item;

packagings of packing groups II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for dangerous substances classified under (b) of each item;

packagings of packing groups III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing groups III or II, marked with the letter 'Z' or 'Y', for less dangerous substances classified under (c) of each item.

Note: For the carriage of substances of Class 4.1 in tank-vehicles, demountable tanks and tank-containers, as well as for carriage in bulk, see Annex B.

2. Special conditions for packing of certain substances

2403 Substances of 5° and molten sulphur of 15° may be carried only in tank-vehicles (see Appendix B.1a) or in tank-containers (see Appendix B.1b).

2404 (1) Substances of 21°, 22°, 23° and 25° shall be packed:

(a) in drums conforming to marginal 3523 for plywood, marginal 3525 for fibreboard or marginal 3526 for plastics material, in each case with one or more moisture-proof inner bags, or

(b) in combination packagings conforming to marginal 3538 with moisture-proof inner packagings. However, no inner or outer packagings of metal shall be permitted.

The packagings shall be so designed that the water content or the content of phlegmatizer, which is added to the substance to render it inert, cannot diminish during carriage.

(2) Substances of 24° shall be packed in:

(a) removable-head steel drums conforming to marginal 3520, or

(b) removable-head aluminium drums conforming to marginal 3521, or

(c) removable-head steel jerricans conforming to marginal 3522, or

(d) plywood drums conforming to marginal 3523, or

2404 *(cont'd)*

(e) fibre drums conforming to marginal 3525, or

(f) fibreboard boxes conforming to marginal 3530, or

(g) steel or aluminium boxes conforming to marginal 3532, or

(h) combination packagings conforming to marginal 3538; however, no inner or outer packagings of metal shall be permitted.

Metal receptacles shall be so constructed and closed that they yield to an internal pressure of not more than 300 kPa (3 bar).

2555 nitrocellulose with not less than 25 % (mass) water may also be packed in plastics drums and jerricans conforming to marginal 3526.

If 2557 nitrocellulose, with not more than 12,6 % nitrogen, by dry mass, mixture with or without plasticizer, with or without pigment is packed in metal receptacles, an inner bag of multi-wall paper shall be used.

If 2555 nitrocellulose with not less than 25 % (mass) water or 2556 nitrocellulose with not less than 25 % (mass) alcohol is packed in plywood drums, fibre drums or fibreboard boxes, a moisture-proof inner bag, a plastics film lining or an inner coating of plastics material shall be used.

All packagings shall be so designed that the water, alcohol or phlegmatizer content cannot diminish during carriage.

(3) (a) Substances of item 26° shall be packed in fibre drums conforming to marginal 3525 with plastics lining or an equally effective inner coating. A package shall not weigh more than 50 kg.

(b) 3242 azodicarbonamide of 26° (b) may also be packed:

— an inner packaging of a single plastics bag in a fibreboard box, of maximum contents 50 kg, or

— inner packagings of plastics bottles, jars, bags or boxes, of maximum contents 5 kg each, within an outer packaging of a fibreboard box or a fibre drum of maximum contents 25 kg.

2405 (1) Substances of 31° shall be packed using packing methods listed in Table 2 and designated OP1A to OP8A for liquids and OP1B to OP8B for solids. Substances shall be packed as indicated in marginal 2401 and as set out in detail in Table 2 (A) and 2 (B). A packing method corresponding to a smaller package size (i.e. with a lower OP number) may be used but a packing method corresponding to a larger package size (i.e. with a higher OP number) shall not be used. Metal packagings meeting the test criteria of packing group I shall not be used. For combination packagings, cushioning materials shall not be readily combustible and shall not cause decomposition of the self-reactive substance if leakage occurs.

(2) Packages bearing a label conforming to model No 01 in accordance with marginal 2412 (5) shall comply with the provisions of marginal 2102 (4) and (6).

(3) For self-reactive substances or formulations of self-reactive substances not listed in marginal 2401, the following procedure shall be used to assign the appropriate packing method:

(a) self-reactive substances type B:

Substances shall be assigned packing method OP5A or OP5B provided that they satisfy the criteria of Appendix A.1, marginal 3104 (2) (b) in one of the packagings indicated. If the self-reactive substance can only satisfy these criteria in a smaller packaging than those listed for packing method OP5A or OP5B (i.e. one of the packagings listed for OP1A to OP4A or OP1B to OP4B), then the corresponding packing method with the lower OP number shall be assigned.

2405 *(cont'd)*

(b) self-reactive substances type C:

Substances shall be assigned packing method OP6A or OP6B provided that they satisfy the criteria of Appendix A.1, marginal 3104 (2) (c) in one of the packagings indicated. If the self-reactive substance can only satisfy these criteria in a smaller packaging than those listed for packing method OP6A or OP6B then the corresponding packing method with the lower OP number shall be assigned.

(c) self-reactive substances type D:

Packing method OP7A or OP7B shall be used.

(d) self-reactive substances type E:

Packing method OP8A or OP8B shall be used.

(e) self-reactive substances type F:

Packing method OP8A or OP8B shall be used.

(4) Substances of 39° (b), 40° (b), 49° (b) or 50° (b) may be carried in IBCs under conditions laid down by the competent authority of the country of origin when, on the basis of testing, the competent authority is satisfied that such carriage may be safely conducted. The tests shall include those necessary:

— to prove that the self-reactive substance complies with the principles for classification given in Appendix A.1, marginal 3104 (2) (f);

— to prove the compatibility with all materials normally in contact with the substance during carriage;

— to determine, when applicable, the control and emergency temperatures associated with the carriage of the substance in the IBC concerned as derived from the SADT;

— to design, when applicable, emergency-relief devices; and

— to determine if any special requirements are necessary.

(5) To prevent explosive rupture of metal IBCs or composite IBCs with full wall metal casing, the emergency-relief devices shall be designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of fire engulfment (heat load 110 kW/m²) or self-accelerating decomposition.

(6) Receptacles or IBCs, containing substances of 31° (b), 33° (b), 35° (b), 37° (b), 39° (b), 41° (b), 43° (b), 45° (b), 47° (b) or 49° (b), which give off small quantities of gases, shall be vented, in accordance with marginal 3500 (8) or 3601 (6).

TABLE 2A)

List of packagings for self-reactive liquids and maximum quantity or net mass per package (zie marginal 2405)

Type and material	Packaging code (see marginal 3514)	Packing method (1)							
		OP1A (2)	OP2A (2)	OP3A (2)	OP4A (2)	OP5A (2)	OP6A (2)	OP7A	OP8A
Type and material	1A1	*	*	*	*	*	*	60 l	225 l
Steel drum (3)	1A2	*	*	*	*	*	*	50 kg	200 kg
Aluminium drum	1B1	*	*	*	*	*	*	60 l	225 l
Fibre drum (3)	1G	0,5 kg	0,5/10kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Plastics drum	1H1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics jerrican	3H1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l
Wooden box (3)	4CI	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box (3)	4D	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fibreboard box (3)	4G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg

2405 *(cont'd)*

Type and material	Packaging code (see marginal 3514)	Packing method (1)							
		OP1A (2)	OP2A (2)	OP3A (2)	OP4A (2)	OP5A (2)	OP6A (2)	OP7A	OP8A
Plastics receptacle with outer steel drum	6HA1	*	*	*	*	*	*	60 l	225 l
Plastics receptacle with outer aluminium drum	6HB1	*	*	*	*	*	*	60 l	225 l
Plastics receptacle with outer fibre drum	6HG1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics receptacle with outer fibreboard box	6HG2	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l
Plastics receptacle with outer plastics drum	6HH1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics receptacle with outer solid plastics box	6HH2	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l

* Prohibited for self-reactive liquid types B and C.

(1) If two values are given, the first applies to the maximum net mass per inner packaging and the second to the maximum net mass of the complete package.

(2) For combination packagings containing self-reactive liquid type B or C, only plastics bottles, plastics jars, glass bottles or glass ampoules shall be used as inner packagings. However, glass receptacles shall only be used as inner packagings for packing methods OP1A and OP2A.

(3) Only allowed as part of a combination packaging. Inner packagings shall be suitable for liquids.

TABLE 2B)

List of packagings for self-reactive solids and maximum net mass per package

Type and material	Packaging code (see marginal 3514)	Packing method (1)							
		OP1B (2)	OP2B (2) (3)	OP3B (2)	OP4B (2)	OP5B (2)	OP6B (2)	OP7B	OP8B
Steel drum	1A2	*	*	*	*	*	*	50 kg	200 kg
Aluminium drum	1B2	*	*	*	*	*	*	50 kg	200 kg
Fibre drum (3)	1G	0,5 kg	0,5/10kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Plastics drum	1H2	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Wooden box (4)	4CI	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box (4)	4D	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fibreboard box (4)	4G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plastics receptacle with outer steel drum	6HA1	*	*	*	*	*	*	50 kg	200 kg
Plastics receptacle with outer aluminium drum	6HB1	*	*	*	*	*	*	50 kg	200 kg
Plastics receptacle with outer fibre drum	6HG1	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	200 kg
Plastics receptacle with outer fibreboard drum	6HG2	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	75 kg
Plastics receptacle with outer plastics drum	6HH1	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	200 kg
Plastics receptacle with outer solid plastics box	6HH2	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	75 kg

* Prohibited for self-reactive solid types B and C.

(1) If two values are given, the first applies to the maximum net mass per inner packaging and the second to the maximum net mass of the complete package.

(2) For combination packagings containing self-reactive solid type B and C, only non-metal packagings are allowed. However, glass receptacles shall only be used as inner packagings for packing methods OP1B and OP2B.

(3) If fire retardant partitions are used, the maximum net mass of the complete package shall be 25 kg.

(4) Only allowed as part of a combination packaging. Inner packaging shall be suitable for the substances to be carried.

2406 (1) Substances classified under (b) of 1° to 17° shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain, stoneware) conforming to marginal 3539, or

(h) metal IBCs conforming to marginal 3622.

(2) Substances classified under (b) of 1° to 17° with a melting-point above 45 °C or are pasty according to the criteria of the penetrometer test (see Appendix A.3 marginal 3310), or are not liquid according to the ASTM D 4359-90 test method may also be packed in:

(a) plywood drums conforming to marginal 3523 or fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) boxes conforming to marginal 3532 for steel or aluminium, marginal 3527 for natural wood, marginal 3528 for plywood, marginal 3529 for reconstituted wood, marginal 3530 for fibreboard, or marginal 3531 for plastics, if necessary with one or more sift-proof inner bags, or

(c) sift-proof bags conforming to marginal 3533 for textiles, marginal 3534 for woven plastics, marginal 3535 for plastics film or marginal 3536 for paper, provided that the goods are carried as a full load or the bags are loaded on pallets.

(3) Substances classified under (b) of 1°, 6°, 7°, 8°, 12°, 13°, 16° and 17° may also be packed in:

(a) rigid plastics IBCs conforming to marginal 3624, or

(b) composite IBCs with plastics inner receptacle conforming to marginal 3625, excluding types 11HZ2 and 31HZ2.

(4) Substances classified under (b) of 1°, 6°, 12° and 13° with a melting-point above 45 °C or are pasty according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310), or are not liquid according to the ASTM D 4359-90 test method may also be packed in:

(a) fibreboard IBCs conforming to marginal 3626, or

(b) wooden IBCs conforming to marginal 3627.

(5) Substances classified under (b) of 1°, 6°, and 12° with a melting-point above 45 °C or are pasty according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310), or are not liquid according to the ASTM D 4359-90 test method may be packed in flexible IBCs conforming to marginal 3623, excluding types 13H1, 13L1 and 13M1, provided that the goods are carried as a full load or the flexible IBCs are loaded on pallets.

2407 (1) Substances classified under (c) of 1° to 17° shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain, stoneware) conforming to marginal 3539, or

(h) light-gauge metal packagings conforming to marginal 3540, or

(i) metal IBCs conforming to marginal 3622, or

(j) rigid plastics IBCs conforming to marginal 3624, or

(k) composite IBCs with plastics inner receptacle conforming to marginal 3625, excluding types 11HZ2 and 31HZ2.

(2) Substances classified under (c) of 1° to 17° with a melting-point above 45 °C or are pasty according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310), or are not liquid according to the ASTM D 4359-90 test method may also be packed in:

(a) plywood drums conforming to marginal 3523 or fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) boxes conforming to marginal 3532 for steel and aluminium, marginal 3527 for natural wood, marginal 3528 for plywood, marginal 3529 for reconstituted wood, marginal 3530 for fibreboard, or marginal 3531 for plastics, if necessary with one or more sift-proof inner bags, or

(c) sift-proof bags conforming to marginal 3533 for textiles, marginal 3534 for woven plastics, marginal 3535 for plastics film or marginal 3536 for paper.

(3) Substances classified under (c) of 6°, 11° to 14°, 16° and 17° with a melting-point above 45 °C or are pasty according to the criteria of the penetrometer test (see Appendix A.3, marginal 3310), or are not liquid according to the ASTM D 4359-90 test method may also be packed in:

(a) flexible IBCs conforming to marginal 3623, excluding types 13H1, 13L1 and 13M1, or

(b) fibreboard IBCs conforming to marginal 3626, or

(c) wooden IBCs conforming to marginal 3627, or

(d) composite IBCs with plastics inner receptacle of type 11HZ2 conforming to marginal 3625.

2408 Celluloid in sheets of 3° (c) may also be carried unpackaged on pallets, wrapped in plastics film and secured by appropriate means, such as steel bands, as a full load in closed vehicles. A pallet shall not weigh more than 1 000 kg.

2409-
2410

3. Mixed packing

2411 (1) Substances which come under the same item may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of 21° to 26° and 31° to 50° shall not be packed with other goods.

(3) Except for the substances mentioned in paragraph (2) and unless special conditions to the contrary are prescribed under paragraph (7), substances of Class 4.1 in quantities not exceeding 5 kg per receptacle may be packed together in a combination packaging conforming to marginal 3538 with substances or articles of other classes — provided that mixed packing is also permitted for substances and articles of these classes — and or with goods not subject to the provisions of this Directive, provided they do not react dangerously with one another.

(4) The following shall be considered dangerous reactions:

(a) combustion and or giving off considerable heat,

(b) emission of flammable and/or toxic gases,

(c) formation of corrosive liquids,

(d) formation of unstable substances.

(5) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2402 shall be observed.

(6) Where a wooden or fibreboard box is used, a package shall not weigh more than 100 kg.

(7) Substances classified under (b) or (c) of 1° to 5° and 11° to 14° shall not be packed together with substances of Class 5.1 classified under (a) or (b) of the various items of marginal 2501.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2412 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances of Class 4.1 shall bear a label conforming to model No 4.1.

(3) Packages containing substances of 7°, 16°, 22° or 25° shall, in addition, bear a label conforming to model No 6.1 and packages containing substances of 8° and 17° a label conforming to model No 8.

(4) Packages containing self-reactive substances of items 31°, 32°, 41° and 42° shall in addition bear a label conforming to model No 01 unless the competent authority has permitted this label to be dispensed with for the type of packaging tested because the results have proved that the selfreactive substance in such a packaging does not exhibit explosive behaviour [see marginal 2414 (4)].

(5) Packages containing fragile receptacles not visible from the outside shall bear on two opposite sides a label conforming to model No 12.

(6) Packages containing liquids in packagings the closures of which are not visible from the outside, packages containing vented packagings or vented packagings without outer packagings shall in addition bear on two opposite sides a label conforming to model No 11.

2413

B. Particulars in the transport document

2414 (1) The description of the goods in the transport document shall conform to one of the identification numbers and names printed in italics in marginal 2401.

If the substance is not mentioned by name, but is assigned to an n.o.s. entry or collective entry, the description of the goods shall consist of the identification number and the n.o.s. designation or collective entry, followed by the chemical or technical name of the substance (1);.

The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or *'RID'*), e.g. '4.1, 6°(b), ADR'.

For the carriage of wastes [see marginal 2000 (4)] the description of the goods shall be: 'Waste containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste, earth containing toluene 4.1, 4° (c), ADR'.

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which most predominantly contribute to the danger or dangers of the solutions and mixtures.

If a named substance in accordance with marginal 2400 (9) is not subject to the conditions of this Class, the consignor may enter in the transport document: 'Not goods of Class 4.1.'

(2) When substances are carried under conditions fixed by the competent authority (see marginals 2400 (16) and 2405 (4), the following statement shall be included in the transport document:

'Carriage in accordance with marginal 2414 (2).'

(3) When a sample of a self-reactive substance is carried in accordance with marginals 2400 (18) and 2405 (6), the following statement shall be included in the transport document:

'Carriage in accordance with marginal 2414 (3).'

(4) When, by permission of the competent authority in accordance with marginal 2412 (4), a label conforming to model No 01 is not required, the following statement shall be included in the transport document:

'The danger label conforming to model No 01 is not required.'

(5) When self-reactive substances type G [see Appendix A.1 marginal 3104 (2) (g)] are carried, the following statement may be given in the transport document:

'Not a self-reactive substance of Class 4.1.'

(6) For self-reactive substances requiring temperature control during carriage, the following statement shall be given in the transport document:

'Control temperature: ... °C Emergency temperature: ... °C'

(7) For the solutions and mixtures containing only one component subject to the provisions of this Directive, the word 'solution' or 'mixture' shall be added as part of the name in the transport document [see marginal 2002 (8) (a)].

(8) When a solid is handed over for carriage in the molten state the description of the goods shall further specify 'molten', unless the term already appears in the name.

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(1) The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

2415-
2421

C. Empty packagings

2422 (1) Uncleaned empty packagings, including empty IBCs, except those referred to in paragraph (2), uncleaned, of 51°, shall be closed in the same way and present the same degree of leakproofness as if they were full.

(2) Uncleaned empty packagings, including empty IBCs, of 51°, to the outside of which residues of their previous contents have adhered, shall be carried in leakproof packagings.

(3) Uncleaned empty packagings, including empty IBCs, which have contained water-wetted substances of 13° (b) or substances of 21° to 25° are not to be accepted for carriage unless the residues are so packed that the content of water or other phlegmatizers added to the substances to render them inert cannot diminish.

Uncleaned empty packagings which have contained substances of 31° to 50° are not to be accepted for carriage unless steps have been taken to prevent dangerous decomposition.

(4) Uncleaned empty packagings, including empty IBCs, of 51°, and packagings conforming to (2) shall bear the same danger labels as if they were full.

(5) The description of the goods in the transport document shall conform to one of the names printed in italics in 51°, e.g. 'Empty packaging, 4.1, 41°, ADR'. In the case of uncleaned empty tank-vehicles, empty demountable tanks, empty tank-containers and empty small containers, the description shall be completed by adding the words 'Last load' together with the name and item number of the goods last loaded, e.g. 'Last load: 2304 naphthalene, molten, 5°'.

2423-
2424

D. Transitional measures

2425 Substances and articles of Class 4.1 may be carried until 30 June 1995 in accordance with the provision of Class 4.1 applicable until 31 December 1994. The transport document shall, in such cases, bear the inscription: 'Carriage in accordance with the ADR in force before 1 January 1995'.

2426-
2429

CLASS 4.2

SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

1. List of substances

2430 (1) Among the substances and articles covered by the title of Class 4.2, those which are listed in marginal 2431 or are covered by a collective heading in that marginal are subject to the conditions set out in marginals 2430 (2) to 2452 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive.

(2) The title of Class 4.2 covers:

— substances, including mixtures and solutions (liquids or solids), which even in small quantities ignite on contact with air within five minutes. They are described as substances liable to spontaneous combustion (pyrophoric substances);

— substances and articles, including mixtures and solutions, which, on contact with air, are liable to heat up without any energy input. These substances can ignite only in large quantities (kilograms) and after a long period of time (hours or days). They are described as self-heating substances.

2430 *(cont'd)*

(3) The substances and articles of Class 4.2 are subdivided as follows:

A. Organic substances liable to spontaneous combustion.

B. Inorganic substances liable to spontaneous combustion.

C. Organometallic compounds liable to spontaneous combustion.

D. Empty packagings.

Substances and articles of Class 4.2 classified under the various items of marginal 2431, shall be assigned to one of the following groups designated by letters (a), (b) or (c), according to their degree of danger:

(a) liable to spontaneous combustion (pyrophoric),

(b) self-heating,

(c) slightly self-heating.

(4) The assignment of substances and articles not specifically named to 3° to 5°, 12°, 15°, 16°, 31° and 32° of marginal 2431, as well as within these items to the letters, can be based on experience or the results of the test procedure in accordance with Appendix A.3, marginals 3330 to 3333.

Assignment to 6° to 10°, 14°, 17° to 21° and 33°, as well as within these to the letters, shall be based on the results of the test procedure in accordance with Appendix A.3, marginals 3330 to 3333; experience shall also be taken into account when it leads to a more strictly based assignment.

(5) When substances or articles not specifically named are assigned to the items of marginal 2431 on the basis of test procedures in accordance with Appendix A.3, marginals 3330 to 3333, the following criteria apply:

(a) Solids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when they ignite on falling from a height of 1 m or within five minutes;

(b) Liquids liable to spontaneous combustion (pyrophoric) shall be assigned to Class 4.2 when:

(i) on being poured on an inert carrier, they ignite within five minutes, or

(ii) in the event of a negative result of the test according to (i), when poured on a dry, indented filter paper (Whatman No 3 filter), they ignite or carbonize it within five minutes;

(c) Substances in which, in a 10 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours shall be assigned to Class 4.2. This criterion is based on the temperature of the spontaneous combustion of charcoal, which is at 50 °C for a sample cube of 27 m^3. Substances with a temperature of spontaneous combustion higher than 50 °C for a volume of 27 m^3 are not to be assigned to Class 4.2.

(6) When substances and articles not specifically named are assigned to the letters of the items of marginal 2431 on the basis of test procedures in accordance with Appendix A.3, marginals 3330 to 3333, the following criteria shall apply:

(a) Substances liable to spontaneous combustion (pyrophoric) shall be assigned to letter (a);

(b) Self-heating substances and articles in which, in a 2.5 cm sample cube, at 140 °C test temperature, spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours, shall be assigned to letter (b);

(c) Slightly self-heating substances in which, in a 2.5 cm sample cube, the phenomena referred to under (b) are not observed, in the given conditions, but in which in a 10 cm sample cube at 140 °C test temperature spontaneous combustion or a rise in temperature to over 200 °C is observed within 24 hours, shall be assigned to letter (c).

2430 *(cont'd)*

(7) If substances of Class 4.2, as a result of admixtures, come into different categories of risk from those to which the substances of marginal 2431 belong, these mixtures shall be assigned to the items and letters to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(8) When substances are specifically named under more than one letter of the same item in marginal 2431, the relevant letter may be determined on the basis of the results of the test procedure in accordance with Appendix A.3, marginals 3330 to 3333, and the criteria set out in (6).

(9) On the basis of the test procedure in accordance with Appendix A.3, marginals 3330 to 3333, and the criteria set out in (6), it may also be determined whether the nature of a specifically named substance is such that the substance is not subject to the provisions for this Class (see marginal 2444).

(10) Substances and mixtures of substances having a melting point higher than 45 °C shall be considered to be solids as defined in the packaging requirements of marginals 2435 (2), 2436 (2) and 2437 (3) and (4).

(11) Self-heating solids, oxidizing, assigned to identification number 3127 of the United Nations Recommendations on the Transport of Dangerous Goods, shall not be accepted for carriage (see, however, marginal 2002 (8), footnote (1) to the table in paragraph 2.3.1).

A. Organic substances liable to spontaneous combustion

2431

1° Carbon, powdered, in grains or in pieces

(b) *1361 carbon* or *1361 carbon black*, animal or vegetable origin

(c) *1361 carbon* or *1361 carbon black*, animal or vegetable origin, *1362 carbon, activated.*

Notes: 1. Carbons made by a steam activation process and non-activated carbon black of mineral origin are not subject to the provisions of this Directive.

2. Non-activated carbons of mineral origin and carbon dust in a state not liable to self-heating are not subject to the provisions of this Directive.

2° Animal and vegetable substances:

(b) *1374 fishmeal*, (fish scrap), *unstabilized*;

(c) *1363 copra, 1386 seedcake* containing more than 1,5 % (mass) oil and with not more than 11 % (mass) moisture, *2217 seedcake* containing not more than 1,5 % (mass) oil and having not more than 11 % (mass) moisture.

3° Industrially-produced fibres, fabrics and similar products:

(c) *1364 cotton waste, oily, 1365 cotton, wet, 1379 paper, unsaturated oil treated,* incompletely dried (including carbon paper), *1373 fibres, animal* or *vegetable* or *synthetic, n.o.s.* impregnated with oil, or *1373 fabrics, animal* or *vegetable* or *synthetic, n.o.s.* impregnated with oil.

4° Substances made from weakly nitrated cellulose:

(c) *2002 celluloid, scrap, 2006 plastics, nitrocellulose-based, self-heating, n.o.s.*

Note: 1353 fibres or fabrics impregnated with weakly nitrated cellulose, non-self heating, and 2000 celluloid are articles of Class 4.1 [see marginal 2401, 3° (c)].

2431 *(cont'd)*

5° Solid organic spontaneously combustible non-toxic and non-corrosive substances, and mixtures of solid organic spontaneously combustible non-toxic and non-corrosive substances (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *2846 pyrophoric solid, organic, n.o.s.;*

(b) *1369 p-nitrosodimethylaniline, 2940 9-phosphabicyclononanes (cyclooctadiene phosphines), self-heating solid, organic, n.o.s.;*

(c) *3088 self-heating solid, organic, n.o.s.*

6° Liquid organic spontaneously combustible non-toxic and non-corrosive substances, and solutions of organic spontaneously combustible non-toxic and non-corrosive substances (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *2845 pyrophoric liquid, organic, n.o.s.;*

Note: Special packing conditions are applicable to this substance (see marginal 2433).

(b) *3183 self-heating liquid, organic, n.o.s.;*

(c) *3183 self-heating liquid, organic, n.o.s.*

7° Solid organic spontaneously combustible toxic substances, and mixtures of solid organic spontaneously combustible toxic substances (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3128 self-heating solid, toxic, organic, n.o.s.;*

(c) *3128 self-heating solid, toxic, organic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

8° Liquid organic spontaneously combustible toxic substances, and solutions of organic spontaneously combustible toxic substances (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3184 self-heating liquid, toxic, organic, n.o.s.;*

(c) *3184 self-heating liquid, toxic, organic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

9° Organic spontaneously combustible corrosive solids, and mixtures of organic spontaneously combustible corrosive solids (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3126 self-heating solid, corrosive, organic, n.o.s.;*

(c) *3126 self-heating solid, corrosive, organic, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

10° Organic spontaneously combustible corrosive liquids, and solutions of organic spontaneously combustible corrosive substances (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3185 self-heating liquid, corrosive, organic, n.o.s.;*

(c) *3185 self-heating liquid, corrosive, organic, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

B. Inorganic substances liable to spontaneous combustion

11° Phosphorus

(a) *1381 phosphorus, white* or *yellow, dry* or *1381 phosphorus, white* or *yellow, under water* or *1381 phosphorus, white* or *yellow, in solution.*

Note: 2447 phosphorus, white or yellow, molten is a substance of 22°.

2431 (cont'd)

12° Metals and metal alloys in powder, dust or granular form or in another spontaneously combustible form:

(a) *1854 barium alloys, pyrophoric, 1855 calcium, pyrophoric* or *1855 calcium alloys, pyrophoric, 2008 zirconium powder, dry, 2545 hafnium powder, dry, 2546 titanium powder, dry, 2881 metal catalyst, dry, 1383 pyrophoric metal, n.o.s.* or *1383 pyrophoric alloy, n.o.s.;*

(b) *1378 metal catalyst, wetted* with a visible excess of liquid, *2008 zirconium powder, dry, 2545 hafnium powder, dry, 2546 titanium powder, dry, 2881 metal catalyst, dry, 3189 self-heating metal powder, n.o.s.;*

Note to (a) and (b): The identification numbers 1378 and 2881 include only metal catalysers with a base of nickel, cobalt, copper, manganese or their compounds.

(c) *1932 zirconium scrap, 2008 zirconium powder, dry, 2009 zirconium, dry,* finished sheets, strip or coiled wire (less than 18 µm thick), *2545 hafnium powder, dry, 2546 titanium powder, dry, 2793 ferrous metal borings, shavings, turnings* or *cuttings* in a self-heating form, *2881 metal catalyst, dry, 3189 self-heating metal powder, n.o.s.*

Notes: 1. 2858 finished zirconium products of a thickness of 18 µm or more are substances of Class 4.1 [see marginal 2401, 13° (c)].

2. 1326 hafnium powders, 1352 titanium powders or 1358 zirconium powders, wetted, with not less than 25 % water, are substances of Class 4.1 (see marginal 2401, 13°).

3. Dust and powder of metals in non-spontaneously combustible form, which nevertheless, in contact with water, emit flammable gases, are substances of Class 4.3 (see marginal 2471, 13°).

13° Sulphides, hydrosulphides and dithionites in spontaneously combustible form:

(b) *1382 potassium sulphide, anhydrous* or *1382 potassium sulphide* with less than 30 % water of crystallization, *1384 sodium dithionite (sodium hydrosulphite), 1385 sodium sulphide, anhydrous* or *1385 sodium sulphide* with less than 30 % water of crystallization, *1923 calcium dithionite (calcium hydrosulphite), 1929 potassium dithionite (potassium hydrosulphite), 2318 sodium hydrosulphide* with less than 25 % water of crystallization;

Note: 1847 potassium sulphide, hydrated with not less than 30 % water of crystallization and 2949 sodium hydrosulphide with not less than 25 % water of crystallization are substances of Class 8 [see marginal 2801, 45° (b) 1.].

(c) *3174 titanium disulphide*

14° Metallic salts and alcoholates, non-toxic and non-corrosive, in spontaneously combustible form:

(b) *3205 alkaline earth metal alcoholates, n.o.s.;*

(c) *3205 alkaline earth metal alcoholates, n.o.s.*

15° Metallic salts and alcoholates, corrosive, in spontaneously combustible form:

(a) *2441 titanium trichloride, pyrophoric* or *2441 titanium trichloride mixtures, pyrophoric;*

(b) *1431 sodium methylate, 3206 alkali metal alcoholates, self-heating, corrosive, n.o.s.;*

(c) *3206 alkali metal alcoholates, self-heating, corrosive, n.o.s.*

Note: 2869 titanium trichloride or titanium trichloride mixture, not pyrophoric, is a substance of Class 8 [see marginal 2801, 11° (b) or (c)].

16° Spontaneously combustible, non-toxic and non-corrosive inorganic solids and mixtures of spontaneously combustible non-toxic and non-corrosive inorganic solids (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *3200 pyrophoric solid, inorganic, n.o.s.;*

(b) *2004 magnesium diamide, 3190 self-heating solid, inorganic, n.o.s.;*

2431 (cont'd)

(c) *1376 iron oxide, spent,* or *1376 iron sponge, spent,* obtained from coal gas purification, *2210 maneb* (manganese ethylene 1,2-bis (dithiocarbamate)) or *2210 maneb preparation* with not less than 60 % maneb, *3190 self-heating solid, inorganic, n.o.s.*

Note: 2968 maneb or 2968 maneb preparations which are stabilized against self-heating and which, in contact with water, emit flammable gases, are substances of Class 4.3 [see marginal 2471, 20° (c)].

17° Inorganic spontaneously combustible, non-toxic and non-corrosive liquids, and solutions of spontaneously combustible inorganic non-toxic and non-corrosive substances (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *2870 aluminium borohydride* or *2870 aluminium borohydride contained in devices, 3194 pyrophoric liquid, inorganic, n.o.s.;*

Notes: 1. Special packing conditions are applicable to these substances (see marginal 2433).

2. Other metal hydrides in flammable form are substances of Class 4.1 (see marginal 2401, 14°).

3. Metal hydrides which, in contact with water, emit flammable gases, are substances of Class 4.3 (see marginal 2471, 16°).

(b) *3186 self-heating liquid, inorganic, n.o.s.;*

(c) *3186 self-heating liquid, inorganic, n.o.s.*

18° Inorganic spontaneously combustible toxic solids and mixtures of inorganic spontaneously combustible toxic solids (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3191 self-heating solid, toxic, inorganic, n.o.s.;*

(c) *3191 self-heating solid, toxic, inorganic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

19° Inorganic spontaneously combustible toxic liquids and solutions of inorganic spontaneously combustible toxic substances (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *1380 pentaborane;*

Note: Special packing conditions are applicable to this substance (see marginal 2433).

(b) *3187 self-heating liquid, toxic, inorganic, n.o.s.;*

(c) *3187 self-heating liquid, toxic, inorganic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

20° Inorganic spontaneously combustible corrosive solids and mixtures of inorganic spontaneously combustible corrosive solids (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3192 self-heating solid, corrosive, inorganic, n.o.s.;*

(c) *3192 self-heating solid, corrosive, inorganic, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

21° Inorganic spontaneously combustible corrosive liquids and solutions of inorganic spontaneously combustible corrosive substances (such as preparations and wastes), which cannot be classified under other collective headings:

(b) *3188 self-heating liquid, corrosive, inorganic, n.o.s.;*

(c) *3188 self-heating liquid, corrosive; inorganic, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

22° *2447 phosphorus, white molten.*

2431 (cont'd)

C. Organometallic compounds liable to spontaneous combustion

Notes: 1. Organometallic compounds and their solutions which are not liable to spontaneous combustion but, in contact with water, emit flammable gases, are substances of Class 4.3 (see marginal 2471, 3°).

2. Flammable solutions with organometallic compounds which are not liable to spontaneous combustion and, in contact with water, do not emit flammable gases, are substances of Class 3.

3. Special packing conditions are applicable to the substances of 31° to 33° (see marginal 2433).

31° Spontaneously combustible metal alkyls and metal aryls

(a) *1366 diethylzinc, 1370 dimethylzinc, 2005 magnesium diphenyl, 2445 lithium alkyls, 3051 aluminium alkyls, 3053 magnesium alkyls, 2003 metal alkyls, n.o.s.* or *2003 metal aryls, n.o.s.,*

32° Other spontaneously combustible organometallic compounds

(a) *3052 aluminium alkyl halides, 3076 aluminium alkyl hydrides, 3049 metal alkyl halides, n.o.s.* or *3049 metal aryl halides, n.o.s., 3050 metal alkyl hydrides, n.o.s.* or *3050 metal aryl hydrides, n.o.s.*

33° Spontaneously combustible organometallic compounds

(a) *3203 pyrophoric organometallic compound, n.o.s.*

D. Empty packagings

41° *Empty packagings,* including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks, empty vehicles* and *empty tank-containers,* uncleaned, as well as *empty vehicles* for carriage in bulk and *empty small* bulk *containers*, uncleaned, which have contained substances of Class 4.2.

Note: Uncleaned empty packagings, including empty intermediate bulk containers (IBCs), empty tank-vehicles, empty demountable tanks, empty tank-containers and empty small containers which have contained substances of 4° (c), identification No 2002, of 12° (c), identification Nos. 1932, 2009 and 2793, and of 16° (c), identification No 1376, are not subject to the provisions of this Directive.

2. Provisions

A. Packages

1. General conditions of packing

2432 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginal 2433. Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(2) With the exception of the packagings referred to in marginal 2436 (2) (a) and (b) and (3) and in marginal 2437 (3) (a) and (b), (4) and (5), (inner) packagings shall be hermetically closed.

(3) In accordance with the provisions of marginals 2430 (3) and 3511 (2) or 3611 (2) respectively, the following shall be used:

— packagings of packing group I, marked with the letter 'X', for substances liable to spontaneous combustion (pyrophoric) classified under (a) of each item,

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for self-heating substances classified under (b) of each item,

2432 *(cont'd)* — packagings of packing groups III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing groups III or II, marked with the letter 'Z' or 'Y', for self-heating substances classified under (c) of each item.

Note: For the carriage of substances of Class 4.2 in tank-vehicles, demountable tanks and tank-containers, as well as for carriage in bulk, see Annex B.

2. Packing of individual substances

2433 (1) Pyrophoric liquids of 6° (a), 17° (a) with the exception of aluminium borohydride in devices, 19° (a) and 31° to 33°, shall be packed in hermetically closing metal receptacles which are not affected by the contents and have a capacity of not more than 450 litres. The receptacles shall be subjected to the initial test and periodic tests every five years at a pressure of not less than 1MPa (10 bar) (gauge pressure). The receptacles shall not be filled to more than 90 % of their capacity; however, a space of at least 5 % shall remain empty for safety when the liquid is at an average temperature of 50 °C. During carriage, the liquid shall be under a layer of inert gas the gauge pressure of which shall be not less than 50 kPa (0,5 bar). The receptacles shall carry a data plate with the following particulars entered in a durable form:

— substance or substances (1) accepted for carriage;

— tare (2) of the receptacle, including accessories;

— test pressure (2) (gauge pressure);

— date (month, year) of the last test undergone;

— stamp of the expert who carried out the test;

— capacity (2) of the receptacle;

— maximum mass of filling allowed (2).

(2) These substances may also be packed in combination packagings conforming to marginal 3538 with a glass inner packaging and a steel or aluminium outer packaging conforming to marginal 3532. Receptacles shall not be filled to more than 90 % of their capacity. A package shall contain only a single inner packaging. Such combination packagings shall conform to a design type which has been tested and approved in accordance with Appendix A.5 for packing group I.

2434 Phosphorus of 22° shall be carried only in tank-vehicles and demountable tanks (see Appendix B.1a) or in tank-containers (see Appendix B.1b).

2435 (1) Substances classified under (a) of 5°, 12°, 15° and 16° shall be packed in:

(a) non-removable head steel drums conforming to marginal 3520, or

(b) non-removable head aluminium drums conforming to marginal 3521, or

(c) non-removable head steel jerricans conforming to marginal 3522, or

(d) non-removable head plastics drums with a maximum capacity of 60 litres and in non-removable head plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings with glass, plastics material or metal inner packagings conforming to marginal 3538.

(1) The name may be replaced by a generic description covering substances of a similar nature and also compatible with the characteristics of the receptacle.
(2) The units of measurement to be added each time after the numerical values.

2435 *(cont'd)* (2) Solids as defined in marginal 2430 (10) may also be packed: in removable head drums conforming to marginal 3520 for steel, marginal 3521 for aluminium, or marginal 3526 for plastics material, or in removable head jerricans conforming to marginal 3522 for steel or marginal 3526 for plastics material.

(3) White or yellow phosphorus of 11° (a) shall be packed in:

(a) non-removable head steel drums conforming to marginal 3520;

(b) non-removable head steel jerricans conforming to marginal 3522;

(c) combination packagings conforming to marginal 3538 with metal inner packagings.

(4) Aluminium borohydride contained in devices of 17° (a) shall be packed in:

(a) removable-head steel drums conforming to marginal 3520, or

(b) removable-head aluminium drums conforming to marginal 3521, or

(c) removable-head plastics drums conforming to marginal 3526, or

(d) steel or aluminium boxes conforming to marginal 3532.

2436 (1) Substances classified under (b) of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain, stoneware) conforming to marginal 3539, or

(h) metal IBCs conforming to marginal 3622, or

(i) rigid plastics IBCs conforming to marginal 3624, or

(j) composite IBCs with plastics inner receptacle conforming to marginal 3625, with the exception of types 11HZ2 and 31HZ2.

(2) Solids as defined in marginal 2430 (10) may also be packed in:

(a) plywood drums conforming to marginal 3523 or in fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) plastics film bags conforming to marginal 3535, provided that they make up a full load or are loaded on pallets.

(3) Fishmeal of 2° (b) may also be packed in flexible IBCs conforming to marginal 3623, with the exception of types 13H1, 13L1 and 13M1, provided that they make up a full load or the flexible IBCs are loaded on pallets.

2437 (1) Substances classified under (c) of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539, or

(h) light-gauge metal packagings conforming to marginal 3540.

Note: Metal packagings for substances of 4° shall be so constructed and closed as to yield when the internal pressure reaches a value not greater than 300 kPa (3 bar).

(2) With the exception of substances of 4°, substances may also be packed in:

(a) metal IBCs conforming to marginal 3622, or

(b) rigid plastics IBCs conforming to marginal 3624, or

(c) composite IBCs with plastics inner receptacle conforming to marginal 3625 with the exception of types 11HZ2 and 31HZ2.

(3) Solids as defined in marginal 2430 (10) may also be packed in:

(a) plywood drums conforming to marginal 3523, or in fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) plastics film bags conforming to marginal 3535.

(4) With the exception of substances of 4°, solids as defined in marginal 2430 may also be packed in flexible IBCs conforming to marginal 3623, with the exception of types 13H1, 13L1 and 13M1.

(5) Substances of 2° (c) and 3° (c) may also be packed in untested packagings, which need only meet the provisions of marginal 3500 (1), (2) and (4) to (7). Cotton waste with an oil content less than 5 % (mass) and cotton of 3° (c) may also be carried in firmly secured balls.

2438 (1) The openings of receptacles for the carriage of liquids having a viscosity, at 23 °C, of less than 200 mm^2/s, with the exception of glass ampoules and pressure cylinders, shall be hermetically sealed by means of two devices in series, one of which shall be screwed shut or secured in an equivalent manner.

Note: For IBCs, however, see marginal 3621 (8).

(2) Steel drums conforming to marginal 3520 containing wetted metal catalyst of 12° (b) shall be fitted with a vent in accordance with marginal 3500 (8).

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3. Mixed packing

2441 (1) Substances classified under the same item may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of 6° (a), 11°, 17° (a), 19° (a), and 31° to 33° shall not be packed together with substances or articles of other items of Class 4.2, with substances or articles of other classes or with goods which are not subject to the provisions of this Directive.

(3) With the exception of the substances referred to in (2) above, substances of Class 4.2, in quantities not exceeding 3 litres for liquids and/or 6 kg for solids, per receptacle, may be packed together in a combination packaging conforming to marginal 3538, with substances or articles of other classes — provided that mixed packing is also permitted for substances and articles of those classes — and/or with goods which are not subject to the provisions of this Directive, provided they do not react dangerously with one another.

For substances classified in group (a), the net quantity per package shall not exceed 3 kg for solids 3 litres for liquids.

(4) The following shall be considered dangerous reactions:

(a) combustion and/or giving off considerable heat,

(b) emission of flammable and/or toxic gases,

(c) formation of corrosive liquids,

(d) formation of unstable substances.

(5) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2432 shall be observed.

(6) A package shall not weigh more than 100 kg when wooden or fibreboard cases are used.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2442 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances of Class 4.2 shall bear a label conforming to model No 4.2.

(3) Packages containing substances of 17° (a), maneb or maneb preparations of 16° (c), and substances of 31° to 33° shall in addition bear a label conforming to model No 4.3.

(4) Packages containing substances of 7°, 8°, 11°, 18° and 19° shall in addition bear a label conforming to model No 6.1.

(5) Packages containing substances of 9°, 10°, 15°, 20° and 21° shall in addition bear a label conforming to model No 8.

(6) Packages containing fragile receptacles not visible from the outside shall bear on two opposite sides a label conforming to model No 12.

(7) Packages containing liquids, the closures of which are not visible from the outside, packages containing receptacles fitted with vents or receptacles fitted with vents without outer packaging and packages containing phosphorus covered with water of 11° (a) shall bear on two opposite sides a label conforming to model No 11.

2443

B. Particulars in the transport document

2444 The description of the goods in the transport document shall conform to one of the identification numbers and names printed in italics in marginal 2431.

If the substance is not mentioned by name, but is assigned to an n.o.s. entry, the description of the goods shall consist of the identification number and the n.o.s designation, followed by the chemical or technical name of the substance [1].

The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or '*RID*'), e.g. '4.2. 13° (b), ADR'.

For the carriage of wastes [see marginal 2000 (5)] the description of the goods shall be: 'Waste containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste earth containing 1381 white phosphorus under water 4.2, 11° (a) ADR'.

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which predominantly contribute to the danger or dangers of the solutions and mixtures.

If a named substance in accordance with marginal 2430 (9) is not subject to the conditions of this Class, the consignor may enter in the transport document: 'Not goods of Class 4.2'.

For the solutions and mixtures containing only one component subject to the provisions of this Directive, the word 'solution' or 'mixture' shall be added as part of the name in the transport document [see marginal 2002 (8) (a)].

When a solid is handed over for carriage in the molten state the description of the goods shall further specify 'molten', unless the term already appears in the name.

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C. Empty packagings

2452 (1) Uncleaned empty packagings, including empty IBCs of 41° shall be closed in the same manner and be leakproof to the same degree as if they were full.

(2) Uncleaned empty packagings, including empty IBCs of 41° shall bear the same danger labels as if they were full.

(3) The description of the goods in the transport document shall conform to one of the names printed in italics in 41°, e.g. 'Empty packaging, 4.2, 41°, ADR'. In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers or empty small containers, uncleaned, this description shall be accompanied by the words 'Last load' and the name and item number of the goods last loaded e.g. 'Last load: 1381 white phosphorus, dry, 11° (a)'.

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[1] The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

CLASS 4.3

SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

1. List of substances

2470 (1) Among the substances covered by the title of Class 4.3, those which are listed in marginal 2471 or covered by a collective heading of that marginal are subject to the conditions set out in marginals 2470 (2) to 2492 and to the provisions of this Annex and of Annex B. They are then considered as substances of this Directive.

Note: For the quantities of substances listed in marginal 2471 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2471a.

(2) The title of Class 4.3 covers substances which react with water to emit flammable gases liable to form explosive mixtures with air.

Note: The term 'water-reactive' used in the n.o.s. entries of marginal 2471 denotes a substance which in contact with water emits flammable gases.

(3) Substances of Class 4.3 are subdivided as follows:

A. Organic substances, organometallic compounds and substances in organic solvents, which, in contact with water, emit flammable gases;

B. Inorganic substances which, in contact with water, emit flammable gases;

C. Empty packagings.

Substances of Class 4.3 classified under the various items of marginal 2471 shall be assigned to one of the following groups, designated by the letter (a), (b) or (c), according to their degree of danger:

(a) very dangerous,

(b) dangerous,

(c) less dangerous.

(4) Assignment of substances not mentioned by name to marginal 2471, 1°, 3°, 11°, 13°, 14°, 16° and 20° to 25°, and within these items to the letters, shall be based on the results of the test procedure in accordance with Appendix A.3, marginals 3340 and 3341; experience shall also be taken into account when it leads to a more strictly based assignment.

(5) When substances not specifically named are assigned to the items of marginal 2471 on the basis of the test procedure in accordance with Appendix A.3, marginals 3340 and 3341, the following criteria apply:

A substance shall be assigned to Class 4.3 if:

(a) during any stage of the test the gas emitted ignites spontaneously, or

(b) the rate of emission of flammable gas per hour is equal to or greater than 1 litre per kilogramme per hour of the substance to be tested.

(6) When substances not specifically named are assigned to the letters of the items in marginal 2471 on the basis of the test procedure in accordance with Appendix A.3, marginals 3340 and 3341, the following criteria shall apply:

(a) Any substance which reacts vigorously with water at ambient temperature to produce gas which ignites spontaneously, or one which reacts readily with water at ambient temperatures such that the rate of emission of flammable gas within one minute is equal to or greater than 10 litres per kilogramme of substance, shall be assigned to letter (a);

2470 *(cont'd)*

(b) Any substance which reacts readily with water at ambient temperature such that the maximum rate of emission of flammable gas per hour is equal to or greater than 20 litres per kilogramme of substance, and which does not meet the criteria of letter (a), shall be assigned to letter (b);

(c) Any substance which reacts slowly with water at ambient temperature such that the maximum rate of emission of flammable gas per hour is equal to or greater than 1 litre per kilogramme of substance, and which does not meet the criteria of letters (a) or (b), shall be assigned to letter (c).

(7) If substances of Class 4.3, as a result of admixtures, come into different categories of risk from those to which the substances of marginal 2471 belong, these mixtures shall be assigned to the items and letters to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes) see also marginal 2002 (8).

(8) When substances are specifically named under more than one letter of the same item of marginal 2471, the relevant letter may be determined on the basis of the results of the test procedure in accordance with Appendix A.3, marginals 3340 and 3341, and the criteria set out in paragraph (6).

(9) On the basis of the test procedure in accordance with Appendix A.3, marginals 3340 and 3341, and the criteria set out in paragraph (6), it may also be determined whether the nature of a specifically named substance is such that the substance is not subject to the provisions for this Class (see marginal 2484).

(10) Substances and mixtures of substances having a melting point higher than 45 °C shall be considered as solids for the purposes of the conditions of packing in marginals 2474 (2), 2475 (3) and 2476 (2).

(11) Water-reactive solids, flammable, assigned to identification number 3132, water-reactive solids, oxidizing, assigned to identification number 3133 and water-reactive solids, self-heating, assigned to identification number 3135 of the United Nations Recommendations on the Transport of Dangerous Goods shall not be accepted for carriage (see, however, marginal 2002 (8), footnote (1) in the table in paragraph 2.3.1).

A. Organic substances, organometallic compounds and substances in organic solvents which, in contact with water, emit flammable gases

2471

1° Chlorosilanes:

(a) *1183 ethyldichlorosilane, 1242 methyldichlorosilane, 1295 trichlorosilane, 2988 chlorosilanes, water-reactive, flammable, corrosive, n.o.s.*

Note: 1. Special packing conditions are applicable to these substances [see marginal 2473 (1)].

2. Chlorosilanes having a flash point of less than 23 °C and which, in contact with water, do not emit flammable gases are substances of Class 3 [see marginal 2301, 21° (a)].

3. Chlorosilanes having a flash point equal to or greater than 23 °C and which, in contact with water, do not emit flammable gases are substances of Class 8 (see marginal 2801, 37°).

2° The following boron trifluoride complex:

(a) *2965 boron trifluoride dimethyletherate.*

3° Organometallic compounds and their solutions:

(a) *1928 methylmagnesium bromide in ethyl ether, 3207 organometallic compound, water-reactive, flammable, n.o.s.* or *3207 solution of organometallic compound, water-reactive, flammable, n.o.s.* or *3207 dispersion of organometallic, compound, water-reactive, flammable, n.o.s.;*

Note: Special packing conditions are applicable to these substances [see marginal 2473 (2)].

2471 (cont'd)

(b) *3207 organometallic compound, water-reactive, flammable, n.o.s.* or *3207 solution of organometallic compound, water-reactive, flammable, n.o.s.* or *3207 dispersion of organometallic compound, water-reactive, flammable, n.o.s.;*

(c) *3207 organometallic compound, water-reactive, flammable, n.o.s.* or *3207 solution of organometallic compound, water-reactive, flammable, n.o.s.* or *3207 dispersion of organometallic compound, water-reactive, flammable, n.o.s.*

Note: 1. Organometallic compounds and their solutions which ignite spontaneously are substances of Class 4.2 (see marginal 2431, 31° to 33°).

2. Flammable solutions with organometallic compounds in concentrations which, in contact with water, neither emit flammable gases in dangerous quantities nor ignite spontaneously are substances of Class 3.

B. Inorganic substances which, in contact with water, emit flammable gases

Note: 1. The term 'alkali metals' includes the elements lithium, sodium, potassium, rubidium and caesium.

2. The term 'alkaline-earth' metals includes the elements magnesium, calcium, strontium and barium.

11° Alkali metals and alkaline-earth metals and their alloys and metallic compounds:

(a) *1389 alkali metal amalgam, 1391 alkali metal dispersion* or *1391 alkaline-earth metal dispersion, 1392 alkaline-earth metal amalgam, 1407 caesium, 1415 lithium, 1420 potassium metal alloys, 1422 potassium sodium alloys, 1423 rubidium, 1428 sodium, 2257 potassium, 1421 alkali metal alloy, liquid, n.o.s.;*

(b) *1400 barium, 1401 calcium, 1393 alkaline-earth metal alloy, n.o.s.;*

(c) *2950 magnesium granules, coated* with a particle size not less than 149 microns.

Note: 1. Alkaline-earth metals and alkaline-earth metal alloys in pyrophoric form are substances of Class 4.2 (see marginal 2431, 12°).

2. 1869 magnesium or 1869 magnesium alloys containing more than 50 % magnesium as pellets, shavings or strips, are substances of Class 4.1 [see marginal 2401, 13° (c)].

3. 1418 magnesium powder and 1418 magnesium alloys in powder form are substances of 14°.

12° Silicon alloys and metal silicides:

(b) *1405 calcium silicide, 1417 lithium silicon, 2624 magnesium silicide, 2830 lithium ferrosilicon;*

(c) *1405 calcium silicide, 2844 calcium manganese silicon.*

Note: For substances of (c) see also marginal 2471a.

13° Other metals, metal alloys and mixtures, non-toxic, which in contact with water, emit flammable gases:

(a) *3208 metallic substance, water-reactive, n.o.s.;*

(b) *1396 aluminium powder, uncoated, 3078 cerium,* turnings or gritty powder, *3170 aluminium processing by-products, 3208 metallic substance, water-reactive, n.o.s.;*

(c) *1398 aluminium silicon powder, uncoated, 1435 zinc ashes, 3170 aluminium processing by-products, 3208 metallic substance, water-reactive, n.o.s.*

Note: 1. Dust and powder of metals in pyrophoric form are substances of Class 4.2 (see marginal 2431, 12°).

2. Aluminium silicon powder, coated, is not subject to the provisions of this Directive.

3. 1333 cerium in slabs, rods or ingots is a substance of Class 4.1 [see marginal 2401, 13° (b)].

2471 (cont'd)

14° Metals and metal alloys in the form of powder or in any other form, which, in contact with water, emit flammable gases and are capable of self-heating:

(a) *1436 zinc powder* or *1436 zinc dust, 3209 metallic substance, water-reactive, self-heating, n.o.s.;*

(b) *1418 magnesium powder* or *1418 magnesium alloys powder, 1436 zinc powder* or *1436 zinc dust, 3209 metallic substance, water-reactive, self-heating, n.o.s.;*

(c) *1436 zinc powder* or *1436 zinc dust, 3209 metallic substance, water-reactive, self-heating, n.o.s.*

Note: 1. Metals and metal alloys in pyrophoric form are substances of Class 4.2 (see marginal 2431, 12°).

2. Metals and metal alloys which, in contact with water, do not emit flammable gases and are not pyrophoric or self-heating, but which are easily ignited, are substances of Class 4.1 (see marginal 2401, 13°).

15° Metals and metal alloys, toxic:

(b) *1395 aluminium ferrosilicon powder;*

(c) *1408 ferrosilicon* with 30 % or more but less than 90 % silicon.

Note: Ferrosilicon containing less than 30 % or not less than 90 % (mass) silicon is not subject to the provisions of this Directive.

16° Metal hydrides:

(a) *1404 calcium hydride, 1410 lithium aluminium hydride, 1411 lithium aluminium hydride, ethereal, 1413 lithium borohydride, 1414 lithium hydride, 1426 sodium borohydride, 1427 sodium hydride, 1870 potassium borohydride, 2010 magnesium hydride, 2463 aluminium hydride, 1409 metal hydrides, water-reactive, n.o.s.;*

(b) *2805 lithium hydride, solid, castings, 2835 sodium aluminium hydride, 1409 metal hydrides, water-reactive, n.o.s.*

Note: 1. 1871 titanium hydride and 1437 zirconium hydride are substances of Class 4.1 (see marginal 2401, 14°).

2. 2870 aluminium borohydride is a substance of Class 4.2 [see marginal 2431, 17° (a)].

17° Metal carbides and metal nitrides:

(a) *2806 lithium nitride;*

(b) *1394 aluminium carbide, 1402 calcium carbide.*

18° Metal phosphides, toxic:

(a) *1360 calcium phosphide, 1397 aluminium phosphide, 1419 magnesium aluminium phosphide, 1432 sodium phosphide, 1433 stannic phosphides, 1714 zinc phosphide, 2011 magnesium phosphide, 2012 potassium phosphide, 2013 strontium phosphide.*

Note: 1. Compounds of phosphorus with heavy metals such as iron, copper, etc., are not subject to the provisions of this Directive.

2. 3048 aluminium phosphide pesticides, with additives inhibiting the emission of flammable gases are substances of Class 6.1 [see marginal 2601, 43°, (a)].

19° Metal amides and metal cyanamides:

(b) *1390 alkali metal amides;*

(c) *1403 calcium cyanamide* with more than 0.1 % (mass) calcium carbide.

Note: 1. Calcium cyanamide containing not more than 0.1 % (mass) calcium carbide is not subject to the provisions of this Directive.

2. 2004 magnesium diamide is a substance of Class 4.2 [see marginal 2431, 16° (b)].

2471 *(cont'd)*

20° Inorganic solid substances and mixtures (such as preparations and wastes) which, in contact with water, emit flammable gases, non-toxic and non-corrosive, and which cannot be classified under other collective headings:

(a) *2813 water-reactive solid, n.o.s.;*

(b) *1340 phosphorus pentasulphide* (P_2S_5) free from yellow and white phosphorus, *2813 water-reactive solid, n.o.s.;*

Note: Phosphorus pentasulphide not free from yellow and white phosphorus is not to be accepted for carriage.

(c) *2968 maneb* [manganese ethylene 1,2-bis(dithiocarbamate)], *stabilized* against self-heating, or *2968 maneb preparation, stabilized* against self-heating, *2813 water-reactive solid, n.o.s.*

Note: 2210 maneb or 2210 maneb preparations in self-heating form are substances of Class 4.2 [see marginal 2431, 16° (c)], however, see also marginal 2471a, (c).

21° Inorganic liquid substances and solutions of inorganic substances (such as preparations and wastes) which, in contact with water, emit flammable gases, non-toxic and non-corrosive, and which cannot be classified under other collective headings:

(a) *3148 water-reactive liquid, n.o.s.;*

Note: Special packing conditions are applicable to this substance [see marginal 2473 (2)].

(b) *3148 water-reactive liquid, n.o.s.;*

(c) *3148 water-reactive liquid, n.o.s.*

22° Inorganic solid substances and mixtures (such as preparations and wastes) which, in contact with water, emit flammable gases, toxic, and which cannot be classified under other collective headings:

(a) *3134 water-reactive solid, toxic, n.o.s.;*

(b) *3134 water-reactive solid, toxic, n.o.s.;*

(c) *3134 water-reactive solid, toxic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

23° Inorganic liquid substances and solutions of inorganic substances (such as preparations and wastes) which, in contact with water, emit flammable gases, toxic, and which cannot be classified under other collective headings:

(a) *3130 water-reactive liquid, toxic, n.o.s.;*

Note: Special packing conditions are applicable to this substance [see marginal 2473 (2)].

(b) *3130 water-reactive liquid, toxic, n.o.s.;*

(c) *3130 water-reactive liquid, toxic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

24° Inorganic solid substances and mixtures (such as preparations and wastes) which, in contact with water, emit flammable gases, corrosive, and which cannot be classified under other collective headings:

(a) *3131 water-reactive solid, corrosive, n.o.s.;*

(b) *3131 water-reactive solid, corrosive, n.o.s.;*

(c) *3131 water-reactive solid, corrosive. n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

2471 *(cont'd)* 25° Inorganic liquid substances and solutions of inorganic substances (such as preparations and wastes) which, in contact with water, emit flammable gases, corrosive, and which cannot be classified under other collective headings:

(a) *3129 water-reactive liquid, corrosive, n.o.s.;*

Note: Special packing conditions are applicable to this substance [see marginal 2473 (2)].

(b) *3129 water-reactive liquid, corrosive, n.o.s.;*

(c) 3129 water-reactive liquid, corrosive, n.o.s.

Note: For corrosivity criteria, see marginal 2800 (3).

C. Empty packagings

31° *Empty packagings,* including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks* and *empty tank-containers,* uncleaned, as well as *empty vehicles* for carriage in bulk and *empty small* bulk *containers,* uncleaned, which have contained substances of Class 4.3.

2471a Substances of the various items carried under the following conditions are not subject to the provisions for this Class contained in this Annex and in Annex B:

(a) Substances classified under (a) of each item are not covered by this marginal;

(b) Substances classified under (b) of each item:

liquids: up to 500 ml per inner packaging;

aluminium powder of 13° (b): up to 1 kg per inner packaging;

other solids: up to 500 g per inner packaging;

(c) Substances classified under (c) of each item:

liquids: up to 1 litre per inner packaging;

solids: up to 1 kg per inner packaging.

These quantities of substances shall be carried in combination packagings which at least meet the conditions of marginal 3538. A package shall not weigh more than 30 kg.

The 'General packing conditions' of marginal 3500 (1), (2) and (5) to (7) shall be observed.

2. Provisions

A. Packages

1. General conditions of packing

2472 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginal 2473.

Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(2) Packagings shall be hermetically closed so as to prevent any infiltration of humidity or any loss of the contents. They shall not have vents in accordance with marginals 3500 (8) or 3601 (6).

(3) In accordance with the provisions of marginals 2470 (3) and 3511 (2) or 3611 (2) respectively, the following shall be used:

— packagings of packing group I, marked with the letter 'X', for very dangerous substances classified under (a) of each item,

2472 (cont'd)

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for dangerous substances classified under (b) of each item,

— packagings of packing group III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing group III or II, marked with the letter 'Z' or 'Y', for less dangerous substances classified under (c) of each item.

Note: For the carriage of substances of Class 4.3 in tank-vehicles, demountable tanks or tank-containers, and for carriage in bulk, see Annex B.

2. *Special conditions for packing of certain substances*

2473 (1) Chlorosilanes of 1° (a) shall be packed in corrosion-resistant steel receptacles with a maximum capacity of 450 litres. The receptacles shall be subjected to the initial test and periodic tests every five years at a pressure of not less than 0.4 MPa (4 bar) (gauge pressure). The closing device of the receptacle shall be protected by a cap. The maximum permissible mass of filling per litre of capacity for trichlorosilane, ethyldichlorosilane and methyldichlorosilane shall not exceed 1.14 kg, 0.93 kg or 0.95 kg respectively, if the filling is carried out by mass; if the filling is by volume, the degree of filling shall not exceed 85 %. Receptacles shall also carry a plate showing the following particulars in a durable form:

— chlorosilanes, Class 4.3;

— description of the chlorosilane(s) accepted for carriage;

— tare (1) of the receptacle, including accessories;

— test pressure (1) (gauge pressure);

— date (month, year) of the last test undergone;

— stamp of the expert who carried out the test;

— capacity (1) of the receptacle;

— maximum degree of filling allowed by mass (1) for each substance accepted for carriage.

(2) Substances of 3° (a), 21° (a), 23° (a) and 25° (a) shall be packed in hermetically closing metal receptacles which are not affected by the contents and have a capacity of not more than 450 litres. The receptacles shall be subjected to the initial test and periodic tests every five years at a pressure of at least 1 MPa (10 bar) (gauge pressure).

The receptacles shall not be filled to more than 90 % of their capacity; however, a space of 5 % shall remain empty for safety when the liquid is at an average temperature of 50 °C. During carriage, the liquid shall be under a layer of inert gas, the gauge pressure of which shall be not less than 50 kPa (0.5 bar). The receptacles shall carry a plate showing the following particulars in a durable form:

— substance or substances (2) accepted for carriage;

— tare (1) of the receptacle, including accessories;

— test pressure (1) (gauge pressure);

— date (month, year) of the last test undergone;

— stamp of the expert who carried out the test;

— capacity (1) of the receptacle;

— maximum mass of filling allowed (1).

(3) Substances referred to in paragraph (2) above may also be packed combination packagings conforming to marginal 3538 with a glass inner packaging and a steel or aluminium outer packaging conforming to marginal 3532.

(1) The units of measurement to be added each time after the numerical values.
(2) The name be replaced by a collective description covering substances of a similar nature and equally compatible with the properties of the receptacle.

2473 *(cont'd)* Receptacles shall not be filled to more than 90 % of their capacity. A package shall contain only a single inner packaging. Such combination packagings shall conform to a design type which has been tested and approved in accordance with Appendix A.5 for packing group I.

2474 (1) Substances classified under (a) of 2°, 11°, 13°, 14°, 16° to 18°, 20°, 22° and 24°, shall be packed in:

(a) non-removable head steel drums conforming to marginal 3520, or

(b) non-removable head aluminium drums conforming to marginal 3521, or

(c) non-removable head steel jerricans conforming to marginal 3522, or

(d) non-removable head plastics drums with a maximum capacity of 60 litres and non-removable head plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings with glass, plastics material or metal inner receptacles conforming to marginal 3538.

(2) Solids as defined in marginal 2470 (10) may also be packed in:

(a) removable head drums conforming to marginal 3520 for steel, marginal 3521 for aluminium, marginal 3526 for plastics material, or in removable head jerricans conforming to marginal 3522 for steel or marginal 3526 for plastics material, or

(b) combination packagings conforming to marginal 3538 with one or more sift-proof inner bags.

2475 (1) Substances classified under (b) of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain, stoneware) conforming to marginal 3539.

(2) Substances of 12° to 17° and 20° may also be packed in:

(a) metal IBCs conforming to marginal 3622, or

(b) rigid plastics IBCs conforming to marginal 3624, or

(c) composite IBCs with plastics inner receptacle conforming to marginal 3625, with the exception of types 11HZ2 and 31HZ2.

(3) Solids as defined in marginal 2470 (10) may also be packed in:

(a) plywood drums conforming to marginal 3523 or in fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) plastics film bags conforming to marginal 3535, provided that they make up a full load or are loaded on pallets.

2476 (1) Substances classified under (c) of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums and jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain, stoneware) conforming to marginal 3539, or

(h) light gauge metal packagings conforming to marginal 3540, or

(i) metal IBCs conforming to marginal 3622, or

(j) rigid plastics IBCs conforming to marginal 3624, or

(k) composite IBCs with plastics inner receptacle conforming to marginal 3625 with the exception of types 11HZ2 and 31HZ2.

(2) Solids as defined in marginal 2470 (10) may also be packed in:

(a) plywood drums conforming to marginal 3523 or fibre drums conforming to marginal 3525, if necessary with one or more sift-proof inner bags, or

(b) plastics film bags conforming to marginal 3535, or

(c) flexible IBCs conforming to marginal 3623, with the exception of types 13H1, 13L1 and 13M1.

Note: Substances of 15° (c) may also be packed in packagings, which need only meet the requirement of marginal 3500 (1), (2) and (5) to (7), and they may in addition be packed in IBCs of type 13H1.

2477 The openings of receptacles for substances of 23° shall be tightly closed by means of two devices in series, one of which shall be screwed or secured in an equivalent manner.

Note: For IBCs, see, however, marginal 3621 (8).

2478-
2480

3. Mixed packing

2481 (1) Substances classified under the same item may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances classified under (a) of the various items may not be packed together with substances of the various items of Class 4.3, with substances and articles of other classes or with goods which are not subject to the provisions of this Directive.

(3) With the exception of the substances referred to in (2), substances of the various items of Class 4.3, in quantities not exceeding 3 litres for liquids and/or 6 kg for solids per receptacle, may be packed together in a combination packaging conforming to marginal 3538 with each other, with substances or articles of other classes — provided that mixed packing is also permitted for substances and articles of those classes — and/or with goods not subject to the provisions of this Directive, provided they do not react dangerously with one another.

2481 *(cont'd)* (4) The following shall be considered dangerous reactions:

(a) combustion and/or giving off considerable heat;

(b) emission of flammable and/or toxic gases;

(c) formation of corrosive liquids;

(d) formation of unstable substances.

(5) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2472 shall be observed.

(6) If wooden or fibreboard cases are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2482 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances of Class 4.3 shall bear a label conforming to model No 4.3.

(3) Packages containing substances of 1° and 2° shall, in addition, bear a label conforming to models Nos. 3 and 8.

(4) Packages containing substances of 3° and lithium aluminium hydride, ethereal, of 16° (a) shall, in addition, bear a label conforming to model No 3.

(5) Packages containing substances of 14° shall, in addition, bear a label conforming to model No 4.2.

(6) Packages containing substances of 15°, 18°, 22° and 23° shall, in addition, bear a label conforming to model No 6.1.

(7) Packages containing substances of 24° and 25° shall, in addition, bear a label conforming to model No 8.

(8) Packages containing fragile receptacles not visible from the outside shall, in addition, bear on two opposite sides a label conforming to model No 12.

(9) Packages containing liquids in receptacles the closures of which are not visible from the outside shall bear on two opposite sides a label conforming to model No 11.

2483

B. Particulars in the transport document

2484 The description of the goods in the transport document shall conform to one of the identification numbers and names printed in italics in marginal 2471.

If the substance is not mentioned by name, but is assigned to an n.o.s. entry, the description of the goods shall consist of the identification number and the n.o.s. designation, followed by the chemical or technical name of substance [1].

[1] The technical name shall be one currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

2484 (cont'd) The description of the goods shall be followed by *particulars of the class, the item number*, if applicable, *the letter, and the initials 'ADR'* (or '*RID*') e.g. '4.3, 1° (a), ADR'.

For the carriage of wastes [see marginal 2000 (5)], the description of the goods shall be: 'Waste containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste, earth containing 1428 sodium, 4.3, 11° (a), ADR.'

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which predominantly contribute to the danger or dangers of the solutions and mixtures.

If a named substance in accordance with marginal 2470 (9) is not subject to the conditions of this Class, the consignor may enter in the transport document: 'Not goods of Class 4.3'.

For the solutions and mixtures containing only one component subject to the provisions of this Directive, the word 'solution' or 'mixture' shall be added as part of the name in the transport document [see marginal 2002 (8) (a)].

When a solid is handed over for carriage in the molten state the description of the goods shall further specify 'molten', unless the term already appears in the name.

2485-2491

C. Empty packagings

2492 (1) Uncleaned empty packagings, including empty IBCs, of 31° shall be closed in the same manner and be leakproof to the same degree as if they were full.

(2) Uncleaned empty packagings, including empty IBCs, of 31° shall bear the same danger labels as if they were full.

(3) The description in the transport document shall conform to one of the names printed in italics in 31°, e.g. 'Empty packaging, 4.3, 31°, this Directive'.

In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers and empty small containers, uncleaned, this description shall be completed by the words 'Last load' together with the name and item number of the goods last loaded, e.g. 'Last load: 1295 trichlorosilane, 1° (a)'.

2493-2499

CLASS 5.1

OXIDIZING SUBSTANCES

1. List of substances

2500 (1) Among the substances covered by the title of Class 5.1, those which are listed in marginal 2501 or are covered by a collective heading in that marginal are subject to the conditions set out in marginals 2500 (2) to 2522 and to the provisions of this Annex and of Annex B. They are then considered as substances of this Directive.

2500 *(cont'd)*

Note: For the quantities of substances listed in marginal 2501 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2501a.

(2) The title of Class 5.1 covers substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause or contribute to the combustion of other material.

(3) The substances of Class 5.1 are subdivided as follows:

A. Liquid oxidizing substances and their aqueous solutions

B. Solid oxidizing substances and their aqueous solutions

C. Empty packagings

Substances of Class 5.1 (other than the substances of 5° and 20°) which are classified under the various items of marginal 2501 shall be assigned to one of the following groups designated by the letter (a), (b) or (c) according to their degree of danger.

(a) highly oxidizing;

(b) oxidizing;

(c) slightly oxidizing.

(4) Solid oxidizing substances not specifically named may be assigned to Class 5.1 either on the basis of experience, or in accordance with the test method, procedure and criteria set out in Appendix A.3, marginals 3350 and 3351. In the event of divergence between test results and known experience, judgement based on known experience shall take precedence over test results. Liquid oxidizing substances not specifically named shall be assigned to Class 5.1 on the basis of experience.

(5) When substances not specifically named are assigned to the items of marginal 2501 on the basis of the test procedure in accordance with Appendix A.3, marginals 3350 and 3351, the following criterion applies:

A substance shall be assigned to Class 5.1 if, in either concentration tested, the mean burning time of the sawdust, established from three tests, is equal to or less than that of the average of the three tests with ammonium persulphate mixture.

(6) When substances not specifically named are assigned to the letters of the items of marginal 2501 on the basis of the test procedure in accordance with Appendix A.3, marginals 3350 and 3351, the following criteria apply:

— a substance shall be assigned to letter (a) when, in either concentration tested, it exhibits a burning time less than with potassium bromate;

— a substance shall be assigned to letter (b) when, in either concentration tested, it exhibits a burning time equal to or less than with potassium perchlorate and the criteria for letter (a) are not met;

— a substance shall be assigned to letter (c) when, in either concentration tested, it exhibits a burning time equal to or less than with ammonium persulphate and the criteria for groups letters (a) or (b) are not met.

(7) If substances of Class 5.1, as a result of admixtures, come into different categories of risk from those to which the substances of marginal 2501 belong, these mixtures or solutions shall be assigned to the items and letters to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(8) When substances are specifically named under more than one letter of the same item of marginal 2501, the relevant letter may be determined on the basis of the results of the test procedure in accordance with Appendix A.3, marginals 3350 and 3351, and the criteria set out in paragraph (6).

2500 *(cont'd)* (9) On the basis of the test procedure in accordance with Appendix A.3, marginals 3350 and 3351, and the criteria set out in paragraph (6), it may also be determined whether the nature of a specifically named substance is such that the substance is not subject to the provisions for this Class (see marginal 2514).

(10) For the packaging requirements of marginals 2506 (2), 2507 (2) and 2508 (2), substances or mixtures of substances having a melting point above 45 °C are considered to be solids.

(11) The chemically unstable substances of Class 5.1 shall be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end it shall in particular be ensured that receptacles do not contain any material liable to promote these reactions.

(12) Oxidizing solids, self-heating, assigned to identification number 3100, oxidizing solids, water-reactive, assigned to identification number 3121 and oxidizing solids, flammable, assigned to identification number 3137 of the United Nations Recommendations on the Transport of Dangerous Goods shall not be accepted for carriage (see, however, marginal 2002 (8), footnote (1) to the table contained in paragraph 2.3.1).

A. Liquid oxidizing substances and their aqueous solutions

2501 1° Hydrogen peroxide and its solutions, or mixtures of hydrogen peroxide with another liquid in aqueous solution:

a) *2015 hydrogen peroxide, stabilized,* or *2015 hydrogen peroxide, aqueous solution, stabilized* with more than 60 % hydrogen peroxide;

Notes: 1. Special packing conditions are applicable to these substances (see marginal 2503).

2. Hydrogen peroxide, not stabilized or hydrogen peroxide, aqueous solutions, not stabilized containing more than 60 % hydrogen peroxide, are not to be accepted for carriage.

b) *2014 hydrogen peroxide, aqueous solution* with not less than 20 % but not more than 60 % hydrogen peroxide (stabilized as necessary); *3149 hydrogen peroxide and peroxyacetic acid mixture, stabilized,* with acid(s), water and not more than 5 % peroxyacetic acid;

Note: This mixture of hydrogen peroxide and peroxyacetic acid (No 3149) shall, in laboratory testing (1), neither detonate in the cavitated state nor deflagrate at all and shall show no effect when heated under confinement nor any explosive power. The formulation shall be thermally stable (self-accelerating decomposition temperature 60 °C or higher for a 50 kg package), and a liquid compatible with peroxyacetic acid shall be used for desensitization. Formulations not meeting these criteria are to be regarded as substances of Class 5.2 [see Appendix A.1, marginal 3106 (2) (g)].

c) *2984 hydrogen peroxide, aqueous solutions,* with not less than 8 % but less than 20 % hydrogen peroxide (stabilized as necessary).

Note: Hydrogen peroxide, aqueous solutions containing less than 8 % hydrogen peroxide are not subject to the provisions of this Directive.

2° Tetranitromethane:

a) *1510 tetranitromethane.*

Note: Tetranitromethane not free from combustible impurities is not to be accepted for carriage.

(1) See United Nations Recommendations on the Transport of Dangerous Goods, paragraph 11.3.3.

2501 (cont'd)

3° Perchloric acid solution:

a) *1873 perchloric acid* in aqueous solution with more than 50 % but not more than 72 % acid, by mass.

Notes: 1. Perchloric acid solutions containing more than 72 % (mass) acid, or mixtures of perchloric acid with any liquid other than water, are not to be accepted for carriage.

2. 1802 perchloric acid with not more than 50 %, by mass, in aqueous solution, acid is a substance of Class 8 [see marginal 2801, 4° (b)].

4° Chloric acid solution:

b) *2626 chloric acid, aqueous solution*, with not more than 10 % chloric acid.

Note: Chloric acid solution containing more than 10 % chloric acid or mixtures of chloric acid with any liquid other than water is not to be accepted for carriage.

5° The following halogenated compounds of fluorine:

1745 bromine pentafluoride, 1746 bromine trifluoride, 2495 iodine pentafluoride.

Notes: 1. Special packing conditions are applicable to these substances (see marginal 2504).

2. Other halogenated compounds of fluorine are not to be accepted for carriage as substances of Class 5.1.

B. Solid oxidizing substances and their aqueous solutions

11° Chlorates and mixtures of chlorates with borates or hygroscopic chlorides (such as magnesium chloride or calcium chloride):

b) *1452 calcium chlorate, 1458 chlorate and borate mixture, 1459 chlorate and magnesium chloride mixture, 1485 potassium chlorate, 1495 sodium chlorate, 1506 strontium chlorate, 1513 zinc chlorate, 2427 potassium chlorate, aqueous solution, 2428 sodium chlorate, aqueous solution, 2429 calcium chlorate, aqueous solution, 2721 copper chlorate, 2723 magnesium chlorate, 1461 chlorates, inorganic, n.o.s., 3210 chlorates, inorganic, aqueous solution, n.o.s.*

Notes: 1. See also 29°.

2. Ammonium chlorate and mixtures of a chlorate with an ammonium salt are not to be accepted for carriage.

12° Ammonium perchlorate:

b) *1442 ammonium perchlorate.*

Note: Classification of this substance shall be in accordance with the results of the tests under Appendix A.1. Depending on the particle size and the packaging of the substance, see also Class 1 (marginal 2101, 4°, No 0402).

13° Perchlorates (with the exception of ammonium perchlorate, see 12°):

b) *1455 calcium perchlorate, 1475 magnesium perchlorate, 1489 potassium perchlorate, 1502 sodium perchlorate, 1508 strontium perchlorate, 1481 perchlorates, inorganic, n.o.s., 3211 perchlorates, inorganic, aqueous solution, n.o.s.*

Note: See also 29°.

2501 (cont'd)

14° Chlorites:

b) *1453 calcium chlorite, 1496 sodium chlorite, 1462 chlorites, inorganic, n.o.s.*

Notes: 1. 1908 chlorite solution is a substance of Class 8 [see marginal 2801, 61° (b) or (c)].

2. Ammonium chlorite and mixtures of a chlorite with an ammonium salt are not to be accepted for carriage.

15° Hypochlorites:

b) *1471 lithium hypochlorite, dry* or *1471 lithium hypochlorite mixtures, 1748 calcium hypochlorite, dry* or *1748 calcium hypochlorite mixture, dry* with more than 39 % available chlorine (8,8 % available oxygen), *2880 calcium hypochlorite, hydrated* or *2880 calcium hypochlorite, hydrated mixture* with not less than 5,5 % but not more than 10 % water, *3212 hypochlorites, inorganic, n.o.s.*;

c) *2208 calcium hypochlorite mixture, dry* with more than 10 % but not more than 39 % available chlorine.

Notes: 1. Calcium hypochlorite mixtures, dry, containing not more than 10 % available chlorine are not subject to the provisions of this Directive.

2. 1791 hypochlorite solution is a substance of Class 3 [see marginal 2801, 61° (b) or (c)].

3. Mixtures of a hypochlorite with an ammonium salt are not to be accepted for carriage.

4. See also 29°.

16° Bromates:

b) *1473 magnesium bromate, 1484 potassium bromate, 1494 sodium bromate, 1450 bromates, inorganic, n.o.s., 3213 bromates, inorganic, aqueous solutions, n.o.s.;*

c) *2469 zinc bromate, 3213 bromates, inorganic, aqueous solution, n.o.s.*

Notes: 1. Ammonium bromate and mixtures of a bromate with an ammonium salt are not to be accepted for carriage.

2. See also 29°.

17° Permanganates:

b) *1456 calcium permanganate, 1490 potassium permanganate, 1503 sodium permanganate, 1515 zinc permanganate, 1482 permanganates, inorganic, n.o.s., 3214 permanganates, inorganic, aqueous solution, n.o.s.*

Note: 1. Ammonium permanganate and mixtures of a permanganate with an ammonium salt are not to be accepted for carriage.

2. See also 29°.

18° Persulphates:

c) *1444 ammonium persulphate, 1492 potassium persulphate, 1505 sodium persulphate, 3215 persulphates, inorganic, n.o.s., 3216 persulphates, inorganic, aqueous solution, n.o.s.*

19° Percarbonates:

c) *2467 sodium percarbonates, 3217 percarbonates, inorganic, n.o.s.*

Note: Sodium carbonate peroxyhydrate is not subject to the provisions of this Directive.

2501 (cont'd)

20° Ammonium nitrate solutions:

2426 ammonium nitrate, liquid, hot concentrated solution, in a concentration of more than 80 % but not more than 93 %, provided that:

1. the pH is between 5 and 7 measured in an aqueous solution of 10 % of the substance carried,

2. the solution does not contain more than 0,2 % combustible material or chlorine compounds in quantities such that the chlorine level exceeds 0,02 %.

Note: Aqueous solutions of ammonium nitrate, in a concentration not exceeding 80 %, are not subject to the provisions of this Directive.

21° Ammonium nitrate and ammonium nitrate fertilizers [1]:

c) *1942 ammonium nitrate* with not more than 0,2 % combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance,

2067 ammonium nitrate fertilizers, type A1: uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, with not less than 90 % ammonium nitrate and not more than 0,2 % combustible material (including organic material calculated as carbon), or with more than 70 % but less than 90 % ammonium nitrate and not more than 0,4 % total combustible material,

2068 ammonium nitrate fertilizers, type A2: uniform non-segregating mixtures of ammonium nitrate with calcium carbonate and/or dolomite, with more than 80 % but less than 90 % ammonium nitrate and not more than 0,4 % total combustible material,

2069 ammonium nitrate fertilizers, type A3: uniform non-segregating mixtures of ammonium nitrate and ammonium sulphate, with more than 45 % but not more than 70 % ammonium nitrate and not more than 0,4 % total combustible material,

2070 ammonium nitrate fertilizers, type A4: uniform non-segregating mixtures of nitrogen phosphate or nitrogen potash types or complete fertilizers of nitrogen phosphate potash type, with more than 70 % but less than 90 % ammonium nitrate and not more than 0,4 % total combustible material.

Notes: 1. Ammonium nitrate containing more than 0,2 % combustible substances (including any organic substance calculated as carbon) is not to be accepted for carriage unless it is a constituent of a substance or article of Class 1.

2. In determining the ammonium nitrate content, all nitrate ions for which a molecular equivalent of ammonium ions is present in the mixture shall be calculated as ammonium nitrate.

3. Fertilizers having an ammonium nitrate content or a content in combustible substances exceeding the values shown are not to be accepted for carriage except under the conditions applicable to Class 1. See also Note 5.

4. Fertilizers having an ammonium nitrate content below the limit values indicated are not subject to the provisions of this Directive.

5. Ammonium nitrate fertilizers, uniform non-segregating mixtures of nitrogen phosphate or nitrogen potash types or complete fertilizers of nitrogen phosphate potash type whose molecular excess of nitrate ions over ammonium ions (calculated as potassium nitrate) is less than 10 % are not subject to the provisions of this Directive, provided that:

a) their ammonium nitrate content is not more than 70 % and their total content of combustible material is not more than 0,4 %, or

b) their ammonium nitrate content is not more than 45 % irrespective of their content of combustible material.

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[1] Fertilizers containing ammonium nitrate which are assigned to the United Nations Recommendations identification number 2071 are not subject to the provisions of this Directive. Fertilizers containing ammonium nitrate which are assigned to United Nations Recommendations identification number 2072 are not to be accepted for carriage.

2501 (cont'd)

22° Nitrates (with the exception of substances of 20°, 21° and 29°):

b) *1493 silver nitrate, 1514 zinc nitrate, 1477 nitrates, inorganic, n.o.s., 3218 nitrates, inorganic, aqueous solution, n.o.s.;*

c) *1438 aluminium nitrate, 1451 caesium nitrate, 1454 calcium nitrate, 1465 didymium nitrate, 1466 ferric nitrate, 1467 guanidine nitrate, 1474 magnesium nitrate, 1486 potassium nitrate, 1498 sodium nitrate, 1499 sodium nitrate and potassium nitrate mixtures, 1507 strontium nitrate, 2720 chromium nitrate, 2722 lithium nitrate, 2724 manganese nitrate, 2725 nickel nitrate, 2728 zirconium nitrate, 1477 nitrates, inorganic, n.o.s., 3218 nitrates, inorganic, aqueous solution, n.o.s.*

Notes: 1. 1625 mercuric nitrate, 1627 mercurous nitrate and 2727 thallium nitrate are substances of Class 6.1 [see marginal 2601, 52° (b) and 68° (b)]. 2976 thorium nitrate, solid, 2980 uranyl nitrate hexahydrate solution and 2981 uranyl nitrate, solid are substances of Class 7 (see marginal 2704, schedules 5, 6, 9, 10, 11 and 13).

2. The commercial grade of calcium nitrate fertilizer, consisting mainly of a double salt (calcium nitrate and ammonium nitrate) and containing not more than 10 % ammonium nitrate and at least 12 % water of crystallization, is not subject to the provisions of this Directive.

23° Nitrites:

b) *1488 potassium nitrite, 1512 zinc ammonium nitrite, 2627 nitrites, inorganic, n.o.s., 3219 nitrites, inorganic, aqueous solution, n.o.s.;*

c) *1500 sodium nitrite, 2726 nickel nitrite, 3219 nitrites, inorganic, aqueous solution, n.o.s.*

Notes: 1. Ammonium nitrite and mixtures of an inorganic nitrite with an ammonium salt are not to be accepted for carriage.

2. Zinc ammonium nitrite is not permitted for carriage on sea routes.

24° Mixtures of nitrates and nitrites of items 22° and 23°.

b) *1487 potassium nitrate and sodium nitrite mixture.*

Note: Mixtures with an ammonium salt are not to be accepted for carriage.

25° Peroxides and superoxides:

a) *1491 potassium peroxide, 1504 sodium peroxide, 2466 potassium superoxide, 2547 sodium superoxide;*

b) *1457 calcium peroxide, 1472 lithium peroxide, 1476 magnesium peroxide, 1509 strontium peroxide, 1516 zinc peroxide, 1483 peroxides, inorganic, n.o.s.*

Note: See also 29°.

26° Chloroisocyanuric acids and their salts:

b) *2465 dichloroisocyanuric acid, dry or 2465 dichloroisocyanuric acid salts, 2468 trichloroisocyanuric acid, dry.*

Note: The dihydrated sodium salt of dichloroisocyanuric acid is not subject to the provisions of this Directive.

27° Solid oxidizing substances, non-toxic, non-corrosive, and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *1479 oxidizing solid, n.o.s.;*

(b) *1439 ammonium dichromate, 3247 sodium peroxoborate, anhydrous, 1479 oxidizing solid, n.o.s.;*

(c) *1479 oxidizing solid, n.o.s.*

2501 *(cont'd)*

28° Aqueous solutions of solid oxidizing substances, non-toxic, non-corrosive, and of mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(b) *3139 oxidizing liquid, n.o.s.;*

(c) *3139 oxidizing liquid, n.o.s.*

29° Solid oxidizing substances, toxic, and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3087 oxidizing solid, toxic, n.o.s.;*

(b) *1445 barium chlorate, 1446 barium nitrate, 1447 barium perchlorate, 1448 barium permanganate, 1449 barium peroxide, 1469 lead nitrate, 1470 lead perchlorate, 2464 beryllium nitrate, 2573 thallium chlorate, 2719 barium bromate, 2741 barium hypochlorite* with more than 22 % available chlorine, *3087 oxidizing solid, toxic, n.o.s.;*

(c) 1872 lead dioxide, 3087 oxidizing solid, toxic, n.o.s.

Note: For toxicity criteria, see marginal 2600 (3).

30° Aqueous solutions of solid oxidizing substances, toxic, and of mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3099 oxidizing liquid, toxic, n.o.s.;*

(b) *3099 oxidizing liquid, toxic, n.o.s.;*

(c) *3099 oxidizing liquid, toxic, n.o.s.*

Note: For toxicity criteria, see marginal 2600 (3).

31° Solid oxidizing substances, corrosive, and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3085 oxidizing solid, corrosive, n.o.s.;*

(b) *1463 chromium trioxide, anhydrous* (solid chromic acid), *3085 oxidizing solid, corrosive, n.o.s.;*

(c) *1511 urea hydrogen peroxide, 3085 oxidizing solid, corrosive, n.o.s.*

Notes: 1. For corrosivity criteria, see marginal 2800 (3).

2. 1755 chromic acid solution is a substance of Class 8 [see marginal 2801, 17° (b) or (c)].

32° Aqueous solutions of solid oxidizing substances, corrosive, and of mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3098 oxidizing liquid, corrosive, n.o.s.;*

(b) *3098 oxidizing liquid, corrosive, n.o.s.;*

(c) *3098 oxidizing liquid, corrosive, n.o.s.*

Note: For corrosivity criteria, see marginal 2800 (3).

C. Empty packagings

Note: Empty packagings with residues from their previous contents adhering to the outside are not to be accepted for carriage.

41° *Empty packagings,* including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks and empty tank-containers,* uncleaned as well as *empty vehicles* for carriage in bulk and *empty small* bulk *containers,* uncleaned, which have contained substances of Class 5.1.

2501a Substances of the various items, carried in conformity with the following provisions, are subject neither to the provisions for this Class contained in this Annex nor to those contained in Annex B:

(a) Substances classified under (a) of each item are not covered by this marginal.

(b) Substances classified under (b) of each item:

liquids: not more than 500 ml per inner packaging;

solids: not more than 500 g per inner packaging;

(c) Substances classified under (c) of each item:

liquids: not more than 1 litre per inner packaging;

solids: not more than 1 kg per inner packaging.

These quantities of substances shall be carried in combination packagings which at least meet the conditions of marginal 3538. A package shall not weigh more than 30 kg.

The 'General conditions of packing' of marginal 3500(1), (2) and (5) to (7) shall be observed.

2. Provisions

A. Packages

1. *General conditions of packing*

2502 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginals 2503 and 2504.

(2) Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 2500(3) and 3511(2) or 3611(2) respectively the following shall be used:

— packagings of packing group I, marked with the letter 'X' for the strongly oxidizing substances classified under the letter (a) of each item;

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for the oxidizing substances classified under the letter (b) of each item;

— packagings of packing group III, II or I, marked with the letter 'Z', 'Y', or 'X', or IBCs of packing group III or II, marked with the letter 'Z' or 'Y', for the slightly oxidizing substances classified under the letter (c) of each item.

Note: For the carriage of substances of Class 5.1 in tank-vehicles,demountable tanks or tank-containers, and for the carriage in bulk of solids of this Class, see Annex B.

2. *Special conditions for packing of certain substances*

2503 (1) Substances of 1° (a) shall be packed in:

(a) non-removable head drums of aluminium of at least 99.5 % purity, conforming to marginal 3521, or in non-removable head drums of special steel not liable to cause decomposition of the hydrogen peroxide, conforming to marginal 3520; or

(b) combination packagings conforming to marginal 3538 with inner packagings of glass, plastics or metal not liable to cause decomposition of the hydrogen peroxide. An inner packaging made of glass or plastics shall not contain more than 2 litres: one of metal not more than 5 litres.

2503 *(cont'd)* Packagings shall be fitted with a vent conforming to marginal 3500 (8). These combination packagings shall conform to a design type which has been tested and approved in accordance with Appendix A.5 for packing group I.

(2) Packagings shall not be filled to more than 90 % of their capacity.

(3) A package shall not weigh more than 125 kg.

2504 Substances of 5° shall be carried in cylinders with a capacity of not more than 150 litres, or receptacles with a capacity of not more than 1 000 litres (e.g. cylindrical receptacles with rolling hoops or spherical receptacles), made of carbon steel or of a suitable alloy steel.

(a) The receptacles shall comply with the relevant provisions of Class 2 [see marginals 2211 and 2213(1) and (2)]. The receptacles shall be designed for a calculation pressure of not less than 2,1 MPa (21 bar) (gauge pressure). The wall thickness of the receptacles shall not, however, be less than 3 mm. Before their first use, the receptacles shall be subjected to a hydraulic pressure test with a gauge pressure of not less than 1 MPa (10 bar). This test shall be repeated every 8 years, accompanied by an internal inspection of the receptacles and a check of the fittings. The receptacles shall in addition be inspected for corrosion every 2 years by means of suitable measuring apparatus (e.g. ultrasound) and also with regard to the condition of the fittings. For the tests and inspections the relevant provisions of Class 2 shall be applicable (see marginals 2215 and 2216).

(b) The receptacles shall not be filled to more than 92 % of their capacity.

(c) The following particulars shall be shown on receptacles in a clearly legible and permanent manner:

— name of the manufacturer or the manufacturing mark and the number of the receptacle,

— description of the substance conforming to marginal 2501, 5°,

— tare mass of the receptacle and the permissible maximum mass of the filled receptacle,

— date (month, year) of the initial test and of the latest periodical test,

— stamp of the expert who carried out the tests and inspections.

2505 Ammonium nitrate solutions of 20° shall be carried only in tank-vehicles and demountable tanks (see Appendix B.1a) or in tank-containers (see Appendix B.1b).

2506 (1) Substances classified under (a) of the various items, other than 1° (a), of marginal 2501 shall be packed in:

(a) non-removable head steel drums conforming to marginal 3520, or

(b) non-removable head aluminium drums conforming to marginal 3521, or

(c) non-removable head steel jerricans conforming to marginal 3522, or

(d) non-removable head plastics drums of a capacity not exceeding 60 litres or non-removable head plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings with inner packagings of glass, plastics or metal conforming to marginal 3538.

(2) Perchloric acid of 3° (a) may also be packed in composite packagings (glass) conforming to marginal 3539.

(3) Solid substances within the meaning of marginal 2500 (10) may also be packed in:

(a) removable head drums conforming to marginals 3520 for steel, 3521 for aluminium, 3523 for plywood, 3525 for fibreboard, or 3526 for plastics material, or in removable-head jerricans conforming to marginals 3522 for steel or 3526 for plastics material, if necessary with one or more sift-proof inner bags; or

(b) combination packagings conforming to marginal 3538, with one or more sift-proof inner bags.

2507 (1) Substances classified under (b) of the various items of marginal 2501 shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums or plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539, or

(h) metal IBCs conforming to marginal 3622, or

(i) rigid plastics IBCs conforming to marginal 3624, or

(j) composite IBCs with plastics inner receptacle conforming to marginal 3625 with the exception of types 11HZ2 and 31HZ2.

Note to (a), (b), (c) and (d): Simplified conditions are applicable to removable head drums and jerricans for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solid substances (see marginals 3512, 3553, 3554 and 3560).

(2) Solid substances within the meaning of marginal 2500 (10) may also be packed in:

(a) drums conforming to marginal 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags, or

(b) sift-proof bags conforming to marginals 3533 for textile material, 3534 for woven plastics material or 3535 for plastics film or 3536 for water-resistant paper, provided the goods are carried as a full load or the bags secured on pallets, or

(c) flexible IBCs conforming to marginal 3623 with the exception of types 13H1, 13L1 and 13M1, provided that carriage is limited to full loads.

2508 (1) Substances classified under (c) of the various items of marginal 2501 shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums or plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539, or

(h) light gauge metal packagings conforming to marginal 3540, or

2508 *(cont'd)*

(i) metal IBCs conforming to marginal 3622, or

(j) rigid plastics IBCs conforming to marginal 3624, or

(k) composite IBCs with plastics inner receptacle conforming to marginal 3625, with the exception of types 11HZ2 and 31HZ2.

Note to (a), (b), (c), (d) and (h): Simplified conditions are applicable to removable head drums, jerricans and light gauge metal packagings for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solid substances (see marginals 3512, 3552 to 3554 and 3560).

(2) Solid substances within the meaning of marginal 2500 (10) may also be packed in:

(a) drums conforming to marginal 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags, or

(b) sift-proof bags conforming to marginals 3533 for textile material, 3534 for woven plastics material or 3535 for plastics film or 3536 for water-resistant paper, or

(c) flexible intermediate bulk containers (IBCs) with the exception of types 13H1, 13L1 and 13M1, conforming to marginal 3623. Substances of 21° and 22° (c) may be carried in all types of flexible IBCs conforming to marginal 3623.

2509 Packagings or IBCs containing substances of 1° (b) or 1° (c) shall be fitted with a vent conforming to marginal 3500 (8) or 3601 (6) respectively.

2510

3. Mixed packing

2511 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of different items of this Class in quantities not exceeding, per receptacle, 3 litres for liquids and/or 5 kg for solids, may be packed together and/or with goods not subject to the provisions of ADR, in a combination packaging conforming to marginal 3538 provided they do not react dangerously with one another.

(3) Except as otherwise specially provided under paragraph (7), substances of this Class, in quantities not exceeding, per receptacle, 3 litres for liquids and/or 5 kg for solids, may be packed together in a combination packaging conforming to marginal 3538, with substances or articles of other classes, provided that mixed packing is also permitted for the substances and articles of these classes, and/or with goods which are not subject to the provisions of this Directive, provided they do not react dangerously with one another.

(4) The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat,

(b) emission of flammable and/or toxic gases,

(c) formation of corrosive liquids,

(d) formation of unstable substances.

2511 (cont'd)

(5) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2502 shall be complied with.

(6) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

(7) For substances of 1° (a), 2°, 4°, 5°, 11°, 12°, 13°, 14°, 16° (b), 17°, 25° and 27° to 32° and substances classified under (a) in the remaining items, mixed packing is not allowed. However, for perchloric acid with more than 50 % acid of 3° (a), mixed packing is permitted with perchloric acid of Class 8, marginal 2801, 4° (b).

4. *Marking and danger labels on packages (see Appendix A.9)*

Marking

2512 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances of Class 5.1 shall bear a label conforming to model No 5.1.

(3) Packages containing substances of 2°, 5°, 29° or 30° shall in addition bear a label conforming to model No 6.1. Packages containing substances of 1° (a), 1° (b), 3° (a), 5°, 31° or 32° shall in addition bear a label conforming to model No 8.

(4) Packages containing fragile receptacles not visible from the outside shall bear on two lateral opposite sides a label conforming to model No 12.

(5) Packages containing liquid substances in receptacles, the closures of which are not visible from the outside, as well as packages containing vented receptacles or vented receptacles without outer packaging, shall bear on two opposite sides a label conforming to model No 11.

2513

B. Particulars in the transport document

2514 The description of the goods in the transport document shall conform to one of the identification numbers and one of the names printed in italics in marginal 2501.

If the substance is not mentioned by name but is assigned to an n.o.s. entry the description of the goods shall consist of the identification number and the n.o.s. designation, followed by the chemical or technical name of the substance (1).

The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or *'RID'*.), e.g.'5.1, 11° (b), ADR'.

For the carriage of wastes [see marginal 2000 (4)] the description of the goods shall be: 'Waste, containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s) e.g. 'Waste earth containing 1513 zinc chlorate, 5.1, 11° (b), ADR'.

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which predominantly contribute to the danger or dangers of the solutions and mixtures.

(1) The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

2514 *(cont'd)* If a named substance in accordance with marginal 2500 (9), is not subject to the conditions of this Class, the consignor may enter in the transport document: 'Not goods of Class 5.1'.

For the solutions and mixtures containing only one component subject to the provisions of this Directive, the word 'solution' or 'mixture' shall be added as part of the name in the transport document [see marginal 2002 (8) (a)].

When a solid is handed over for carriage in the molten state the description of the goods shall further specify 'molten', unless the term already appears in the name.

2515-2521

C. Empty packagings

2522 (1) Uncleaned empty packagings, including empty IBCs, of 41° shall be closed in the same manner and with the same degree of leakproofness as if they were full.

(2) Uncleaned empty packagings, including empty IBCs, of 41° shall bear the same danger labels as if they were full.

(3) The description in the transport document shall conform to one of the names printed in italics in 41°, e.g. *'Empty packagings, 5.1, 41°, ADR'*. In the case of empty tank-vehicles, empty demountable tanks, empty tank containers and empty small bulk containers, uncleaned, this description shall be completed by adding the words 'Last load' together with the name and item number of the goods last loaded, e.g. 'Last load: 2015 hydrogen peroxide, inhibited 1° (a)'.

2523-2549

CLASS 5.2

ORGANIC PEROXIDES

1. List of substances

2550 (1) Among the substances and articles covered by the title of Class 5.2, only those which are listed in marginal 2551 or are covered by a collective heading of that marginal are subject to the conditions set out in marginals 2550 (4) to 2567 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive [1].

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(2) Organic peroxides and formulations of organic peroxides are not considered to be substances of Class 5.2, if:

— they contain not more than 1,0 % available oxygen from the organic peroxides when containing not more than 1,0 % hydrogen peroxide;

— they contain not more than 0,5 % available oxygen from the organic peroxides when containing more than 1,0 % but not more than 7,0 % hydrogen peroxide; or

— tests have proved that they are of type G [see paragraph (6)].

Note: The available oxygen content (%) of an organic peroxide formulation is given by the formula $16 \times \Sigma (n_i \times c_i/m_i)$ where:

n_i — number of peroxygen groups per molecule of organic peroxide i;

C_i — concentration (mass %) of organic peroxide i; and

m_i — molecular mass of organic peroxide i.

[1] For the quantities of substances listed in marginal 2551 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2551a.

2550 *(cont'd)*

(3) The following organic peroxides are not to be permitted for carriage under the provisions of Class 5.2:

— organic peroxides type A [see Appendix A.1, marginal 3104 (2)(a)].

Definition

(4) Class 5.2 covers organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals.

Properties

(5) Organic peroxides are thermally unstable substances which are liable to exothermic self-accelerating decomposition at normal or elevated temperatures. The decomposition can be initiated by heat, contact with impurities (e.g. acids, heavy-metal compounds, amines), friction or impact. The rate of decomposition increases with temperature and varies with the organic peroxide formulation. Decomposition may result in the evolution of harmful, or flammable, gases or vapours. Some organic peroxides may decompose explosively, particularly if confined. This characteristic may be modified by the addition of diluents or by the use of appropriate packagings. Many organic peroxides burn vigorously. Contact of organic peroxides with the eyes shall be avoided. Some organic peroxides will cause serious injury to the cornea, even after brief contact, or will be corrosive to the skin.

Classification of organic peroxides

(6) Organic peroxides are classified into seven types according to the degree of danger. The principles to be applied to the classification of substances not listed in marginal 2551 are set out in Appendix A.1, marginal 3104. The types of organic peroxide range from type A, which is not accepted for carriage in the packaging in which it is tested, to type G, which is not subject to the provisions of Class 5.2 [see marginal 2561 (5)]. The classification of types B to F is directly related to the maximum quantity allowed in one packaging.

(7) Organic peroxides and formulations of organic peroxides listed in marginal 2551 are assigned to collective headings:

— 1° to 20°, identification numbers 3101 to 3120.

The collective headings specify:

— the type (B to F) of organic peroxide, see paragraph (6);

— physical state (liquid/solid), see marginal 2553 (1); and

— temperature control (when required), see paragraph (16) to (19).

Mixtures of these formulations may be classified as the same type of organic peroxide as that of the most dangerous component and be transported under the conditions of transport given for this type. However, as two stable components can form a thermally less stable mixture, the selfaccelerating decomposition temperature of the mixture should be determined and, if necessary, the control and emergency temperature derived from the SADT in accordance with marginal 2550 (17).

(8) Classification of organic peroxides, formulations or mixtures of organic peroxides not listed in marginal 2551 and assignment to a collective heading shall be made by the competent authority of the country of origin.

(9) Samples of organic peroxides or formulations of organic peroxides not listed in marginal 2551, for which a complete set of test results in not available and which are to be carried for further testing or evaluation, shall be assigned to one of the appropriate entries for organic peroxides type C provided the following conditions are met:

— the available data indicate that the sample whould be no more dangerous than organic peroxides type B;

— the sample is packaged in accordance with packing method OP2A or OP2B and the quantity per transport unit is limited to 10 kg;

— the available data indicate that the control temperature, if any, is sufficiently low to prevent any dangerous decomposition and sufficiently high to prevent any dangerous phase separation.

2550 (cont'd) *Desensitization of organic peroxides*

(10) In order to ensure safety during carriage, organic peroxides are in many cases desensitized by organic liquids or solids, inorganic solids or water. Where a percentage of a substance is stipulated, this refers to the percentage by mass, rounded to the nearest whole number. In general, desensitization shall be such that, in case of spillage, the organic peroxide will not concentrate to a dangerous extent.

(11) Unless otherwise stated for the individual organic peroxide formulation, the following definition(s) shall apply to diluents used for desensitization:

— diluents type A are organic liquids which are compatible with the organic peroxide and which have a boiling point of not less than 150 °C. Type A diluents may be used for desensitizing all organic peroxides,

— diluents type B are organic liquids which are compatible with the organic peroxide and which have a boiling point of less than 150 °C but not less than 60 °C and a flash-point of not less than 5 °C.

Type B diluents may only be used for desensitization of organic peroxides for which temperature control is required. The boiling point of the liquid shall be at least 50 °C higher than the control temperature of the organic peroxide.

(12) Diluents, other than type A or B, may be added to organic peroxide formulations as listed in marginal 2551 provided that they are compatible and do not change the classification.

(13) Water may only be used for the desensitization of organic peroxides which are listed in marginal 2551 or in the competent authority decision according to paragraph (8) as being 'with water' or 'as a stable dispersion in water'. Samples of organic peroxides or formulations of organic peroxides not listed in marginal 2551 may also be desensitised with water provided the requirements of paragraph (9) are met.

(14) Organic and inorganic solids may be used for desensitization of organic peroxides provided that they are compatible.

(15) Compatible liquids and solids are those which have no detrimental influence on the thermal stability and hazard type of the organic peroxide formulation.

Temperature control provisions

(16) Certain organic peroxides may only be carried under temperature-controlled conditions. The control temperature is the maximum temperature at which the organic peroxide can be safely carried. It is assumed that the temperature of the immediate surroundings of a package only exceeds 55 °C during carriage for a relatively short time in a 24 hour period. In the event of loss of temperature control, it may be necessary to implement emergency procedures. The emergency temperature is the temperature at which such procedures shall be implemented.

(17) The control and emergency temperatures are derived from the self-accelerating decomposition temperature (SADT) which is defined as the lowest temperature at which self-accelerating decomposition may occur with a substance in the packaging as used during carriage (see Table 1). The SADT shall be determined in order to decide whether a substance shall be subjected to temperature control during carriage. Provisions for the determination of the SADT are given in Appendix A.1, marginal 3103.

TABLE 1

Derivation of control and emergency temperatures

SADT	Control temperature	Emergency temperature
20 °C or less	20 °C below SADT	10 °C below SADT
over 20 °C to 35 °C	15 °C below SADT	10 °C below SADT
over 35 °C	10 °C below SADT	5 °C below SADT

2550 (cont'd)

(18) The following organic peroxides shall be subject to temperature control during carriage:

— organic peroxides types B and C with an SADT ≤ 50 °C;

— organic peroxides type D showing a violent or medium effect when heated under confinement with an SADT ≤ 50 °C or showing a low or no effect when heated under confinement with an SADT ≤ 45 °C; and

— organic peroxides types E and F with an SADT ≤ 45 °C.

Note: Provisions for the determination of the effects of heating under confinement are given in Appendix A.1, marginal 3103.

(19) Where applicable, control and emergency temperatures are listed in marginal 2551. The actual temperature during carriage may be lower than the control temperature but shall be selected so as to avoid dangerous separation of phases.

2551 ***A. Organic peroxides not requiring temperature control***

1° (b) *3101 organic peroxide type B, liquid,* such as:

Substance	Concentration (%)	Diluent type A (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
tert-Amyl peroxy-3,5,5-trimethylhexanoate	≤ 100		OP5A	01
tert-Butyl peroxyacetate	53-77	≥ 23	OP5A	01
1,1-Di-(tert-butylperoxy) cyclohexane	81-100		OP5A	01
1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	58-100		OP5A	01
Methyl ethyl ketone peroxide(s) (1)	≤52	≥ 48	OP5A	1, 8

(1) Available oxygen > 10 %.

2° (b) *3102 organic peroxide type B, solid,* such as:

Substance	Concentration (%)	Inert solid (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
tert-Butyl monoperoxy-maleate	53-100			OP5B	01
tert-Butyl monoperoxy-phthalate	≤ 100			OP5B	01
3-Chloroperoxybenzoic acid	58-86	≥ 14		OP1B	01
Dibenzoyl peroxide	52-100	≤ 48		OP2B	01
Dibenzoyl peroxide	78-94		≥ 6	OP4B	01
Di-4-chlorobenzoyl peroxide	≤ 77		≥ 23	OP5B	01
Di-2,4-dichlorobenzoyl peroxide	≤ 77		≥ 23	OP5B	01
2,2-Dihydroperoxypropane	≤ 27	≥ 73		OP5B	01
2,5-Dimethyl-2,5-di-(benzoylperoxy)-hexane	83-100			OP5B	01
Di-(2-phenoxyethyl)peroxydicarbonate	86-100			OP5B	01
Disuccinic acid peroxide (1)	73-100			OP4B	01
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxacyclo-nonane	53-100			OP4B	01

(1) Addition of water will decrease the thermal stability.

2551 (cont'd)

3° (b) *3103 organic peroxide type C, liquid,* such as:

Substance	Concentration (%)	Diluent type A (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
n-Butyl-4,4-di-(tert-butylperoxy)-valerate	53-100			OP5A	
tert-Butyl hydroperoxide	73-90		≥ 10	OP5A	8
tert-Butyl hydroperoxide + di-tert-butyl peroxide	≤82+≥9		≥ 7	OP5A	8
tert-Butyl monoperoxy-maleate	≤ 52	≥ 48		OP6A	
tert-Butyl peroxyacetate	≤ 52	≥ 48		OP6A	
tert-Butyl peroxybenzoate	78-100	≤ 22		OP5A	
tert-Butylperoxy Isopropylcarbonate	≤ 77	≥ 23		OP5A	
2,2-Di-(tert-butylperoxy)-butane	≤ 52	≥ 48		OP6A	
1,1-Di-(tert-butylperoxy)-cyclohexane	53-80	≥ 20		OP5A	
2,5-Dimethyl-2,5-di-(tert-butylperoxy) hexyne-3	53-100			OP5A	
Ethyl 3,3-di-(tert-butylperoxy)-butyrate	78-100			OP5A	
Organic peroxide, liquid, *sample* (1)				OP2A	

(1) See marginal 2550 (9).

4° (b) *3104 organic peroxide type C, solid,* such as:

Substance	Concentration (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
Cyclohexanone peroxide(s)	≤ 91	≥ 9	OP6B	8
Dibenzoyl peroxide	≤ 77	≥ 23	OP6B	
2,5-Dimethyl-2,5-di-(benzoylperoxy)-hexane	≤ 82	≥ 18	OP5B	
2,5-Dimethyl-2,5-dihydroperoxyhexane	≤ 82	≥ 18	OP6B	
Organic peroxide, solid, *sample* (1)			OP2B	8

(1) See marginal 2550 (9).

5° (b) *3105 organic peroxide type D, liquid,* such as:

Substance	Concentration (%)	Diluent type A (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
Acetyl acetone peroxide (1)	≤ 42	≥ 48	≥ 8	OP7A	
Acetyl benzoyl peroxide	≤ 45	≥ 55		OP7A	
tert-Amyl peroxybenzoate	≤ 96	≥ 4		OP7A	
tert-Butyl cumylperoxide	≤ 100			OP7A	
tert-Butyl hydroperoxide (2)	≤ 80	≥ 20		OP7A	8
tert-Butyl peroxybenzoate	53-77	≥ 23		OP7A	
tert-Butyl peroxycrotonate	≤ 77	≥ 23		OP7A	
tert-Butyl peroxydiethyl-acetate + tert-Butyl peroxybenzoate	≤33+≤33	≥ 33		OP7A	
tert-Butyl peroxy-3,5,5-trimethylhexanoate	≤ 100			OP7A	
Cyclohexanone peroxide(s) (3)	≤ 72	≥ 28		OP7A	
1,1-Di-(tert-butylperoxy)cyclohexane	≤ 52	≥ 48		OP7A	
Di-(tert-butylperoxy)-phthalate	43-52	≥ 48		OP7A	
2,2-Di-(tert-butylperoxy)propane	≤ 52	≥ 48		OP7A	

2551 *(cont'd)*

Substance	Concentration (%)	Diluent type A (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
2,2-Dimethyl-2,5-di-(tert-butylperoxy) hexane	53-100			OP7A	
2,5-Dimethyl-2,5-di-(3,5,5-trimethylhexanoyl-peroxy)-hexane	≤ 77	≥ 23		OP7A	
Ethyl-3,3-di-(tert-amylperoxy)butyrate	≤ 67	≥ 33		OP7A	
Ethyl-3,3-di-(tert-butylperoxy)butyrate	≤ 77	≥ 23		OP7A	
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxy-cyclononane	≤ 52	≥ 48		OP7A	
p-Menthyl hydroperoxide	56-100			OP7A	8
Methyl ethyl ketone peroxide(s) (4)	≤ 45	≥ 55		OP7A	
Methyl isobutyl ketone peroxide(s) (5)	≤ 62	≥ 19		OP7A	
Peroxyacetic acid, type D, *stabilized* (6)	≤ 43			OP7A	8
Pinanyl hydroperoxide	56-100			OP7A	8
1,1,3,3-Tetramethylbutyl hydroperoxide	≤ 100			OP7A	

(1) Available oxygen ≤ 4,7 %.
(2) Diluent may be replaced by di-tert-butyl peroxide.
(3) Available oxygen ≤ 9 %.
(4) Available oxygen ≤ 10 %.
(5) With 19 % methyl isobutyl ketone in addition to diluent type A.
(6) Mixtures of peroxyacetic acid with hydrogen peroxide, water and acids which fulfil the criteria of Appendix A.1, marginal 3104 (2) (d).

6° (b) *3106 organic peroxide type D, solid*, such as:

Substance	Concentration (%)	Diluent type A (%)	Inert solid	Water	Packing method (see marginal 2554)
Acetyl acetone peroxide (1), as a paste	≤ 32				OP7B
n-Butyl-4,4-di-(tert-butylperoxy) valerate	≤ 52		≥ 48		OP7B
tert-Butyl peroxybenzoate	≤ 52		≥ 48		OP7B
tert-Butyl peroxy-2-ethyl-hexanoate 2,2-di-(tert-butylperoxy)butane	≤12+≤14	≥ 14	≥ 60		OP7B
3-tert-Butylperoxy-3-phenylphthalide	≤ 100				OP7B
tert-Butylperoxystearylcarbonate	≤ 100				OP7B
3-Chloroperoxybenzoic acid	≤ 57		≥ 3	≥ 40	OP7B
Cyclohexanone peroxide(s) (1) (2), as a paste	≤ 72				OP7B
Dibenzoyl peroxide	≤ 62		≥ 28	≥ 10	OP7B
Dibenzoyl peroxide (1), as a paste	53-62				OP7B
Dibenzoyl peroxide	36-52		≥ 48		OP7B
1,1-Di-(tert-butylperoxy)cyclohexane	≤ 42	≥ 13	≥ 45		OP7B
2,2-Di-(4,4-tert-butylperoxycyclohexyl)-propane	≤ 42		≥ 58		OP7B
Di-(2-tert-butylperoxyisopropyl)benzene(s)	43-100		≥ 57		OP7B
Di-(tert-butylperoxy)phthalate (1), as a paste	≤ 52				OP7B
2,2-Di-(tert-butylperoxy)propane	≤ 42	≥ 13	≥ 45		OP7B
1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	≤ 57		≥ 43		OP7B
Di-4-chlorobenzoyl peroxide (1), as a paste	≤ 52				OP7B
Di-2,4-dichlorobenzoyl peroxide, as a paste with silicon oil	≤ 52				OP7B

2551 *(cont'd)*

Substance	Concentration (%)	Diluent type A (%)	Inert solid (%)	Water (%)	Packing method (see marginal 2554)
Di-(1-hydroxycyclohexyl)-peroxide	≤ 100				OP7B
Dilauroyl peroxide	≤ 100				OP7B
2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	≤ 82		≥ 18		OP7B
2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane-3	≤ 52		≥ 48		OP7B
Di-(2-phenoxyethyl)peroxydicarbonate	≤ 85		≥ 15		OP7B
Distearyl peroxydicarbonate	≤ 87		≥ 13		OP7B
Ethyl-3,3-di-(tert-butylperoxy)butyrate	≤ 52		≥ 48		OP7B
3,3,6,6,9,9-Hexamethyl-1,2,4,5-tetraoxycyclononane	≤52		≥ 48		OP7B
Tetrahydronaphthyl hydroperoxide	≤ 100				OP7B

(1) With diluent type A, with or without water.
(2) Available oxygen ≤ 9 %.

7° (b) *3107 organic peroxide type E, liquid,* such as:

Substance	Concentration (%)	Diluent type A (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
tert-Amyl hydroperoxide	≤ 88	≥ 6	≥ 6	OP8A	
Di-tert-amyl peroxide	≤ 100			OP8A	
Di-tert-butyl peroxide	≤ 100			OP8A	
1,1-Di-(tert-butylperoxy)cyclohexane (1)	≤ 27	≥ 36		OP8A	
Di-(tert-butylperoxy)phthalate	≤ 42	≥ 58		OP8A	
1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	≤ 57	≥ 43		OP8A	
Methyl ethyl ketone peroxide(s) (2)	≤ 40	≥ 60		OP8A	
Peroxyacetic acid, type E, *stabilized* (3)	≤ 43			OP8A	

(1) With ≥ 36 % ethylbenzene in addition to diluent type A.
(2) Available oxygen ≤ 8,2 %.
(3) Mixtures of peroxyacetic acid with hydrogen peroxide, water and acids which fulfil the criteria of Appendix A.1, marginal 3104 (2) (e).

8° (b) *3108 organic peroxide type E, solid,* such as:

Substance	Concentration (%)	Packing method (see marginal 2554)
tert-Butyl monoperoxymaleate (1), as a paste	≤ 42	OP8B
Dibenzoyl peroxide (1), as a paste	≤ 52	OP8B

(1) With diluent type A, with or without water.

2551 (cont'd)

9° (b) *3109 organic peroxide type F, liquid,* such as:

Substance	Concentration (%)	Diluent type A (%)	Water (%)	Packing method (see marginal 2554)	Additional labelling (see marginal 2559)
tert-Butyl hydroperoxide	≤ 72		≥ 28	OP8A	8
Cumyl hydroperoxide	80-90	≥ 10		OP8A	8
Cumyl hydroperoxide	≤ 80	≥ 20		OP8A	
Dilauroyl peroxide as a stable dispersion in water	≤ 42			OP8A	
Isopropylcumyl hydroperoxide	≤ 72	≥ 28		OP8A	8
p-Menthyl hydroperoxide	≤ 55	≥ 45		OP8A	
Peroxyacetic acid, type F, stabilized (1)	≤ 43			OP8A	8
Pinanyl hydroperoxide	≤ 55	≥ 45		OP8A	

(1) Mixtures of peroxyacetic acid with hydrogen peroxide, water and acids which fulfil the criteria of Appendix A.1, marginal 3104 (2) (f).

10° (b) *3110 organic peroxide type F, solid,* such as:

Substance	Concentration (%)	Inert solid (%)	Packing method (see marginal 2554)
Dicumyl peroxide	43-100	≤ 57	OP8B

B. Organic peroxides requiring temperature control

Note: Substances of 11° to 20° are organic peroxides which decompose easily at normal temperatures and shall therefore be carried only under conditions of adequate refrigeration. For these organic peroxides, the maximum temperature during carriage shall not exceed the control temperature indicated.

11° (b) *3111 organic peroxide type B, liquid, temperature controlled,* such as:

Substance	Concentration (%)	Diluent type A or B (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)	Additional labelling (see marginal 2559)
tert-Butyl peroxyisobutyrate	53-77	≥ 23	OP5A	+ 15	+ 20	01
Diisobutyryl peroxide	33-52	≥ 48	OP5A	– 20	– 10	01

12° (b) *3112 organic peroxide type B, solid, temperature controlled,* such as:

Substance	Concentration (%)	Diluent type A or B (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)	Additional labelling (see marginal 2559)
Acetyl cyclohexanesulphonyl peroxide	≤ 82	≥ 12	OP4B	– 10	0	01
Dibenzyl peroxydicarbonate	≤ 87	≥ 13	OP5B	+ 25	+ 30	01
Dicyclohexyl peroxydicarbonate	92-100		OP5B	+ 5	+ 10	01
Diisopropylperoxydicarbonate	53-100		OP2B	– 15	– 5	01
Di-(2-methylbenzoyl)peroxide	≤ 87	≥ 13	OP5B	+ 30	+ 35	01

2551 (cont'd)

13° (b) *3113 organic peroxide type C, liquid, temperature controlled,* such as:

Substance	Concentration (%)	Diluent type A (%)	Diluent type B (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)
tert-Amyl peroxypivalate	≤ 77		≥ 23	OP5A	+ 10	+ 15
tert-Butyl peroxydiethylacetate	≤ 100			OP5A	+ 20	+ 25
tert-Butyl peroxy-2-ethylhexanoate	53-100			OP6A	+ 20	+ 25
tert-Butyl peroxypivalate	68-77	≥ 23		OP5A	0	+ 10
Di-sec-butyl peroxydicarbonate	53-100			OP4A	- 20	- 10
Di-(2-ethylhexyl) peroxydicarbonate	78-100			OP5A	- 20	- 10
Di-n-propyl peroxydicarbonate	≤ 100			OP4A	- 25	- 15
Organic peroxide, liquid, *sample,* temperature controlled (1)				OP2A		

(1) See marginal 2550 (9).

14° (b) *3114 organic peroxide type C, solid, temperature controlled,* such as:

Substance	Concentration (%)	Water (%) or B (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)
Di-(4-tert-butylcyclohexyl) peroxydicarbonate	≤ 100		OP6B	+ 30	+ 35
Dicyclohexyl peroxydicarbonate	≤ 91	≥ 9	OP3B	+ 5	+ 10
Didecanoyl peroxide	≤ 100		OP6B	+ 15	+ 20
Di-n-octanoyl peroxide	≤ 100		OP5B	+ 10	+ 15
Organic peroxide, solid, *sample,* temperature controlled (1)			OP2B		

(1) See marginal 2550 (9).

15° (b) *3115 organic peroxide type D, liquid, temperature controlled,* such as:

Substance	Concentration (%)	Diluent type (%) type A (%)	Diluent type (%) type B (%)	Water (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)	Additional labelling (see marginal 2559)
Acetyl cyclohexanesulphonylperoxyde	≤ 32		≥ 68		OP7A	- 10	0	
tert-Amyl peroxy-2-ethylhexanoate	≤ 100				OP7A	+ 20	+ 25	
tert-Amyl peroxyneodecanoate	≤ 77		≥ 23		OP7A	0	+ 10	
tert-Butyl peroxy-2-ethyl-hexanoate + *2,2,-di-(tert-butylperoxy)butane*	≤ 31 + ≤ 36		≥ 33		OP7A	+ 35	+ 40	
tert-Butyl peroxyisobutyrate	≤ 52		≥ 48		OP7A	+ 15	+ 20	
tert-Butyl peroxyneodecanoate	78-100				OP7A	- 5	+ 5	
tert-Butyl peroxyneodecanoate	≤ 77		≥ 23		OP7A	0	+ 10	
tert-Butyl peroxypivalate	≤ 67		≥ 33		OP7A	0	+ 10	
Cumyl peroxyneodecanoate	≤ 77		≥ 23		OP7A	- 10	0	
Cumyl peroxypivalate	≤ 77		≥ 23		OP7A	- 5	+ 5	
Diacetone alcohol peroxides (1)	≤ 57		≥ 26	≥ 8	OP7A	+ 30	+ 35	
Diacetyl peroxide (2)	≤ 27		≥ 73		OP7A	+ 20	+ 25	8
Di-n-butyl peroxydicarbonate	28-52		≥ 48		OP7A	- 15	- 5	

2551 *(cont'd)*

Substance	Concentration (%)	Diluent type (%)		Water (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)	Additional labelling (see marginal 2559)
		type A (%)	type B (%)					
Di-sec-butylperoxydicarbonate	≤ 52		≥ 48		OP7A	– 15	– 5	
Di-(2-ethylhexyl) peroxy-dicarbonate	≤ 77		≥ 23		OP7A	– 15	– 5	
Diethyl peroxydicarbonate	≤ 27		≥ 73		OP7A	– 10	0	
Diisobutyryl peroxide	≤ 32		≥ 68		OP7A	– 20	– 10	
Diisopropyl peroxydicarbonate	≤ 52		≥ 48		OP7A	– 10	0	
Diisotridecyl peroxydicarbonate	≤ 100				OP7A	– 10	0	
2,5-Dimethyl-2,5-di-(2-ethyl-hexanoyl-peroxy)hexane	≤ 100				OP7A	+ 20	+ 25	
Di-(3,5,5-trimethylhexanoyl)peroxide	≤ 82	≥ 18			OP7A	0	+ 10	
Methylcyclohexanone peroxide(s)	≤ 67		≥ 33		OP7A	+ 35	+ 40	
1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate	≤ 100				OP7A	+ 20	+ 25	
2,4,4-Trimethylpentyl-2-peroxyphenoxyacetate	≤ 37		≥ 63		OP7A	– 10	0	

(1) With ≤ 9 % hydrogen peroxide; available oxygen ≤ 10,0 %.
(2) Only non-metallic packagings shall be used.

16° (b) *3116 organic peroxide type D, solid, temperature controlled,* such as:

Substance	Concentration (%)	Inert solid (%)	Water (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)
Dicetyl peroxydicarbonate	≤ 100			OP7B	+ 20	+ 25
Dimyristyl peroxydicarbonate	≤ 100			OP7B	+ 20	+ 25
Di-n-nonanoyl peroxide	≤ 100			OP7B	0	+ 10
Diperoxy azelaic acid	≤ 27	≥ 73		OP7B	+ 35	+ 40
Diperoxy dodecane diacid	14-42	≥ 58		OP7B	+ 40	+ 45
Disuccinic acid peroxide	≤ 72		≥ 28	OP7B	+ 10	+ 15
Di-(3,5,5-trimethyl-1,2-dioxolanyl-3)peroxide (1), as a paste	≤ 52			OP7B	+ 30	+ 35

(1) With diluent type A, with or without water.

17° (b) *3117 organic peroxide type E, liquid, temperature controlled,* such as:

Substance	Concentration (%)	Diluent type A or B (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)
tert-Butyl peroxy-2-ethylhexanoate	≤ 52	≥ 48	OP8A	+ 20	+ 25
Di-n-butyl peroxydicarbonate	≤ 27	≥ 73	OP8A	– 10	0
Di-(2-ethylhexyl) peroxydicarbonate as a stable dispersion in water	≤ 42		OP8A	– 15	– 5
Dipropionyl peroxide	≤ 27	≥ 73	OP8A	+ 15	+ 20

2551 (cont'd) 18° (b) *3118 organic peroxide type E, solid, temperature controlled,* such as:

Substance	Concentration (%)	Packing method (see marginal 2554)	Control temperature (°C)	Emergency temperature (°C)
Di-(2-ethylhexyl) peroxydicarbonate as a stable dispersion in water (frozen)	≤ 42	OP8A	– 15	– 5

19° (b) *3119 organic peroxide type F, liquid, temperature controlled,* such a:

Substance	Concentration (%)	Packing method (see marginal 2554)	Control temperature (%)	Emergency temperature (°C)
Di-(4-tert-butylcyclohexyl) peroxy-dicarbonate as a stable dispersion in water	≤ 42	OP8A	+ 30	+ 35
Dicetyl peroxydicarbonate as a stable dispersion in water	≤ 42	OP8A	+ 30	+ 35
Dimyristyl peroxydicarbonate as a stable dispersion in water	≤ 42	OP8A	+ 20	+ 25

20° (b) *3120 organic peroxide type F, solid, temperature controlled*

No organic peroxides are currently included under this item.

C. Empty packagings

31° *Empty packagings*, including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks* and *empty tank-containers*, uncleaned, having contained substances of Class 5.2.

2551a Test or repair kits, or other articles, containing small quantities of substances indicated below, carried in conformity with the following provisions, are not subject to the provisions for this Class contained in this Annex or in Annex B:

(a) liquids of 1°, 3°, 5°, 7°, or 9°: not more than 25 ml per inner packaging;

(b) solids of 2°, 4°, 6°, 8°, or 10°: not more than 100 g per inner packaging.

These quantities of substances shall be carried in combination packagings which at least meet the conditions of marginal 3538. The total gross mass of the package shall not exceed 30 kg. These quantities of substances may be packed together with other articles or substances provided that they will not interact dangerously in the event of leakage.

The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat;

(b) emission of flammable and/or toxic gases;

2551a *(cont'd)*

(c) formation of corrosive liquids;

(d) formation of unstable substances.

The 'General conditions of packing' of marginal 3500 (1), (2) and (5) to (7) shall be observed.

2. Provisions

A. Packages

1. General conditions of packing

2552 (1) Packagings shall satisfy the conditions of Appendix A.5 and shall be so constructed that none of the materials which are in contact with the contents will dangerously affect the contents. The degree of filling shall not exceed 93 %. For conbination packagings, cushioning materials shall not be readily combustible and shall not cause decomposition of the organic peroxide if leakage occurs.

(2) Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 3511 (2) or 3611 (2), packagings of packing groups II or I marked with the letter 'Y' or 'X' or IBCs of packing group II, marked with the letter 'Y', shall be used. Metal packagings of packing group I, however, shall not be used.

Note: For the carriage of substances of Class 5.2 in tank vehicles, demountable tanks or tank-containers, see Annex B.

2. Special conditions for packing of certain substances and articles

2553 (1) The packing methods for substances of Class 5.2 are listed in Table 2 and are designated OP1A to OP8A for liquids and OP1B to OP8B for solids. Viscous substances with an outflow time from a DIN-CUP with 4 mm Ø outlet at 20 °C exceeding 10 minutes (corresponding to an outflow time of more than 690 seconds at 20 °C from a Ford cup 4, or to more than $2{,}68 \times 10^{-3}$ m^2/s) shall be considered as solids.

(2) Substances and articles shall be packed as indicated in marginal 2551 and as set out in detail in Table 2(A) and 2(B). A packing method for a package of a smaller size (i.e. with a lower OP number) may be used; this provision is not applicable, however, to a packing method for a package of a larger size (i.e. with a higher OP number).

(3) Packages bearing a label conforming to model No. 01 shall comply with the provisions of marginal 2102 (4) and (6).

(4) Receptacles or IBCs, containing substances of 1° (b), 3° (b), 5° (b), 7° (b), 9° (b), 11° (b), 13° (b), 15° (b), 17° (b) or 19° (b), which give off small quantities of gases, shall be vented, in accordance with marginal 3500 (8) or 3601 (6).

2554 (1) For organic peroxides or formulations of organic peroxides not listed in marginal 2551, the following procedure shall be used to assign the appropriate packing method:

(a) *Organic peroxides type B:*

Substances and articles shall be assigned packing method OP5A or OP5B provided that they satisfy the criteria of Appendix A.1, marginal 3104 (2) (b) in one of the packagings indicated. If the organic peroxide can only satisfy these criteria in a smaller packaging than those listed for packing method OP5A or OP5B (i.e. one of the packagings listed for OP1A to OP4A or OP1B to OP4B), then the corresponding packing method with the lower OP number shall be assigned.

2554 *(cont'd)*

(b) *Organic peroxides type C:*

Substances and articles shall be assigned packing method OP6A or OP6B provided that they satisfy the criteria of Appendix A.1, marginal 3104 (2)(c) in one of the packagings indicated. If the organic peroxide can only satisfy these criteria in a smaller packaging than those listed for packing method OP6A or OP6B then the corresponding packing method with the lower OP number shall be assigned.

(c) *Organic peroxides type D:*

Packing method OP7A or OP7B shall be assigned.

(d) *Organic peroxides type E:*

Packing method OP8A or OP8B shall be assigned.

(e) *Organic peroxides type F:*

Packing method OP8A or OP8B shall be assigned.

TABLE 2A)

List of packagings for liquid organic peroxides

Type and material	Packaging code (see marginal 3514)	Maximum quantity or net mass per package (1)							
		OP1A (2)	OP2A (2)	OP3A (2)	OP4A (2)	OP5A (2)	OP6A (2)	OP7A	OP8A
Steel drum	1A1	*	*	*	*	*	*	60 l	225 l
Steel drum (3)	1A2	*	*	*	*	*	*	50 kg	200 kg
Aluminium drum	1B1	*	*	*	*	*	*	60 l	225 l
Fibre drum (3)	1G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Plastics drum	1H1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics jerrican	3H1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l
Wooden box (3)	4C1	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box (3)	4D	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fibreboard box (3)	4G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plastics receptacle with outer steel drum	6HA1	*	*	*	*	*	*	60 l	225 l
Plastics receptacle with outer aluminium drum	6HB1	*	*	*	*	*	*	60 l	225 l
Plastics receptacle with outer fibre drum	6HG1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics receptacle with outer fibreboard box	6HG2	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l
Plastics receptacle with outer plastics drum	6HH1	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	225 l
Plastics receptacle with outer solid plastics box	6HH2	0,5 l	0,5 l	5 l	5 l	30 l	60 l	60 l	60 l

* = Prohibited for organic peroxide types B and C.

(1) If two values are given, the first applies to the maximum net mass per inner receptacle and the second to the maximum net mass of the complete package.

(2) For combination packagings containing organic peroxide type B or C, only plastics bottles, plastics jars, glass bottles or glass ampoules may be used as inner packagings. However, glass receptacles may only be used as inner receptacles for packing methods OP1A and OP2A.

(3) These packagings are only allowed as part of a combination packaging. Inner packagings shall be suitable for liquids.

2554 *(cont'd)*

TABLE 2B)

List of packagings for solid organic peroxides

Type and material	Packaging code (see marginal 3514)	Maximum quantity or net mass per package (1)							
		OP1B (2)	OP2B (2) (3)	OP3B (2)	OP4B (2)	OP5B (2)	OP6B (2)	OP7B	OP8B
Steel drum	1A2	*	*	*	*	*	*	50 kg	200 kg
Aluminium drum	1B2	*	*	*	*	*	*	50 kg	200 kg
Fibre drum	1G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Plastics drum	1H2	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	200 kg
Wooden box (4)	4C1	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plywood box (4)	4D	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Fibreboard box (4)	4G	0,5 kg	0,5/10 kg	5 kg	5/25 kg	25 kg	50 kg	50 kg	100 kg
Plastics receptacle with outer steel drum	6HA1	*	*	*	*	*	*	50 kg	200 kg
Plastics receptacle with outer aluminium drum	6HB1	*	*	*	*	*	*	50 kg	200 kg
Plastics receptacle with outer fibre drum	6HG1	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	200 kg
Plastics receptacle with outer fibreboard box	6HG2	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	75 kg
Plastics receptacle with outer plastics drum	6HH1	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	200 kg
Plastics receptacle with outer solid plastics drum	6HH2	0,5 kg	0,5 kg	5 kg	5 kg	25 kg	50 kg	50 kg	75 kg

* = Prohibited for organic peroxide types B and C.

(1) If two values are given, the first applies to the maximum net mass per inner receptacle and the second to the maximum net mass of the complete package.

(2) For combination packagings containing organic peroxide type B or C, only non-metallic packagings may be used. However, glass receptacles may only be used as inner receptacles for packing methods OP1B and OP2B.

(3) If fire retardant partitions are used, the maximum net mass of the complete package may be 25 kg.

(4) These packagings are only allowed as part of a combination packaging. Inner packagings shall be suitable for the substances to be carried.

2555 (1) The substances of marginal 2551, 9° (b), 10° (b), 19° (b) or 20° (b) may be carried in IBCs under conditions laid down by the competent authority of the country of origin when, on the basis of testing, the competent authority is satisfied that such carriage may be safely conducted. The tests shall include those necessary:

— to prove that the organic peroxide complies with the principles for classification given in Appendix A.1, marginal 3104 (2) (f);

— to prove the compatibility with all materials normally in contact with the substance during carriage;

— to determine, when applicable, the control and emergency temperatures associated with the carriage of the substance in the IBC concerned as derived from the SADT;

— to design, when applicable, emergency-relief devices; and

— to determine if any special requirements are necessary.

2555 *(cont'd)* (2) The following organic peroxides of type F may be carried in IBCs of the type shown, without complying with the conditions of paragraph (1):

Substance	Type of IBC	Maximum capacity (litres)	Control temperature	Emergency temperature
3109 Organic peroxide type F, liquid:				
— dilauroyl peroxide, not more than 42 %, stable dispersion, in water	31HA1	1 000		
3119 Organic peroxide type F, liquid, temperature controlled				
— di-(4-tert-butylcyclohexyl) peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+ 30 °C	+ 35 °C
— dicetyl peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+ 30 °C	+ 35 °C
— dimyristyl peroxydicarbonate, not more than 42 %, stable dispersion, in water	31HA1	1 000	+ 15 °C	+ 25 °C

(3) To prevent explosive rupture of metal IBCs or composite IBCs with full wall metal casing, the emergency-relief devices shall be designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of fire engulfment (heat load 110 kW/m^2) or self-accelerating decomposition.

2556-2557

3. Mixed packing

2558 Substances of Class 5.2 shall not be packed together with substances or articles of other classes or with goods which are not subject to the provisions of this Directive.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2559 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document preceded by the letters 'UN'.

Danger labels

(1) Packages containing substances of Class 5.2 shall bear a label conforming to model No 5.2.

(2) Packages containing organic peroxides of 1°, 2°, 11° and 12° shall in addition bear a label conforming to model No. 01 unless the competent authority has permitted this label to be dispensed with for the type of packaging tested because the results have proved that the organic peroxide in such a packaging does not exhibit explosive behaviour [see marginal 2561 (4)].

(3) When a substance is highly corrosive or corrosive according to the criteria of Class 8 [see marginal 2800 (1)], packages shall, in addition, bear a label conforming to model No 8. This is indicated in marginal 2551 (additional labelling) or, when required, in the approved conditions of carriage [see marginal 2550 (8)].

(4) Packages containing fragile receptacles not visible from the outside shall bear on two opposite sides a label conforming to model No 12.

2559 (cont'd) (5) Packages containing liquids in packagings the closures of which are not visible from the outside, packages containing vented packagings or vented packagings without outer packagings shall bear on two opposite sides a label conforming to model No 11.

2560

B. Particulars in the transport document

2561 (1) The description of the goods in the transport document shall conform to one of the identification numbers and the corresponding collective heading printed in italics in marginal 2551 followed by the chemical name (in brackets).

This description shall be followed by *particulars of the class, the item number*, if applicable, *the letter and the initials 'ADR'* (or *'RID'*), e.g. '3108, organic peroxide type E, solid, (dibenzoyl peroxide), 5.2, 8° (b), ADR'.

For the carriage of wastes [see marginal 2000 (5)], the description of the goods shall be: *'Waste, containing* ...', the component(s) which has/have been used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste, containing 3107 organic peroxide type E, liquid, (peroxyacetic acid), 5.2, 7° (b), ADR'. In general, not more than the two components which predominantly contribute to the danger or dangers of the waste need be shown.

(2) When substances and articles are carried under conditions fixed by the competent authority (see marginals 2550 (8), 2555 (1), 211 511 and 212 511, the following statement shall be included in the transport document:

'Carriage in accordance with marginal 2561 (2)'.

A copy of the decision of the competent authority with the conditions of carriage shall be attached to the transport document.

(3) When a sample of an organic peroxide is carried in accordance with marginal 2550 (9), the following statement shall be included in the transport document:

'Carriage in accordance with marginal 2561 (3)'.

(4) When, by permission of the competent authority in accordance with marginal 2559 (2), a label conforming to model No. 01 is not required, the following statement shall be included in the transport document:

'The danger label conforming to model No. 01 is not required'.

(5) When organic peroxides type G [see Appendix A.1, marginal 3104 (2)(g)] are carried, the following statement may be given in the transport document:

'Not a substance of Class 5.2'.

(6) For organic peroxides requiring temperature control during carriage, the following statement shall be given in the transport document:

'Control temperature: ...°C

Emergency temperature: ...°C'.

2562-2566

C. Empty packagings

2567 (1) Empty packagings, including empty IBCs, uncleaned, of 31° shall be closed in the same manner and with the same degree of leakproofness as if they were full.

2567 *(cont'd)* (2) Empty packagings including empty IBCs, uncleaned, of 31° shall bear the same danger labels as if they were full.

(3) The description in the transport document shall conform to one of the names printed in italics in 31°, e.g. 'Empty packagings, 5.2, 31°, ADR'. In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers, uncleaned, this description shall be completed by adding the words 'Last load' together with the chemical name and item number of the goods last loaded, e.g. 'Last load: 3109 organic peroxide type F, liquid, (tert-butyl hydroperoxide), 9° (b)'.

2568-2599

CLASS 6.1

TOXIC SUBSTANCES

1. List of substances

2600 (1) Among the substances and articles covered by the title of Class 6.1, those which are listed in marginal 2601 or are covered by a collective heading of that marginal are subject to the conditions set out in marginals 2600(2) to 2622 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive.

Note: For the quantities of substances of marginal 2601 which are not subject to the provisions for this class either in this Annex or in Annex B, see marginal 2601a.

(2) The title of Class 6.1 covers the toxic substances of which it is known by experience or regarding which it is presumed from experiments on animals that in relatively small quantity they are able by a single action or by action of short duration to cause damage to human health, or death, by inhalation, by cutaneous absorption or by ingestion.

Substances of Class 6.1 are subdivided as follows:

A. Substances which are highly toxic on inhalation with a flash-point below 23 °C which are not substances of Class 3;

B. Organic substances which have a flash-point of not less than 23 °C or non-flammable organic substances;

C. Organometallic compounds or carbonyls;

D. Inorganic substances which may release toxic gases on contact with water (or atmospheric humidity), aqueous solutions or acids and other toxic water-reactive [1] substances;

E. Other inorganic substances and metallic salts of organic substances;

F. Substances and preparations used as pesticides;

G. Substances intended for laboratories and experiments and for the manufacture of pharmaceutical products, if not listed in other items of this Class;

H. Empty packagings.

(3) Substances and articles of Class 6.1, other than the substances of 1° to 5°, which are classified under the various items of marginal 2601, shall be assigned to one of the following groups designated by the letters (a), (b) or (c), according to their degree of toxicity:

(a) highly toxic substances

(b) toxic substances

(c) slightly toxic substances

[1] The term 'water reactive' denotes a substance which, in contact with water, emits flammable gases.

2600 *(cont'd)* Substances, mixtures and solutions, including pesticides of 71° to 87°, not expressly mentioned shall be classified under the appropriate item and letter according to the following criteria:

1 To assess the degree of toxicity, account shall be taken of human experience of instances of accidental poisoning, as well as special properties possessed by any individual substances: liquid state, high volatility, any special likelihood of cutaneous absorption, and special biological effects.

2. In the absence of observations on humans, the degree of toxicity shall be assessed using the available data from animal experiments in accordance with the table below:

	Subdivision into groups within an item	Oral toxicity LD_{50} (mg/kg)	Dermal toxicity LD_{50} (mg/kg)	Toxicity on inhalation LC_{50} dusts and mists (mg/l)
Highly toxic	(a)	$LD_{50} \leq 5$	$LD_{50} \leq 40$	$LC_{50} \leq 0{,}5$
Toxic	(b)	$5 < LD_{50} \leq 50$	$40 < LD_{50} \leq 200$	$0{,}5 < LC_{50} \leq 2$
Slightly toxic	(c) (1)	solids: $50 < LD_{50} \leq 200$ liquids: $50 < LD_{50} \leq 500$	$200 < LD_{50} \leq 1\,000$	$2 < LC_{50} \leq 10$

(1) Tear gases shall be included in group (b) even if data concerning their toxicity correspond to group (c) criteria.

2.1. Where a substance exhibits different degrees of toxicity for two or more kinds of exposure, it shall be classified under the highest such degree of toxicity.

2.2. Substances meeting the criteria of Class 8 and with an inhalation toxicity of dusts and mists (LC_{50}) leading to Packing Group I shall only be accepted for an allocation to class 6.1 if the toxicity through oral ingestion or dermal contact is at least in the range of Group (a) or (b). Otherwise an assignment to Class 8 shall be made if appropriate (see footnote [1]) marginal 2800).

LD_{50} value for acute oral toxicity

2.3. That dose of the substance administered which is most likely to cause death within 14 days in one half of both male and female young adult albino rats. The number of animals tested shall be sufficient to give a statistically significant result and shall be in conformity with good pharmacological practices. The result is expressed in mg per kg body mass.

LD_{50} value for acute dermal toxicity

2.4. That dose of the substance which, administered by continuous contact for 24 hours with the bare skin of albino rabbits, is most likely to cause death within 14 days in one half of the animals tested. The number of animals tested shall be sufficient to give a statistically significant result and shall be in conformity with good pharmacological practices. The result is expressed in mg per kg body mass.

LC_{50} value for acute toxicity on inhalation

2.5. That concentration of vapour, mist or dust which, administered by continuous inhalation for one hour to both male and female young adult albino rats, is most likely to cause death within 14 days in one half of the animals tested. If the substance is administered to the animals as dust or mist, more than 90 % of the particles available for inhalation in the testshall have a diameter of 10 μm or less, provided that it is reasonably foreseeable that such concentrations could be encountered by humans during carriage. The result is expressed in mg per litre of air for dusts and mists and in ml per m^3 of air (ppm) for vapours.

2600 *(cont'd)*

2.6. These criteria for inhalation toxicity of dusts and mists are based on LC50 data relating to 1-hour exposure, and where such information is available it shall be used. However, where only LC_{50} data relating to 4-hour exposure are available, such figures can be multiplied by four and the product substituted in the above criteria, i.e. LC_{50} value multiplied by four (4 hour) is considered the equivalent of LC_{50} (1 hour).

Inhalation toxicity of vapours

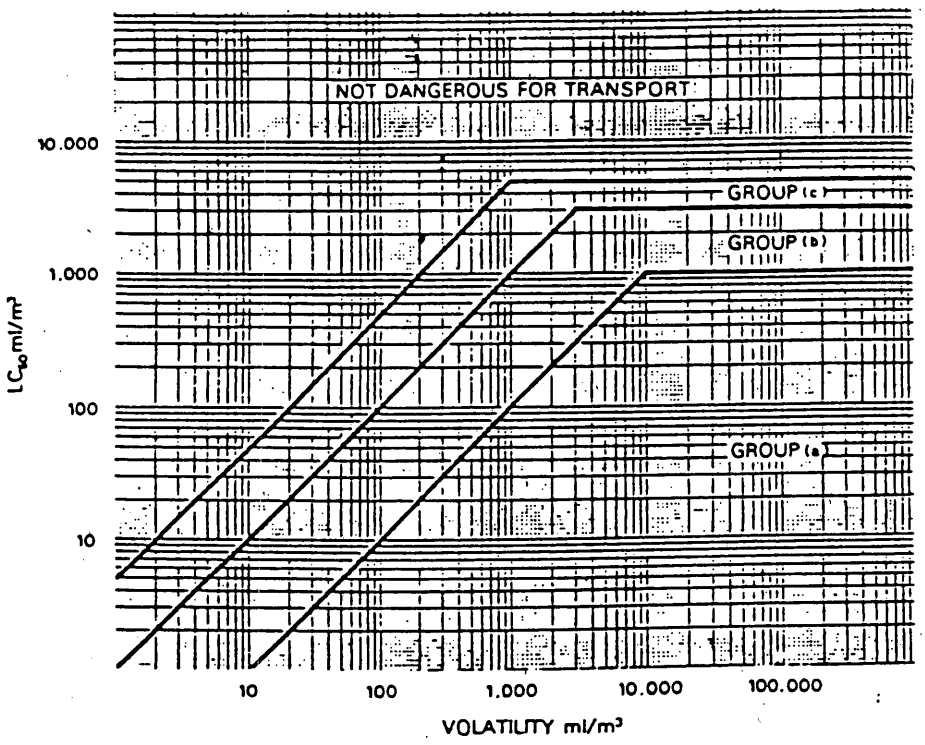
3. Liquids giving off toxic vapours shall be classified into the following groups where 'V' is the saturated vapour concentration (in ml/m³ of air) (volatility) at 20 °C and standard atmospheric pressure:

	Subdivision into groups within an item	
Highly toxic	(a)	Where $V \geq 10\ LC_{50}$ and $LC_{50} \leq 1\,000$ ml/m³
Toxic	(b)	Where V [LC_{50} and $LC_{50} \leq 3\,000$ ml/m³ and the criteria for (a) are not met
Slightly toxic	(c)	Where $V \geq 1/5\ LC_{50}$ and $LC_{50} \leq 5\,000$ ml/m³ and the criteria for (a) and (b) are not met

These criteria for inhalation toxicity of vapours are based on LC_{50} data relating to 1-hour exposure, and where such information is available, it shall be used.

However, where only LC_{50} data relating to 4-hour exposure to the vapours are available, such figures can be multiplied by two and the product substituted in the above criteria, i.e. LC_{50} (4 hour) × 2 is considered the equivalent of LC_{50} (1 hour).

Inhalation toxicity of vapours
Group borderlines



2600 *(cont'd)* In this figure, the criteria are expressed in graphical form, as an aid to easy classification. However, due to approximations inherent in the use of graphs, substances falling on or near group borderlines shall be checked using numerical criteria.

Mixtures of liquids

4. Mixtures of liquids which are toxic on inhalation shall be assigned to danger categories according to the following criteria:

4.1. If LC_{50} is known for each of the toxic substances constituting the mixture, the group may be determined as follows:

(a) calculation of the LC_{50} of the mixture:

$$LC_{50}\ (\text{mixture}) = \frac{1}{\sum_{i=1}^{n} \frac{f_i}{LC_{50i}}}$$

where

f_i = molar fraction of constituent i of the mixture.

LC_{50i} = average lethal concentration of constituent i in ml/m^3.

(b) calculation of volatility of each mixture constituent:

$$V_i = P_i \times \frac{10^6}{101{,}3}\ ml/m^3$$

where

P_i = partial pressure of constituent i in kPa at 20 °C and at standard atmospheric pressure.

(c) calculation of the ratio of volatility to LC_{50}:

$$R = \sum_{i=1}^{n} \frac{V_i}{LC_{50i}}$$

(d) the values calculated for LC_{50} (mixture) and R are then used to determine the group of the mixture:

Group (a): $R \geq 10$ and LC_{50} (mixture) $\leq 1\,000\ ml/m^3$.

Group (b): $R \geq$ and LC_{50} (mixture) $\leq 3\,000\ ml/m^3$, if the mixture does not meet the criteria for (a)

Group (c): $R \geq 1/5$ and LC_{50} (mixture) $\leq 5\,000\ ml/m^3$, if the mixture does not meet the criteria of group (a) or group (b).

4.2. In the absence of LC_{50} data on the toxic constituent substances, the mixture may be assigned to a group based on the following simplified threshold toxicity tests. When these threshold tests are used, the most restrictive group shall be determined and used for carrying the mixture.

4.3. A mixture is assigned to group (a) only if it meets both of the following criteria:

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of $1\,000\ ml/m^3$ vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC_{50} equal to or less than $1\,000\ ml/m^3$.

(ii) A sample of vapour in equilibrium with the liquid mixture is diluted with 9 equal volumes of air to form a test atmosphere. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have a volatility equal to or greater than 10 times the mixture LC_{50}.

2600 *(cont'd)*

4.4. A mixture is assigned to group (b) only if it meets both of the following criteria, and does not meet the criteria for group (a):

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 3 000 ml/m^3 vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC_{50} equal to or less than 3 000 ml/m^3.

(ii) A sample of the vapour in equilibrium with the liquid mixture is used to form a test atmosphere. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have a volatility equal to or greater than the mixture LC_{50}.

4.5. A mixture is assigned to group (c) only if it meets both of the following criteria, and does not meet the criteria for groups (a) or (b):

(i) A sample of the liquid mixture is vaporized and diluted with air to create a test atmosphere of 5 000 ml/m^3 vaporized mixture in air. Ten albino rats (5 male and 5 female) are exposed to the test atmosphere for 1 hour and observed for 14 days. If five or more of the animals die within the 14-day observation period, the mixture is presumed to have an LC_{50} equal to or less than 5 000 ml/m^3.

(ii) The vapour concentration (volatility) of the liquid mixture is measured and if the vapour concentration is equal to or greater than 1 000 ml/m^3, the mixture is presumed to have a volatility equal to or greater than 1/5 the mixture LC_{50}.

(4) When, as a result of additions, substances of Class 6.1 pass into other danger categories than those to which the substances mentioned by name in marginal 2601 belong, these mixtures or solutions shall be listed under the items and letters to which they belong, based on their actual degree of danger.

Note: For classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(5) On the basis of the criteria of paragraph (3), it may also be determined whether the nature of a solution or mixture mentioned by name or containing a substance mentioned by name is such that the solution or mixture is not subject to the requirements for this Class.

(6) Flammable liquids which are toxic on inhalation, having a flash-point below 23 °C, except substances of 1° to 10°, are substances of Class 3 (see marginal 2301, 11° to 19°).

(7) Flammable liquids slightly toxic, with the exception of substances and preparations used as pesticides, having a flash-point between 23 °C to 61 °C, inclusive, are substances of Class 3 (see marginal 2301).

(8) Self-heating substances slightly toxic are substances of Class 4.2 (see marginal 2431).

(9) Water-reactive substances slightly toxic are substances of Class 4.3 (see marginal 2471).

(10) Oxidizing substances slightly toxic are substances of Class 5.1 (see marginal 2501).

(11) Substances slightly toxic and slightly corrosive are substances of Class 8 (see marginal 2801).

(12) Chemically unstable substances of Class 6.1 shall not be accepted for carriage unless the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end, it shall in particular be ensured that receptacles do not contain any substance(s) likely to cause such a reaction.

2600 (cont'd) (13) Substances and mixtures of substances having a melting point above 45 °C are considered as solids within the meaning of the packing requirements of marginals 2606 (2), 2607 (4) and

(14) The flash-point referred to below shall be determined in the manner described in Appendix A.3.

A. Highly toxic substances having a flash-point below 23 °C which are not substances of Class 3

2601 1° Hydrogen cyanide, stabilized:

1051 hydrogen cyanide, stabilized, containing not more than 3 % water, *1614 hydrogen cyanide, stabilized,* containing not more than 3 % water and absorbed in a porous inert material.

Notes: 1. Special conditions of packing are applicable to this substance [see marginal 2603 (1)].

2. Anhydrous hydrogen cyanide not satisfying these conditions is not to be accepted for carriage.

3. Hydrogen cyanide (Hydrocyanic acid) containing less than 3 % water is stable, if the pH-value is 2,5 ± 0,5 and the liquid is clear and colourless.

2° Hydrogen cyanide solutions:

1613 hydrogen cyanide, aqueous solution (hydrocyanic acid), with not more than 20 % hydrogen cyanide, *3294 hydrogen cyanide, solution in alcohol,* with not more than 45 % hydrogen cyanide.

Notes: 1. Special conditions of packing are applicable to these substances [see marginal 2603 (2)].

2. Solutions of hydrogen cyanide which do not conform to these conditions are not to be accepted for carriage.

3° Metal carbonyls:

1259 nickel carbonyl, 1994 iron pentacarbonyl.

Notes: 1. Special conditions of packing are applicable to these substances (see marginal 2604).

2. Other metal carbonyls having a flash-point below 23 °C are not to be accepted for carriage.

4° *1185 ethyleneimine, inhibited.*

Note: Special conditions of packing are applicable to this substance [see marginal 2605 (1)].

5° *2480 methyl isocyanate.*

Note: Special conditions of packing are applicable to this substance [see marginal 2605 (2)].

6° Other isocyanates having a flash-point below 23 °C:

(a) *2482 n-propyl isocyanate, 2484 tert-butyl isocyanate, 2485 n-butyl isocyanate.*

7° *Nitrogenous substances:*

(a) 1. *1163 dimethylhydrazine, unsymmetrical, 1244 methylhydrazine;*

2. *2334 allylamine, 2382 dimethylhydrazine, symmetrical.*

8° Oxygenated substances:

(a) *1092 acrolein, inhibited, 1098 allyl alcohol, 1143 crotonaldehyde, stabilized, 2606 methyl orthosilicate.*

2601 (cont'd)

9° Halogenated substances:

(a) *1239 methyl chloromethyl ether.*

10° Corrosive halogenated substances:

(a) *1182 ethyl chloroformate, 1238 methyl chloroformate, 2407 isopropyl chloroformate, 2438 trimethylacetyl chloride.*

B. Organic substances which have a flash-point of 23 °C or over or non-flammable organic substances

Note: Organic substances and preparations used as pesticides are substances of 71° to 78° and 81° to 87°.

11° Nitrogenous substances having a flash-point between 23 °C and 61 °C inclusive:

(a) *3275 nitriles, toxic, flammable, n.o.s.;*

(b) *2668 chloroacetonitrile, 3073 vinylpyridines, inhibited, 3275 nitriles, toxic, flammable, n.o.s.*

12° Nitrogenous substances having a flash-point above 61 °C:

(a) *1541 acetone cyanohydrin, stabilized, 3276 nitriles, toxic, n.o.s.;*

(b) *1547 aniline, 1577 chlorodinitrobenzenes, 1578 chloronitrobenzenes, 1590 dichloroanilines, 1596 dinitroanilines, 1597 dinitrobenzenes, 1598 dinitro-o-cresol, 1599 dinitrophenol solution, 1650 beta-naphthylamine, 1652 naphthylurea, 1661 nitroanilines* (o-,m-,p-), *1662 nitrobenzene, 1664 nitrotoluenes* (o-,m-,p-), *1665 nitroxylenes,* (o-,m-,p-) *1708 toluidines, 1711 xylidines, 1843 ammonium dinitro-o-cresolate, 1885 benzidine, 2018 chloroanilines, solid, 2019 chloroanilines, liquid, 2038 dinitrotoluenes, 2224 benzonitrile, 2253 N,N-dimethylaniline, 2306 nitrobenzotrifluorides, 2307 3-nitro-4-chlorobenzotrifluoride, 2522 dimethylaminoethyl methacrylate, 2572 phenylhydrazine, 2647 malononitrile, 2671 aminopyridines* (o-,m-,p-), *2673 2-amino-4-chlorophenol, 2690 N,n-butylimidazole, 2738 N-butylaniline, 2754 N-ethyltoluidines, 2822 2-chloropyridine, 3276 nitriles, toxic, n.o.s.;*

(c) *1548 aniline hydrochloride, 1599 dinitrophenol solution, 1663 nitrophenols* (o-,m-,p-), *1673 phenylenediamines* (o-,m-,p-), *1709 2,4-toluylenediamine, 2074 acrylamide, 2077 alpha-naphthylamine, 2205 adiponitrile, 2272 N-ethylaniline, 2273 2-ethylaniline, 2274 N-ethyl-Nbenzylaniline, 2294 N-methylaniline, 2300 2-methyl-5-ethylpyridine, 2311 phenetidines, 2431 anisidines, 2432 N,N-diethylaniline, 2446 nitrocresols, 2470 phenylacetonitrile, liquid, 2512 aminophenols* (o-,m-,p-), *2651 4,4'-diaminodiphenylmethane, 2656 quinoline, 2660 nitrotoluidines (mono), 2666 ethyl cyanoacetate, 2713 acridine, 2730 nitroanisole, 2732 nitrobromobenzene, 2753 N-ethylbenzyltoluidines, 2873 dibutylaminoethanol, 2941 fluoroanilines, 2942 2-trifluoromethylaniline, 2946 2-amino-5-diethylaminopentane, 3276 nitriles, toxic, n.o.s.*

Note: Isocyanates having a flash-point above 61 °C are substances of 19°.

13° Oxygenated substances having a flash-point between 23 °C and 61 °C inclusive:

(a) *2521 diketene, inhibited.*

14° *Oxygenated substances having a flash-point above 61 °C:*

(b) *1594 diethyl sulphate, 1671 phenol, solid, 2261 xylenols, 2587 benzoquinone, 2669 chlorocresols, 2821 phenol solution, 2839 aldol;*

(c) *2369 ethylene glycol monobutyl ether, 2525 ethyl oxalate, 2609 triallyl borate, 2662 hydroquinone, 2716 1,4-butynediol, 2821 phenol solution, 2874 furfuryl alcohol, 2876 resorcinol, 2937 alpha-methylbenzyl alcohol, 2938 methyl benzoate.*

2601 (cont'd)

15° Halogenated hydrocarbons:

(a) *1605 ethylene dibromide, 1647 methyl bromide and ethylene dibromide mixture, liquid, 2646 hexachlorocyclopentadiene;*

Note: Mixtures of ethylene dibromide (sym-dibromoethane) with methyl bromide having, at 50 °C, a vapour pressure greater than 300 kPa (3 bar) are substances of Class 2 [see marginal 2201, 4° (bt)].

(b) *1669 pentachloroethane, 1701 xylyl bromide, 1702 1,1,2,2-tetrachloroethane, 1846 carbon tetrachloride, 1886 benzylidene chloride, 1891 ethyl bromide, 2322 trichlorobutene, 2644 methyl iodide, 2653 benzyl iodide;*

(c) *1591 o-dichlorobenzene, 1593 dichloromethane* (methylene chloride), *1710 trichloroethylene, 1887 bromochloromethane, 1888 chloroform, 1897 tetrachloroethylene, 2279 hexachlorobutadiene, 2321 trichlorobenzenes, liquid, 2504 tetrabromoethane, 2515 bromoform, 2516 carbon tetrabromide, 2664 dibromoethane, 2688 1-bromo-3-chloropropane, 2729 hexachlorobenzene, 2831 1,1,1-trichloroethane, 2872 dibromochloropropanes.*

Note: Mixtures of methyl chloride with methylene chloride (dichloromethane) having, at 50 °C, a vapour pressure greater than 300 kPa (3 bar) are substances of Class 2 [see marginal 2201, 4° (bt)].

16° Other halogenated substances having a flash-point between 23 °C and 61 °C inclusive:

(a) *1135 ethylene chlorohydrin, 2558 epibromohydrin;*

(b) *1181 ethyl chloroacetate, 1569 bromoacetone, 1603 ethyl bromoacetate, 1916 2,2'-dichlorodiethyl ether, 2023 epichlorohydrin, 2295 methyl chloroacetate, 2589 vinyl chloroacetate, 2611 propylene chlorohydrin.*

17° Other halogenated substances having a flash-point above 61 °C:

(a) *1580 chloropicrin, 1670 perchloromethyl mercaptan, 1672 phenylcarbylamine chloride, 1694 bromobenzyl cyanides, 2232 chloroacetaldehyde, 2628 potassium fluoroacetate, 2629 sodium fluoroacetate, 2642 fluoroacetic acid, 1583 chloropicrin mixture, n.o.s., 1610 halogenated irritating liquid, n.o.s.;*

Note: Mixtures of methyl bromide or methyl chloride with chloropicrin , having, at 50 °C, a vapour pressure greater than 300 kPa (3 bar) are substances of Class 2 [see marginal 2201, 4° (at) or 4° (bt)].

(b) *1695 chloroacetone, stabilized, 1697 chloroacetophenone, 2075 chloral, anhydrous, inhibited, 2490 dichloroisopropyl ether, 2552 hexafluoroacetone hydrate, 2567 sodium pentachlorophenate, 2643 methyl bromoacetate, 2645 phenacyl bromide, 2648 1,2-dibromobutan-3-one, 2649 1,3-dichloroacetone, 2650 1,1-dichloro-1-nitroethane, 2750 1,3-dichloropropanol-2, 2948 3-trifluoromethylaniline, 3155 pentachlorophenol, 1583 chloropicrin mixture, n.o.s., 1610 halogenated irritating liquid, n.o.s.;*

(c) *1579 4-chloro-o-toluidine hydrochloride, 2020 chlorophenols, solid, 2021 chlorophenols, liquid, 2233 chloroanisidines, 2235 chlorobenzyl chlorides, 2237 chloronitroanilines, 2239 chlorotoluidines, 2299 methyl dichloroacetate, 2433 chloronitrotoluenes, 2533 methyl trichloroacetate, 2659 sodium chloroacetate, 2661 hexachloroacetone, 2689 glycerol alpha-monochlorohydrin, 2747 tert-butylcyclohexyl chloroformate, 2849 3-chloropropoanol-1, 2875 hexachlorophene, 3241 2-bromo-2-nitropropane-1,3-diol, 1583 chloropicrin mixture, n.o.s., 1610 halogenated irritating liquid, n.o.s.*

Note: Chloroformates having predominantly corrosive properties are substances of Class 8 (see marginal 2801, 64°).

18° Isocyanates having a flash-point between 23 °C and 61 °C inclusive:

(b) *2285 isocyanatobenzotrifluorides, 2487 phenyl isocyanate, 2488 cyclohexyl isocyanate, 3080 isocyanates, toxic, flammable, n.o.s.* or *3080 isocyanate solution, toxic, flammable, n.o.s.*

Note: Solutions of these isocyanates having a flash-point below 23 °C are substances of Class 3 [see marginal 2301, 14° (b)].

2601 *(cont'd)*

19° Isocyanates having a flash-point above 61 °C:

(b) *2078 toluene diisocyanate* and isomer mixtures, *2236 3-chloro-4-methylphenyl isocyanate, 2250 dichlorophenyl isocyanates, 2281 hexamethylene diisocyanate, 2206 isocyanates, toxic, n.o.s.* or *2206 isocyanate solution, toxic, n.o.s.;*

Notes: 1. Solutions of these isocyanates having a flash-point below 23 °C are substances of Class 3 (see marginal 2301, 14°).

2. Solutions of these isocyanates having a flash-point between 23 °C and 61 °C inclusive are substances of 18° (b).

(c) *2290 isophoronediisocyanate, 2328 trimethylhexamethylene diisocyanate* and isomer mixtures, *2489 diphenylmethane-4,4'-diisocyanate, 2206 isocyanates, toxic, n.o.s.* or *2206 isocyanate solution, toxic, n.o.s.*

20° Substances containing sulphur and having a flash-point between 23 °C and 61 °C inclusive:

(a) *2337 phenyl mercaptan;*

(b) *1545 allyl isothiocyanate, inhibited, 2477 methyl isothiocyanate, 3023 tert-octyl mercaptan, 3071 mercaptans, liquid, toxic, flammable, n.o.s.* or *3071 mercaptan mixture, liquid, toxic, flammable, n.o.s.*

21° Substances containing sulphur and having a flash-point above 61 °C:

(b) *1651 naphthylthiourea, 2474 thiophosgene, 2936 thiolactic acid, 2966 thioglycol;*

(c) *2785 4-thiapentanal.*

22° Substances containing phosphorus and having a flash-point between 23 °C and 61 °C inclusive:

(a) *3279 organophosphorus compound, toxic, flammable, n.o.s.;*

(b) *3279 organophosphorus compound, toxic, flammable, n.o.s.*

23° Substances containing phosphorus and having a flash-point above 61 °C:

(a) *3278 organophosphorus compound, toxic, n.o.s.;*

(b) *1611 hexaethyl tetraphosphate, 1704 tetraethyl dithiopyrophosphate, 2501 tris-(1-aziridinyl) phosphine oxide, solution, 2574 tricresyl phosphate* with more than 3 % ortho isomer, *3278 organophosphorus compound, toxic, n.o.s.;*

(c) *2501 tris-(1-aziridinyl) phosphine oxide, solution, 3278 organophosphorus compound, toxic, n.o.s.*

24° Toxic organic substances carried in the molten state:

(b) 1. *1600 dinitrotoluenes, molten, 2312 phenol, molten;*

2. *3250 chloroacetic acid, molten.*

25° Organic substances and articles and solutions and mixtures of organic substances (such as preparations and wastes) which cannot be classified under another collective heading:

(a) *1601 disinfectant, solid, toxic, n.o.s., 1602 dye, liquid, toxic, n.o.s.* or *1602 dye intermediate, liquid, toxic, n.o.s., 1693 tear gas substance, liquid orsolid, n.o.s., 3142 disinfectant, liquid, toxic, n.o.s., 3143 dye, solid, toxic, n.o.s.* or *3143 dye intermediate, solid, toxic, n.o.s., 2810 toxic liquid, organic, n.o.s., 2811 toxic solid, organic, n.o.s.;*

Note: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in concentrations considered highly toxic according to the criteria in marginal 2600(3) is not to be accepted for carriage.

2601 (cont'd)

(b) *2016 ammunition, toxic, non-explosive* without burster or expelling charge, *non-fused, 1601 disinfectant, solid, toxic, n.o.s., 1602 dye, liquid, toxic, n.o.s.* or *1602 dye intermediate, liquid, toxic, n.o.s., 1693 tear gas substance, liquid or solid, n.o.s., 3142 disinfectant, liquid, toxic, n.o.s., 3143 dye, solid, toxic, n.o.s.,* or *3143 dye intermediate, solid, toxic, n.o.s., 2810 toxic liquid, organic, n.o.s., 2811 toxic solid, organic, n.o.s.;*

(c) *2518 1,5,9-cyclododecatriene, 2667 butyltoluenes, 1601 disinfectant, solid, toxic, n.o.s., 1602 dye, liquid, toxic, n.o.s.* or *1602 dye intermediate, liquid, toxic, n.o.s., 3142 disinfectant, liquid, toxic, n.o.s., 3143 dye, solid, toxic, n.o.s.* or *3143 dye intermediate, solid, toxic, n.o.s., 2810 toxic liquid, organic, n.o.s., 2811 toxic solid, organic, n.o.s.;*

26° Flammable toxic organic substances, articles containing flammable toxic organic substances and solutions and mixtures of flammable toxic organic substances (such as preparations and wastes), which cannot be classified under another collective heading:

(a) 1. *2929 toxic liquid, flammable, organic, n.o.s.;*

2. *2930 toxic solid, flammable, organic, n.o.s.;*

Note: Dichloromethyl ether, symmetrical, (identification No 2249), is not to be accepted for carriage.

(b) 1. *2929 toxic liquid, flammable, organic, n.o.s.;*

2. *1700 tear gas candles, 2930 toxic solid, flammable, organic, n.o.s.;*

27° Corrosive toxic organic substances, articles containing such substances and solutions and mixtures of corrosive toxic organic substances (such as preparations and wastes):

(a) *1595 dimethyl sulphate, 1752 chloroacetyl chloride, 1889 cyanogen bromide,3246 methanesulphonyl chloride, 2927 toxic liquid, corrosive, organic, n.o.s., 2928 toxic solid, corrosive, organic, n.o.s;*

(b) 1737 benzyl bromide, 1738 benzyl chloride, 1750 chloroacetic acid solution, 1751 chloroacetic acid, solid, 2017 ammunition, tear-producing, non-explosive without burster or expelling charge, non-fuzed, *2022 cresylic acid, 2076 cresols* (o-,m-,p-), *2267 dimethyl thiophosphoryl chloride, 2745 chloromethyl chloroformate, 2746 phenyl chloroformate, 2748 2-ethylhexyl chloroformate, 3277 chloroformates, toxic, corrosive, n.o.s., 2927 toxic liquid, corrosive, organic, n.o.s., 2928 toxic solid, corrosive, organic, n.o.s.*

Note: Chloroformates having predominantly corrosive properties are substances of Class 8 (see marginal 2801, 64°).

28° Flammable corrosive toxic chloroformates:

(a) *1722 allyl chloroformate, 2740 n-propyl chloroformate;*

(b) *2743 n-butyl chloroformate, 2744 cyclobutyl chloroformate, 2742 chloroformates, toxic, corrosive, flammable, n.o.s.*

Note: Chloroformates having predominantly corrosive properties are substances of Class 8 (see marginal 2801, 64°).

C. Organometallic compounds and carbonyls

Notes: 1. Toxic organometallic compounds used as pesticides are substances of 75° and 76°.

2. Spontaneously combustible organometallic compounds are substances of Class 4.2 (see marginal 2431, 31° to 33°).

3. Water-reactive organometallic compounds, flammable, are substances of Class 4.3 (see marginal 2471, 3°).

31° Organic lead compounds:

(a) *1649 motor fuel anti-knock mixture* (tetraethyl lead, tetramethyl lead).

2601 (cont'd)

32° Organic tin compounds:

(a) *2788 organotin compound, liquid, n.o.s., 3146 organotin compound, solid, n.o.s.;*

(b) *2788 organotin compound, liquid, n.o.s., 3146 organotin compound, solid, n.o.s.;*

(c) *2788 organotin compound, liquid, n.o.s., 3146 organotin compound, solid, n.o.s.*

33° Organic mercury compounds:

(a) *2026 phenylmercuric compound, n.o.s.;*

(b) *1674 phenylmercuric acetate, 1894 phenylmercuric hydroxide, 1895 phenylmercuric nitrate, 2026 phenylmercuric compound, n.o.s.;*

(c) *2026 phenylmercuric compound, n.o.s.*

34° Organic arsenic compounds:

(a) *1698 diphenylamine chloroarsine, 1699 diphenylchloroarsine, 1892 ethyldichloroarsine, 3280 organoarsenic compound, n.o.s.;*

(b) *3280 organoarsenic compound, n.o.s.;*

(c) *2473 sodium arsanilate, 3280 organoarsenic compound, n.o.s.*

35° Other organometallic compounds:

(a) *3282 organometallic compound, toxic, n.o.s.;*

(b) *3282 organometallic compound, toxic, n.o.s.;*

(c) *3282 organometallic compound, toxic, n.o.s.*

36° Carbonyls:

(a) *3281 metal carbonyls, n.o.s.;*

(b) *3281 metal carbonyls, n.o.s.;*

(c) *3281 metal carbonyls, n.o.s.*

D. Inorganic substances which, on contact with water (or atmospheric humidity), may emit (cont'd) toxic gases, aqueous solutions or acids and other toxic water-reactive substances

41° Inorganic cyanides:

(a) *1565 barium cyanide, 1575 calcium cyanide, 1626 mercuric potassium cyanide, 1680 potassium cyanide, 1689 sodium cyanide, 1713 zinc cyanide, 2316 sodium cuprocyanide,solid, 2317 sodium cuprocyanide, solution, 1588 cyanides, inorganic, solid, n.o.s., 1935 cyanide solution, n.o.s.;*

(b) *1587 copper cyanide, 1620 lead cyanide, 1636 mercury cyanide, 1642 mercury oxycyanide, desensitized, 1653 nickel cyanide, 1679 potassium cuprocyanide, 1684 silver cyanide, 1588 cyanides, inorganic, solid, n.o.s.; 1935 cyanide solution, n.o.s.;*

(c) *1588 cyanides, inorganic, solid, n.o.s., 1935 cyanide solution, n.o.s.*

Notes: 1. Ferricyanides, ferrocyanides, alkaline thiocyanates and ammonium thiocyanate are not subject to the provisions of this Directive.

2. Solutions of inorganic cyanides with a total cyanide ion content of more than 30 % shall be classified under letter (a), solutions with a total cyanide ion content of more than 3 % and not more than 30 % under letter (b) and solutions with a cyanide ion content of more than 0.3 % and not more than 3 % under letter (c).

2601 (cont'd)

42° Azides:

(b) *1687 sodium azide.*

Notes: 1. 1571 barium azide, wetted, is a substance of Class 4.1 (see marginal 2401, 25°).

2. Barium azide in the dry state or with less than 50 % water or alcohol is not to be accepted for carriage.

43° Preparations of phosphides containing additives inhibiting the emission of flammable gases:

(a) *3048 aluminium phosphide pesticide.*

Notes: 1. These preparations are not to be accepted for carriage unless they contain additives inhibiting the emission of flammable gases.

2. 1397 aluminium phosphide, 2011 magnesium phosphide, 1714 zinc phosphide, 1432 sodium phosphide, 1360 calcium phosphide and 2013 strontium phosphide are substances of Class 4.3 (see marginal 2471, 18°).

44° Other water-reactive toxic substances:

(b) *3123 toxic liquid, water-reactive, n.o.s., 3125 toxic solid, water-reactive, n.o.s.;*

(c) *3123 toxic liquid, water-reactive, n.o.s., 3125 toxic solid, water-reactive, n.o.s.*

Note: The term 'water-reactive' denotes a substance which, in contact with water, emits flammable gases.

E. Other inorganic substances and metallic salts of organic substances

51° Arsenic and arsenical compounds:

(a) *1553 arsenic acid, liquid, 1560 arsenic trichloride, 1556 arsenic compound, liquid, n.o.s.,* (arsenates, arsenites, and arsenic sulphides), *1557 arsenic compound, solid, n.o.s.,* (arsenates, arsenites, and arsenic sulphides);

(b) *1546 ammonium arsenate, 1554 arsenic acid, solid, 1555 arsenic bromide, 1558 arsenic, 1559 arsenic pentoxide, 1561 arsenic trioxide, 1562 arsenical dust, 1572 cacodylic acid, 1573 calcium arsenate, 1574 calcium arsenate and calcium arsenite mixture, solid, 1585 copper acetoarsenite, 1586 copper arsenite, 1606 ferric arsenate, 1607 ferric arsenite, 1608 ferrous arsenate, 1617 lead arsenates, 1618 lead arsenites, 1621 london purple, 1622 magnesium arsenate, 1623 mercuric arsenate, 1677 potassium arsenate, 1678 potassium arsenite, 1683 silver arsenite, 1685 sodium arsenate, 1686 sodium arsenite, aqueous solution, 1688 sodium cacodylate, 1691 strontium arsenite, 1712 zinc arsenate* or *1712 zinc arsenite* or *1712 zinc arsenate and zinc arsenite mixture, 2027 sodium arsenite, solid, 1556 arsenic compound, liquid, n.o.s.* (arsenates, arsenites, and arsenic sulphides), *1557 arsenic compound, solid, n.o.s.* (arsenates, arsenites, and arsenic sulphides);

(c) *1686 sodium arsenite, aqueous solution, 1556 arsenic compound, liquid, n.o.s.* (arsenates, arsenites, and arsenic sulphides), *1557 arsenic compound, solid, n.o.s.* (arsenates, arsenites, and arsenic sulphides).

Note: Substances and preparations containing arsenic and used as pesticides are substances of 79°.

52° Mercury compounds:

(a) *2024 mercury compound, liquid, n.o.s., 2025 mercury compound, solid, n.o.s.;*

(b) *1624 mercuric chloride, 1625 mercuric nitrate, 1627 mercurous nitrate, 1629 mercury acetate, 1630 mercury ammonium chloride, 1631 mercury benzoate, 1634 mercury bromides, 1637 mercury gluconate, 1638 mercury iodide, 1639 mercury nucleate, 1640 mercury oleate, 1641 mercury oxide, 1643 mercury potassium iodide, 1644 mercury salicylate, 1645 mercury sulphate, 1646 mercury thiocyanate, 2024 mercury compound, liquid, n.o.s., 2025 mercury compound, solid, n.o.s.;*

2601 (cont'd)

(c) *2024 mercury compound, liquid, n.o.s., 2025 mercury compound, solid, n.o.s.*

Notes: 1. Substances and preparations containing mercury and used as pesticides are substances of 75°.
2. Mercurous chloride (calomel) is a substance of Class 9 [see marginal 2901, 12 °(c)]. Cinnabar is not subject to the provisions of this Directive.
3. Fulminates of mercury are not to be accepted for carriage.

53° Thallium compounds:

(b) 1707 thallium compound, n.o.s.

Notes: 1. Substances and preparations containing thallium and used as pesticides are substances of 85°.
2. 2727 thallium nitrate is a substance of 68°.

54° Beryllium and beryllium compounds:

(b) 1. *1567 beryllium, powder;*
2. *1566 beryllium compound, n.o.s.;*

(c) *1566 beryllium compound, n.o.s.*

Note: 2464 beryllium nitrate is a substance of Class 5.1 [see marginal 2501, 29° (b)].

55° Selenium and selenium compounds:

(a) *2630 selenates or 2630 selenites, 3283 selenium compound, n.o.s.;*

(b) *2657 selenium disulphide, 3283 selenium compound, n.o.s.;*

(c) *2658 selenium powder, 3283 selenium compound, n.o.s.*

Note: 1905 selenic acid is a substance of Class 8 [see marginal 2801, 16° (a)].

56° Osmium compounds:

(a) *2471 osmium tetroxide.*

57° Tellurium compounds:

(b) *3284 tellurium compound, n.o.s.;*

(c) *3284 tellurium compound, n.o.s.*

58° Vanadium compounds:

(b) *2859 ammonium metavanadate, 2861 ammonium polyvanadate, 2862 vanadium pentoxide, non-fuzed form, 2863 sodium ammonium vanadate, 2864 potassium metavanadate, 2931 vanadyl sulphate, 3285 vanadium compound, n.o.s.;*

(c) *3285 vanadium compound, n.o.s.*

Notes: 1. 2443 vanadium oxytrichloride, 2444 vanadium tetrachloride and 2475 vanadium trichloride are substances of Class 8 (see marginal 2801, 11° and 12°).
2. Vanadium pentoxide, fused and solidified, is not subject to the provisions of this Directive.

59° Antimony and antimony compounds:

(c) *1550 antimony lactate, 1551 antimony potassium tartrate, 2871 antimony powder, 1549 antimony compound, solid, n.o.s., 3141 antimony compound, inorganic, liquid, n.o.s.*

Notes: 1. 1730 antimony pentafluoride, liquid, 1731 antimony pentafluoride solution, 1733 antimony trichloride and 1732 antimony pentafluoride are substances of Class 8 (see marginal 2801, 10°, 11° and 12°).
2. Antimony oxides and antimony sulphide with an arsenic content not exceeding 0,5 % of the total mass, are not subject to the provisions of this Directive.

2601 (cont'd)

60° Barium compounds:

(b) *1564 barium compound, n.o.s.;*

(c) *1884 barium oxide, 1564 barium compound, n.o.s.*

Notes: 1. 1445 barium chlorate, 1446 barium nitrate, 1447 barium perchlorate, 1448 barium permanganate and 1449 barium peroxide are substances of Class 5.1 (see marginal 2501, 29°).

2. 1571 barium azide, wetted, is a substance of Class 4.1 (see marginal 2401, 25°).

3. Barium stearate, barium sulphate and barium titanate are not subject to the provisions of this Directive.

61° Cadmium compounds:

(a) *2570 cadmium compound;*

(b) *2570 cadmium compound;*

(c) *2570 cadmium compound.*

Note: Cadmium pigments, such as cadmium sulphides, cadmium sulphoselenides and cadmium salts of higher fatty acids (e.g. cadmium stearate), are not subject to the provisions of this Directive.

62° Lead compounds:

(c) *1616 lead acetate, 2291 lead compound, soluble, n.o.s.*

Notes: 1. 1469 lead nitrate and 1470 lead perchlorate are substances of Class 5.1 (see marginal 2501, 29°).

2. Lead salts and lead pigments which, when mixed in a ratio of 1:1 000 with 0,07 M hydrochloric acid and stirred for one hour at a temperature of 23 °C ± 2 °C, exhibit a solubility of 5 % or less are not subject to the provisions of this Directive.

63° Fluorides soluble in water:

(c) *1690 sodium fluoride, 1812 potassium fluoride, 2505 ammonium fluoride.*

Note: Corrosive fluorides are substances of Class 8 (see marginal 2801, 6° to 10°).

64° Fluorosilicates:

(c) *2655 potassium fluorosilicate, 2674 sodium fluorosilicate, 2853 magnesium fluorosilicate, 2854 ammonium fluorosilicate, 2855 zinc fluorosilicate, 2856 fluorosilicates, n.o.s.*

65° Inorganic substances and solutions and mixtures of inorganic substances (such as preparations and wastes) which cannot be classified under another collective heading:

(a) *3287 toxic liquid, inorganic, n.o.s., 3288 toxic solid, inorganic, n.o.s.;*

(b) *3243 solids containing toxic liquid, n.o.s., 3287 toxic liquid, inorganic, n.o.s., 3288 toxic solid, inorganic, n.o.s.;*

Note: Mixtures of solids and toxic liquids which are not subject to the provisions of this Directive may be carried under number 3243 without the classification criteria for Class 6.1 being applied to them, provided that no liquid overflow is visible during loading or when the packaging or transport unit is closed. Each packaging shall correspond to a design type which has passed the leakproofness test for packing group II. This number shall not be used for solids containing a liquid classified under letter (a).

2601 (cont'd)

(c) *3293 hydrazine aqueous solution, with not more than 37 % hydrazine by mass, 3287 toxic liquid, inorganic, n.o.s., 3288 toxic solid, inorganic, n.o.s.*

Note: 2030 hydrazine hydrate and 2030 hydrazine aqueous solution, with not less than 37 % and not more than 64 % hydrazine, by mass, are substances of Class 8 [see marginal 2801, 44°(b)].

66° Toxic, self-heating substances:

(a) *3124 toxic solid, self-heating, n.o.s.;*

(b) *3124 toxic solid, self-heating, n.o.s.*

67° Toxic substances, corrosive:

(a) *3289 toxic liquid, corrosive, inorganic, n.o.s., 3290 toxic solid, corrosive, inorganic, n.o.s.;*

(b) *3289 toxic liquid, corrosive, inorganic, n.o.s., 3290 toxic solid, corrosive, inorganic, n.o.s.*

68° Toxic substances, oxidizing:

(a) *3086 toxic solid, oxidizing, n.o.s., 3122 toxic liquid, oxidizing, n.o.s.;*

(b) *2727 thallium nitrate, 3086 toxic solid, oxidizing, n.o.s., 3122 toxic liquid, oxidizing, n.o.s.*

F. Substances and preparations used as pesticides

Notes: 1. Flammable liquid substances and preparations, used as pesticides, which are highly toxic, toxic or harmful and have a flash-point below 23 °C, are substances of Class 3 (see marginal 2301, 41° to 57°).

2. (a) Articles impregnated with substances and preparations used as pesticides of 71° to 87°, such as fibreboard plates, paper strips, cotton-wool balls, sheets of plastics material, etc., in airtight, hermetically closed wrappings are not subject to the provisions of this Directive.

(b) Substances such as baits and cereals impregnated with substances and preparations used as pesticides of 71° to 87° or other substances of Class 6.1 shall be classified according to their toxicity (see marginal 2600(3) and Note 3 below).

71° to 87°: In these items, substances and preparations used as pesticides are tabulated under groups designated by the letters (a), (b), (c):

(a) highly toxic substances and preparations;

(b) toxic substances and preparations;

(c) slightly toxic substances and preparations.

Notes: 1. All active substances and their preparations used as pesticides shall be classified under 71° to 87° (a), (b) and (c) in accordance with marginal 2600 (3).

2. If only the LD_{50} value of the active substance is known and not that of the preparations of the active substance, the preparations may be classified under 71° to 87° (a), (b) or (c) using the following tables, where the figures shown in columns (a), (b) and (c) of 71° to 87° represent the percentage of active pesticide substance in the preparations.

3. The aim of the following tables is to show the range of pesticides and their preparations corresponding to the different packing groups according to the concentration of active substance. If the LD_{50} of the preparation is known and if the packing groups determined by applying the criteria in marginal 2600 (3) do not correspond to the packing groups indicated in the following tables based on the concentration of active substance in the preparation, the packing group determined in accordance with the criteria in marginal 2600 (3) shall take precedence.

2601 *(cont'd)*

4. For substances which are not named in the list, and for which only the LD_{50} value of the active substance is known and not the LD_{50} value of the various preparations, the classification of a preparation may be determined from the table in marginal 2600 (3), using an LD_{50} value obtained by multiplying the LD_{50} value of the active substance by: 100/X, X being the percentage of active substance by mass according to the following formula:

$$LD_{50}\text{-of the preparation} = \frac{LD_{50}\text{-value of the activa substance} \times 100}{\%\text{ of active substance by mass}}$$

5. The classification according to Notes 2, 3 and 4 above shall not be used when the preparations contain additives which affect the toxicity of the active substance or when a preparation contains more than one active substance. In such cases, the classification shall be based on the LD_{50} value of the preparation in question according to the criteria in marginal 2600 (3). If the LD_{50} value is not known, the substance shall be classified under (a) of 71° to 87°.

71° *2783 organophosphorus pesticide, solid, toxic, 3017 organophosphorus pesticide, liquid, toxic, flammable,* flashpoint not less than 23 °C, *3018 organophosphorus pesticide, liquid, toxic,* such as:

	71°a)	71°b)	71°c)	
	%	%	solid %	liquid %
Azinphos-ethyl	—	100-> 25	25-6	25-2
Azinphos-methyl	—	100-> 10	10-2	10-1
Bromophos-ethyl	—	—	100-35	100-14
Carbofenothion	—	100-> 20	20-5	20-2
Chlorfenvinphos	—	100-> 20	20-5	20-2
Chlormephos	—	100-> 15	15-3	15-1
Chlorpyriphos	—	—	100-40	100-10
Chlorthiophos	—	100-> 15	15-4	15-1
Crotoxyphos	—	—	100-35	100-15
Crufomate	—	—	—	100-90
Cyanophos	—	—	100-55	100-55
DEF	—	—	—	100-40
Demephion	100-> 0	—	—	—
Demeton	100-> 30	30-> 3	3-> 0,5	3-> 0
Demeton-O-(Systox)	100-> 34	34-> 3,4	3,4-0,85	3,4-0,34
Demeton-O-methyl	—	—	100-90	100-35
Demeton-S-methyl	—	100-> 80	80-30	80-10
Demeton-S-methylsulfone	—	100-> 74	74-18,5	74-7,4
Dialifos	—	100-> 10	10-2,5	10-1
Diazinon	—	—	100-38	100-15
Dichlofenthion	—	—	—	100-54
Dichlorvos	—	100-> 35	35-7	35-7
Dicrotophos	—	100-> 25	25-6	25-2
Dimefox	100-> 20	20-> 2	2-> 0,5	2-> 0
Dimethoate	—	—	100-73	100-29
Dioxathion	—	100-> 40	40-10	40-4
Disulfoton	100-> 40	40-> 4	4-1	4-> 0
Edifenphos	—	—	100-75	100-30
Endothion	—	100-> 45	45-10	45-4
EPN	100-> 62	62-> 12,5	12,5-2,5	12,5-2,5
Ethion	—	100-> 25	25-5	25-2

2601 *(cont'd)*

	71°a)	71°b)	71°c)	
	%	%	solid %	liquid %
Ethoate-methyl	—	—	100-60	100-25
Ethoprophos	100-> 65	65-> 13	13-2	13-2
Fenaminphos	100-> 40	40-> 4	4-1	4-> 0
Fenitrothion	—	—	—	100-48
Fensulfothion	100-> 40	40-> 4	4-1	4-> 0
Fenthion	—	—	100-95	100-38
Fonophos	100-> 60	60-> 6	6-1	6-0,5
Formothion	—	—	—	100-65
Heptenophos	—	—	100-48	100-19
Iprobenfos	—	—	—	100-95
Isofenphos	—	100-> 60	60-15	60-6
Isothioate	—	—	100-25	100-25
Isoxathion	—	—	100-55	100-20
Mecarbam	—	100-> 30	30-7	30-3
Mephosfolan	100-> 25	25-> 5	5-0,5	5-0,5
Methamidophos	—	100-> 15	15-3	15-1,5
Methidathion	—	100-> 40	40-10	40-4
Methyltrithion	—	—	100-49	100-19
Mevinphos	100-> 60	60-> 5	5-1	5-0,5
Monocrotophos	—	100-> 25	25-7	25-2,5
Naled	—	—	—	100-50
Omethoate	—	—	100-25	100-10
Oxydemeton-methyl	—	100-> 93	93-23	93-9
Oxydisulfoton	100-> 70	70-> 5	5-> 1,5	5-0,5
Paraoxon	100-> 35	35-> 3,5	3,5-0,9	3,5-0,35
Parathion	100-> 40	40-> 4	4-1	4-0,4
Parathion-methyl	—	100-> 12	12-3	12-1,2
Phenkapton	—	—	100-25	100-10
Phenthoate	—	—	100-70	100-70
Phorate	100-> 20	20-> 2	2-0,5	2-> 0
Phosalone	—	—	100-60	100-24
Phosfolan	—	100-> 15	15-4	15-1
Phosmet	—	—	100-45	100-18
Phosphamidon	—	100-> 34	34-8	34-3
Pirimiphos-ethyl	—	—	100-70	100-28
Propaphos	—	100-> 75	75-15	75-15
Prothoate	—	100-> 15	15-4	15-1
Pyrazophos	—	—	—	100-45
Pyrazoxon	100-> 80	80-> 8	8-2	8-0,5
Quinalphos	—	100-> 52	52-13	52-5
Salithion	—	—	100-60	100-25
Schradan	—	100-> 18	18-9	18-3,6
Sulfotep	—	100-> 10	10-2	10-1
Sulprofos	—	—	100-45	100-18
Temephos	—	—	100-90	100-90
TEPP	100-> 10	10-> 0	—	—
Terbufos	100-> 15	15-> 3	3-0,74	3-0,74
Thiometon	—	100-> 50	50-10	50-5
Thionazin	100-> 70	70-> 5	5-1	5-0,5
Triamiphos	—	100-> 20	20-5	20-1
Triazophos	—	—	100-33	100-13
Trichlorfon	—	—	100-70	100-23
Trichloronat	—	100-> 30	30-8	30-3
Vamidothion	—	—	100-30	100-10

2601 (cont'd)

72° *2761 organochlorine pesticide, solid, toxic,*
2995 organochlorine pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
2996 organochlorine pesticide, liquid, toxic, such as:

	72°a)	72°b)	72°c)	
	%	%	solid %	liquid %
Aldrin	—	100-> 75	75-19	75-7
Allidochlor	—	—	100-35	100-35
Camphechlor	—	—	100-40	100-15
Chlordane	—	—	—	100-55
Chlordimeform	—	—	—	100-50
Chlordimeform hydrochloride	—	—	—	100-70
Chlorophacinone	100-> 40	40-> 4	4-1	1-0,4
Crimidine	100-> 25	25-> 2	2-0,5	2-> 0
DDT	—	—	100-55	100-20
1-2-Dibromo-3-Chloropropane	—	—	100-85	100-34
Dieldrin	—	100-> 75	75-19	75-7
Endosulfan	—	100-> 80	80-20	80-8
Endrin	100-> 60	60-> 6	6-1	6-0,5
Heptachlor	—	100-> 80	80-20	80-8
Isobenzane	100-> 10	10-> 2	2-0,4	2-0,4
Isodrin	—	100-> 14	14-3	14-1
Lindane (γBHC)	—	—	100-44	100-15
Mirex	—	—	—	100-60
Pentachlorophenol	—	100-> 54	54-13	54-5

73° *2765 phenoxy pesticide, solid, toxic*
2999 phenoxy pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3000 phenoxy pesticide, liquid, toxic, such as:

	73°a)	73°b)	73°c)	
	%	%	solid %	liquid %
2,4-D	—	—	—	100-75
2,4-DB	—	—	—	100-40
2,4,5-T	—	—	—	100-60
Triadimefon	—	—	—	100-70

74° *2757 carbamate pesticide, solid, toxic,*
2991 carbamate pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
2992 carbamate pesticide, liquid, toxic, such as:

	74°a)	74°b)	74°c)	
	%	%	solid %	liquid %
Aldicarb	100-> 15	15-> 1	1-> 0	1-> 0
Aminocarb	—	100-> 60	60-15	60-6
Bendiocarb	—	100-> 65	65-15	65-5
Benfuracarb	—	—	100-55	100-20

2601 *(cont'd)*

	74°a)	74°b)	74°c)	
	%	%	solid %	liquid %
Butocarboxim	—	—	100-75	100-30
Carbaryl	—	—	100-30	100-10
Carbofuran	—	100-> 10	10-2	10-1
Cartap HCL	—	—	100-40	100-40
Di-allate	—	—	—	100-75
Dimetan	—	—	100-60	100-24
Dimetilan	—	100-> 50	50-12	50-5
Dioxacarbe	—	—	100-30	100-10
Formetanate	—	100-> 40	40-10	40-4
Isolan	—	100-> 20	20-5	20-2
Isoprocarb	—	—	100-85	100-35
Mercaptodimethur	—	100-> 70	70-17	70-7
Methasulfocarb	—	—	100-55	100-20
Methomyl	—	100-> 34	34-8	34-3
Mexacarbate	—	100-> 28	28-7	28-2
Mobam	—	—	100-35	100-14
Oxamyl	—	100-> 10	10-2,5	10-1
Pirimicarb	—	—	100-73	100-29
Promecarbe	—	—	100-35	100-14
Promurit (Muritan)	100-> 5,6	5,6-> 0,56	0,56-0,14	0,56-> 0
Propoxur	—	—	100-45	100-18

75° 2777 *mercury based pesticide, solid, toxic,*
3011 *mercury based pesticide, liquid, toxic, flammable,* flash-point not less than 23 °C,
3012 *mercury based pesticide, liquid, toxic,* such as:

	75°a)	75°b)	75°c)	
	%	%	solid %	liquid %
Phenylmercuric acetate (PMA)	—	100-> 60	60-15	60-6
Mercuric chloride	—	100-> 70	70-17	70-7
Chloro-methoxyl ethyl mercury	—	100-> 40	40-10	40-4
Mercury oxide	—	100-> 35	35-8	35-3
Phenylmercury pyrocatechin (PMB)	—	100-> 60	60-15	60-6

76° 2786 *organotin pesticide, solid, toxic,*
3019 *organotin pesticide, liquid, toxic, flammable,* flash-point not less than 23 °C,
3020 *organotin pesticide, liquid, toxic,* such as:

	76°a)	76°b)	76°c)	
	%	%	solid %	liquid %
Fentin acetate	—	—	100-62	100-25
Cyhexatin	—	—	100-95	100-35
Fentin hydroxide	—	—	100-54	100-20

2601 (cont'd)

77° *3025 coumarin derivative pesticide, liquid, toxic, flammable,* flash-point not less than 23 °C,
3026 coumarin derivative pesticide, liquid, toxic,
3027 coumarin derivative pesticide, solid, toxic, such as:

	77°a)	77°b)	77°c)	
	%	%	solid %	liquid %
Brodifacoum	100-> 5	5-> 0,5	0,5-0,13	0,5-0,05
Coumachlor	—	—	100-25	100-10
Coumafuryl	—	—	—	100-80
Coumaphos	—	100-> 30	30-8	30-3
Coumatetralyl (Racumin)	—	100-> 34	34-8,5	34-3,4
Dicoumarol	—	—	100-25	100-10
Difenacoum	100-> 35	35-> 3,5	3,5-0,9	3,5-0,35
Warfarin (and salts of)	100-> 60	60-> 6	6-1,5	6-0,6

78° *2781 bipyridilium pesticide, solid, toxic,*
3015 bipyridilium pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3016 bipyridilium pesticide, liquid, toxic, such as:

	78°a)	78°b)	78°c)	
	%	%	solid %	liquid %
Diquat	—	—	—	100-45
Paraquat	—	100-> 40	40-8	40-8

79° *2759 arsenical pesticide, solid, toxic,*
2993 arsenical pesticide, liquid, toxic, flammable, flash-point not less than 23 °C
2994 arsenical pesticide, liquid, toxic, such as:

	79°a)	79°b)	79°c)	
	%	%	solid %	liquid %
Arsenic anhydride	—	100-> 40	40-10	40-4
Calcium arsenate	—	100-> 40	40-10	40-4
Sodium arsenite	—	100-> 20	20-5	20-2

80° *2775 copper based pesticide, solid, toxic,*
3009 copper based pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3010 copper based pesticide, liquid, toxic, such as:

	80°a)	80°b)	80°c)	
	%	%	solid %	liquid %
Copper sulphate	—	—	100-50	100-20

2601 (cont'd)

81° *2779 substituted nitrophenol pesticide, solid, toxic,*
3013 substituted nitrophenol pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3014 substituted nitrophenol pesticide, liquid, toxic, such as:

	81°a)	81°b)	81°c)	
	%	%	solid %	liquid %
Binapacryl	—	—	100-65	100-25
Dinobuton	—	—	100-25	100-10
Dinoseb	—	100-> 40	40-8	40-8
Dinoseb acetate	—	—	100-30	100-10
Dinoterb	—	100-> 50	50-10	50-5
Dinoterb acetate	—	100-> 50	50-12	50-5
DNOC	—	100-> 50	50-12	50-5
Medinoterb	—	100-> 80	80-20	80-8

82° *2763 triazine pesticide, solid, toxic,*
2997 triazine pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
2998 triazine pesticide, liquid, toxic, such as:

	82°a)	82°b)	82°c)	
	%	%	solid %	liquid %
Cyanazin	—	—	100-90	100-35
Terbumeton	—	—	—	100-95

83° *2769 benzoic derivative pesticide, solid, toxic,*
3003 benzoic derivative pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3004 benzoic derivative pesticide, liquid, toxic, such as:

	83°a)	83°b)	83°c)	
	%	%	solid %	liquid %
Tricamba	—	—	—	100-60

84° *2773 phthalimide derivative pesticide, solid, toxic,*
3007 phthalimide derivative pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3008 phthalimide derivative pesticide, liquid, toxic, such as:

	84°a)	84°b)	84°c)	
	%	%	solid %	liquid %
...(1)	...	...	...	...

(1) No pesticide currently assigned to this collective entry.

2601 (cont'd)

85° *2767 phenyl urea pesticide, solid, toxic,*
3001 phenyl urea pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3002 phenyl urea pesticide, liquid, toxic, such as:

	85°a)	85°b)	85°c)	
	%	%	solid %	liquid %
...(1)	...	...	...	...

(1) No pesticide currently assigned to this collective entry.

86° *2771 dithiocarbamate pesticide, solid, toxic,*
3005 dithiocarbamate pesticide, liquid, toxic, flammable, flash-point not less than 23 °C,
3006 dithiocarbamate pesticide, liquid, toxic, such as:

	86°a)	86°b)	86°c)	
	%	%	solid %	liquid %
Metam sodium	—	—	100-85	100-35

87° Pesticides which cannot be classified under items 71° to 86°:

2588 pesticide, solid, toxic, n.o.s.,
2902 pesticide, liquid, toxic, n.o.s.,
2903 pesticide, liquid, toxic, flammable, n.o.s., flash-point not less than 23 °C, such as:

Organonitrogenous compounds

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
Benquinox	—	—	100-50	100-20
Chinomethionate	—	—	100-50	100-50
Cycloheximide	100-> 40	40-> 4	4-1	4-> 0
Drazoxolon	—	—	100-63	100-25

Alkaloïds

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
Preparations of nicotine	—	100-> 25	25-5	25-5
Strychnine	100-> 20	20-> 0	—	—

2601 *(cont'd)*

Other organometallic compounds

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
...(1)	...	...	...	...

(1) No pesticide currently assigned to this collective entry.

Inorganic fluorine compounds

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
Barium silicofluoride	—	—	100-88	100-35
Sodium silicofluoride	—	—	100-62	100-25

Inorganic thallium compounds

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
Thallium sulphate	—	100-> 30	30-8	30-3

Other pesticides

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
ANTU	100-> 40	40-> 4	4-1	4-0,8
Blasticidin-S-3	—	—	100-25	100-10
Bromoxynil	—	—	100-80	100-38
Dazomet	—	—	—	100-60
Defenzoquat	—	—	—	100-90
Dimexano	—	—	—	100-48
Diphacinone	100-> 25	25-> 3	3-0,7	3-0,2
Endothal-sodium	—	100-75	75-19	75-7
Fenaminosulph	—	100-> 50	50-10	50-10
Fenpropathrin	—	—	100-30	100-10
Fluoracetamide	—	100-> 25	25-6,7	25-2,5
Imazalil	—	—	—	100-64
Ioxynil	—	—	100-80	100-20
Keleyan	—	—	—	100-48
Norbormide	100-> 88	88-> 8,8	8,8-2,2	8,8-0,8
Pindone and its salts	—	—	—	100-55
Rotenon	—	—	100-65	100-25

2601 *(cont'd)* Pyrethrinoids

	87°a)	87°b)	87°c)	
	%	%	solid %	liquid %
Cypermethrin	—	—	100-80	100-32

Note: Aluminium phosphide pesticides are substances of 43° (a).

G. Active substances such as those intended for laboratories and experiments and for the manufacture of pharmaceutical products, if not listed under other items of this Class

90° Active substances, including:

(a) *1570 brucine, 1692 strychnine* or *1692 strychnine salts,*

1544 alkaloids, solid, n.o.s. or *1544 alkaloid salts, solid, n.o.s.,*

1655 nicotine compound, solid, n.o.s. or *1655 nicotine preparation, solid, n.o.s.,*

3140 alkaloids, liquid, n.o.s. or *3140 alkaloid salts, liquid, n.o.s.,*

3144 nicotine compound, liquid, n.o.s. or *3144 nicotine preparation, liquid, n.o.s.,*

3172 toxins, extracted from living sources, n.o.s.

(b) *1654 nicotine, 1656 nicotine hydrochloride* or *1656 nicotine hydrochloride solution, 1657 nicotine salicylate, 1658 nicotine sulphate, solid* or *1658 nicotine sulphate solution, 1659 nicotine tartrate,*

1544 alkaloids, solid, n.o.s. or *1544 alkaloid salts, solid, n.o.s.,*

1655 nicotine compound, solid, n.o.s. or *1655 nicotine preparation, solid, n.o.s.,*

1851 medicine, liquid, toxic, n.o.s.,

3140 alkaloids, liquid, n.o.s. or *3140 alkaloid salts, liquid, n.o.s.,*

3144 nicotine compound, liquid, n.o.s. or *3144 nicotine preparation, liquid, n.o.s.,*

3172 toxins extracted from living sources, n.o.s.,

3249 medicine, solid, toxic, n.o.s.

(c) *1544 alkaloids, solid, n.o.s.* or *1544 alkaloids salts, solid, n.o.s.,*

1655 nicotine compound, solid, n.o.s. or *1655 nicotine preparation, solid, n.o.s.,*

1851 medicine, liquid, toxic, n.o.s.,

3140 alkaloids, liquid, n.o.s. or *3140 alkaloid salts, liquid, n.o.s.;*

3144 nicotine compound, liquid, n.o.s. or *3144 nicotine preparation, liquid, n.o.s.,*

3172 toxins extracted from living sources, n.o.s.,

3249 medicine, solid, toxic, n.o.s.

Notes: 1. The active substances and triturations or mixtures of substances of 90° with other substances shall be classified according to their toxicity [see marginal 2600 (3)].

2. Pharmaceutical products ready for use, e.g. cosmetics, drugs and medicines, which are substances manufactured and packed in packagings of a type intended for retail sale or distribution for personal or household consumption, which would otherwise be substances of 90° are not subject to the provisions of this Directive.

3. Substances and preparations containing alkaloids or nicotine used as pesticides are substances of 87°.

2601 (cont'd)

H. Empty packagings

Note: Empty packagings with residues from their previous contents adhering to the outside are not to be accepted for carriage.

91° *Empty packagings, including empty intermediate bulk containers (IBCs) empty tank-vehicles, empty demountable tanks, empty tank-containers, empty bulk vehicles* and *empty bulk containers,* uncleaned, which have contained substances of Class 6.1.

2601a Substances of 11°, 12°, 14° to 28°, 32° to 36°, 41°, 42°, 44°, 51° to 55°, 57° to 68°, 71° to 87° and 90° carried in conformity with the following provisions are subject neither to the provisions for this Class contained in this Annex nor to those contained in Annex B:

(a) Substances classified under (b) of each item:

— liquids: not more than 500 ml per inner packaging and not more than 2 litres per package;

— solids: not more than 1 kg per inner packaging and not more than 4 kg per package.

(b) Substances classified under (c) of each item:

— liquids: not more than 3 litres per inner packaging and not more than 12 litres per package.

— solids: not more than 6 kg per inner packaging and not more than 24 kg per package.

These quantities of substances shall be carried in combination packagings conforming at least to the conditions of marginal 3538.

The 'General conditions of packing' of marginal 3500 (1), (2) and (5) to (7) shall be observed.

2. Provisions

A. Packages

1. General conditions of packing

2602 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginals 2603 to 2608.

(2) Intermediate Bulk Containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 2600 (3) and 3511 (2) or 3611 (2) the following shall be used:

— packagings of packing group I, marked with the letter 'X', for the highly toxic substances classified under the letter (a) of each item;

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for the toxic substances classified under the letter (b) of each item;

— packagings of packing group III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing group III or II, marked with the letter 'Z' or 'Y', for the slightly toxic substances classified under the letter (c) of each item.

Note: For the carriage of substances of Class 6.1 in tank-vehicles, demountable tanks or tank-containers, and for the carriage in bulk of solids of this Class, see Annex B.

2. Special conditions for packing of certain substances

2603 (1) Stabilized hydrogen cyanide of 1° shall be packed:

(a) when completely absorbed by an inert porous material: in strong metal receptacles of a capacity of not more than 7,5 litres, placed in wooden cases in such a manner that they cannot come into contact with one another. Such a combination packaging shall comply with the following conditions:

1. the receptacles shall be tested at a pressure of not less than 0,6 MPa (6 bar) (gauge pressure);
2. the receptacles shall be entirely filled with the porous material. The porous material shall not shake down or form dangerous spaces even after prolonged use or under impact, even at temperatures of up to 50 °C. The date of filling shall be durably marked on the lid of each receptacle;
3. the combination packaging shall be tested and approved, in accordance with Appendix A.5, for packing group I. The package shall not weigh more than 120 kg;

(b) when liquid, but not absorbed by a porous material: in carbon-steel pressure-resistant cylinders which shall satisfy the following conditions:

1. before being used for the first time, the pressure-resistant cylinders shall undergo a hydraulic pressure test at a pressure of not less than 10 MPa (100 bar) (gauge pressure). The pressure test shall be repeated every two years and shall include a meticulous inspection of the inside of the receptacle and a check of the tare;
2. the cylinders shall comply with the relevant provisions of Class 2 (see marginals 2211, 2212 (1) (a), 2213, 2215 and 2218);
3. maximum permissible mass of the contents: 0,55 kg per litre of capacity.

(2) Solutions of hydrocyanic acid of 2° shall be packed in flame-sealed glass ampoules, containing not more than 50 g, or in glass bottles so closed as to be leakproof and containing not more than 250 g.

The ampoules or bottles shall be carried in combination packagings which meet the following conditions:

(a) The ampoules and bottles shall be secured by absorbent cushioning materials in leakproof steel or aluminium outer packagings; a package shall not weigh more than 15 kg; or

(b) The ampoules and bottles shall be secured by absorbent cushioning materials in wooden cases with a leakproof tin-plate lining; a package shall not weigh more than 75 kg.

The combination packagings referred to in(a) and (b) shall be tested and approved, in accordance with Appendix A.5, for packing group I.

2604 Iron pentacarbonyl and nickel tetracarbonyl of 3° shall be packed as follows:

(1) In seamless moulded bottles made of pure aluminium of a capacity not exceeding 1 litre and a wall thickness not less than 1 mm, which shall be tested at a pressure of not less than 1 MPa (10 bar) (gauge pressure). The bottles shall be closed by means of a metal screw-threaded plug with an inert gasket, the screw-threaded plug being screwed firmly into the neck of the bottle and so secured that it cannot work loose under normal conditions of carriage.

A maximum of four aluminium bottles of this type may be secured in outer packagings of wood or fibreboard by non-flammable absorbent cushioning material. Such a combination packaging shall conform to a design type which has been tested and approved for packing group I in accordance with Appendix A.5.

A package shall not weigh more than 10 kg.

(2) In metal receptacles fitted with completely leakproof closing devices which shall, if necessary, be secured against mechanical damage by protective caps. Steel receptacles of a capacity not exceeding 150 litres shall have a minimum wall thickness of 3 mm, and larger steel receptacles and receptacles made of other materials shall have walls at least thick enough to guarantee equivalent mechanical strength. The maximum capacity of receptacles permitted shall be 250 litres. The mass of the contents shall be not more than 1 kg of liquid per litre of capacity.

2604 *(cont'd)* Before being used for the first time, the receptacles shall undergo a hydraulic pressure test at a pressure of not less than 1 MPa (10 bar) (gauge pressure). The pressure test shall be repeated every five years and shall include a meticulous inspection of the inside of the receptacle and a check of the tare. Metal receptacles shall bear the following particulars in clearly legible and durable characters:

(a) the name of the substance in full (the names of both substances may also be shown side by side in the event of alternative use);

(b) the name of the owner of the receptacle;

(c) the tare of the receptacle, including such fittings and accessories as valves, protective caps, etc.;

(d) the date (month, year) of the initial test and of the most recent test, and the stamp of the expert who carried out the test;

(e) the maximum permissible mass of the contents of the receptacle in kg;

(f) the internal pressure (test pressure) to be applied in the hydraulic pressure test.

2605 (1)

(a) Ethyleneimine, inhibited, of 4° shall be packed in steel receptacles of sufficient thickness, which shall be closed by a screw-threaded bung or plug rendered leakproof both to liquid and to vapour by means of a suitable gasket. The receptacles shall initially and periodically, at least every five years, be tested at a pressure of not less than 0,3 MPa (3 bar) (gauge pressure) in accordance with marginals 2215 (1) and 2216. Each receptacle shall be secured by absorbent cushioning materials in a strong leakproof protective metal packaging. The protective packaging shall be hermetically closed and its closure shall be secured against any inadvertent opening. The mass of the contents shall not exceed 0,67 kg per litre of capacity. A package shall not weigh more than 75 kg. Packages weighing more than 30 kg, other than those forwarded as a full load, shall be fitted with means of handling.

(b) Ethyleneimine, inhibited, of 4° may also be packed in steel receptacles of sufficient thickness, which shall be closed by a screw-threaded bung and a screw-threaded protective cap or equivalent device leakproof both to liquid and to vapour. The receptacles shall initially and periodically, at least every five years, be tested at a pressure of at least 1 MPa (10 bar) (gauge pressure) in accordance with marginals 2215 (1) and 2216. The mass of the contents shall not exceed 0,67 kg per litre of capacity. A package shall not weigh more than 75 kg.

(c) Receptacles in conformity with (a) and (b) shall bear, in clearly legible and durable characters:

— the name or mark of the manufacturer and the number of the receptacle;

— the word 'ethyleneimine';

— the tare of the receptacle and its maximum permitted mass when filled;

— the date (month and year) of the initial test and of the most recent test undergone;

— the stamp of the expert who carried out the tests and examinations.

(2) Methyl isocyanate of 5° shall be packed:

(a) in hermetically closed receptacles made of pure aluminium and having a capacity not exceeding one litre, which shall not be filled beyond 90 % of their capacity. The receptacles shall be secured, not more than 10 to a box, with appropriate cushioning material in a wooden box. Packages of this kind shall satisfy the test requirements for combination packagings conforming to marginal 3538 for packing group I, and shall not weigh more than 30 kg; or

(b) in receptacles made of pure aluminium having a wall thickness of not less than 5 mm or in receptacles of stainless steel. The receptacles shall be fully welded and shall initially and periodically, at least every five years, be tested at a pressure of at least 0,5 MPa (5 bar) (gauge pressure) in accordance with marginals 2215 (1) and 2216. They shall be so closed as to be leakproof by means of two closures one above the other, one of which shall be screw-threaded or secured in an equally effective manner. The degree of filling shall be not more than 90 %.

2605 *(cont'd)* Drums weighing more than 100 kg shall be fitted with rolling hoops or stiffening ribs.

(c) Receptacles in conformity with (b) shall bear, in clearly legible and durable characters:

— the name or mark of the manufacturer and the number of the receptacle;

— the words 'methyl isocyanate';

— the tare of the receptacle and its maximum permitted mass when filled;

— the date (month and year) of the initial test and of the most recent test undergone;

— the stamp of the expert who carried out the tests and examinations.

2606 (1) Substances classified under (a) of the various items shall be packed:

(a) in non-removable head steel drums conforming to marginal 3520; or

(b) in non-removable head aluminium drums conforming to marginal 3521; or

(c) in non-removable head steel jerricans conforming to marginal 3522; or

(d) in non-removable head plastics drums of a capacity not exceeding 60 litres or non-removable head plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings with inner packaging of glass, plastics or metal conforming to marginal 3538.

(2) Solid substances within the meaning of marginal 2600 (13) may also be packed:

(a) in removable head drums conforming to marginals 3520 for steel, 3521 for aluminium, 3523 for plywood, 3525 for fibreboard, or 3526 for plastics material, or in removable head jerricans conforming to marginals 3522 for steel or 3526 for plastics material, if necessary with one or more sift-proof inner bags; or

(b) in combination packagings conforming to marginal 3538, with one or more sift-proof inner bags.

(3) Sodium cyanide of 41° (a) may also be packed in metal IBCs conforming to marginal 3622 or in wooden IBCs with a sift-proof inner liner conforming to marginal 3627, provided it is carried as a full load.

2607 (1) Substances classified under (b) of the various items shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

(d) in plastics drums or plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538.

Note to (a), (b), (c) and (d): Simplified conditions are applicable to removable-head drums and jerricans for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solids (see marginals 3512, 3553, 3554 and 3560).

2607 *(cont'd)* (2) Substances classified under (b) of the various items which have a vapour pressure at 50 °C of not more than 110 kPa (1,10 bar) may also be packed in metal IBCs conforming to marginal 3622 or in rigid plastics IBCs conforming to marginal 3624 or in composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

(3) Substances classified under 15°(b) may also be packed in composite packagings (glass, porcelain or stoneware) conforming to marginal 3539.

(4) Solid substances within the meaning of marginal 2600 (13) may also be packed:

(a) in removable-head drums conforming to marginal 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags; or

(b) in water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material, 3535 for plastics film or 3536 for water-resistant paper, provided the goods are carried as a full load or the bags secured on pallets; or

(c) in composite IBCs with flexible plastics inner receptacle conforming to marginal 3625, fibreboard IBCs conforming to marginal 3626 or wooden IBCs conforming to marginal 3627; or

(d) in flexible IBCs conforming to marginal 3623, with the exception of IBCs of types 13H1, 13L1, 13M1, provided that the goods are carried as a full load or the flexible IBCs are loaded on pallets.

2608 (1) Substances classified under (c) of the various items shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

(d) in plastics drums or plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538; or

(g) in composite packagings (glass, porcelain or stoneware) conforming to marginal 3539; or

(h) in light gauge metal packagings conforming to marginal 3540.

Note to (a), (b), (c), (d), and (h): Simplified conditions are applicable to removable-head drums, jerricans and light gauge metal packagings for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solids (see marginals 3512, 3552 to 3554 and 3560).

(2) Substances classified under (c) of the various items which have a vapour pressure at 50 °C of not more than 110 kPa (1,10 bar) may also be packed in metal IBCs conforming to marginal 3622, in rigid plastics IBCs conforming to marginal 3624 or in composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

(3) Solid substances within the meaning of marginal 2600 (13) may also be packed:

(a) in movable-head drums conforming to marginal 3523 for plywood, or 3525 for fibreboard, if necessary with one or more sift-proof inner bags; or

2608 *(cont'd)*

(b) in water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material, 3535 for plastics film or 3536 for water-resistant paper; or

(c) in flexible IBCs conforming to marginal 3623 with the exception of IBCs of types 13H1, 13L1 and 13M1, in composite IBCs with flexible plastics inner receptacle conforming to marginal 3625, in fibreboard IBCs conforming to marginal 3626 or in wooden IBCs conforming to marginal 3627.

2609-2610

3. Mixed packing

2611 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of different items of Class 6.1 in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together and/or with goods not subject to the provisions of this Directive, in a combination packaging conforming to marginal 3538, provided they do not react dangerously with one another.

(3) Substances of 1°, 3°, 4° and 5° shall not be packed with other goods.

(4) Substances of 2° and substances classified under (a) of the various items shall not be packed together with substances and articles of classes 1 and 5.2 and material of class 7.

(5) Except as otherwise specially provided, substances of 2° and liquid substances classified under (a) of the various items, in quantities not exceeding 0,5 litre per inner packaging and 1 litre per package, and substances classified under (b) and (c) of the various items, in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together in a combination packaging conforming to marginal 3538, with substances or articles of other classes, provided that mixed packing is also permitted for the substances of these classes, and/or with goods which are not subject to the provisions of this Directive, provided they do not react dangerously with one another.

(6) The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat;

(b) emission of flammable and/or toxic gases;

(c) formation of corrosive liquids;

(d) formation of unstable substances.

(7) The mixed packing of acid substances with basic substances in a package shall not be permitted if the two substances are packed in fragile receptacles.

(8) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2602 shall be complied with.

(9) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages (See Appendix A.9)

Marking

2612 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances or articles of this Class shall bear a label conforming to model No 6.1.

(3) Packages containing substances of 1° to 6°, 7° (a) 2., 8°, 9°, 11°, 13°, 16°, 18°, 20°, 22° or 26° (a) 1. or (b) 1. shall, in addition, bear a label conforming to model No 3.

(4) Packages containing flammable pesticides of 71° to 87° having a flashpoint of 23 °C or above shall, in addition, bear a label conforming to model No 3.

(5) Packages containing substances of 7° (a) 1., 10° or 28° shall, in addition, bear labels conforming to models Nos 3 and 8.

(6) Packages containing substances of 26° (a) 2. or (b) 2. or 54° (b) 1. shall, in addition, bear labels conforming to model Nos 4.1.

(7) Packages containing substances of 66° shall, in addition, bear a label conforming to model No 4.2.

(8) Packages containing substances of 44° shall, in addition, bear a label conforming to model No 4.3.

(9) Packages containing substances of 68° shall, in addition, bear a label conforming to model No 05.

(10) Packages containing substances of 24° (b) 2., 27° or 67° shall, in addition, bear a label conforming to model No 8.

(11) Packages containing fragile receptacles not visible from the outside shall, in addition, bear on two opposite sides a label conforming to model No 12.

(12) Packages containing liquids in receptacles the closures of which are not visible from the outside, packages containing receptacles with vents, and receptacles with vents but without outer packaging, shall, in addition, bear on two opposite sides label conforming to model No 11.

2613

B. Particulars in the transport document

2614 The description of the goods in the transport document shall conform to one of the substance identification numbers and one of the names printed in italics in marginal 2601.

If the substance is not mentioned by name but is assigned to an n.o.s. entry, or to another collective entry the description of the goods shall consist of the identification number, the n.o.s. designation or the collective entry designation, followed by the chemical or technical name [1].

[1] The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose. In the case of pesticides, the name to be entered should be that given in ISO Standard 1750:1891 if listed.

2614 (cont'd) The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or *'RID'*) e.g. '6.1, 11°(a), ADR'.

For the carriage of wastes [see marginal 2000 (5)], the description of the goods shall be: 'Waste containing ...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste, containing 2570 cadmium compounds, 6.1, 61°(c) ADR'.

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which most predominantly contribute to the danger or dangers of the solutions and mixtures.

For the carriage of solutions and mixtures containing only one component subject to the provisions of this Directive, the words 'solution' or 'mixture' should be added as part of the name in the transport document [see marginal 2002 (8)].

When a solid substance is handed over for carriage in the molten state, the description of the goods shall be completed by the word 'molten', unless it is already included in the name.

If a solution or mixture containing a named substance in accordance with marginal 2600 (5), is not subject to the conditions of this Class the consignor may enter in the transport document 'Not goods of Class 6.1'.

2615-2621

C. Empty packagings

2622 (1) If the empty packagings, uncleaned, of 91° are bags or flexible IBCs, these shall be placed in boxes or waterproof bags to prevent any leakage of substance.

(2) Other empty packagings, including uncleaned empty IBCs of 91° shall be closed in the same manner and with the same degree of leakproofness as if they were full.

(3) Empty packagings, including uncleaned empty IBCs of 91° shall bear the same danger labels as if they were full.

(4) The description in the transport document shall conform to one of the names printed in italics in 91°, e.g.: 'Empty packaging, 6.1, 91° ADR'.

In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers as well as empty vehicles for carriage in bulk and empty bulk containers, uncleaned, this description shall be completed by adding the words 'Last load' together with the name and item of the goods last loaded, e.g.: 'Last load: 2312 phenol, molten, 24° (b)'.

2623-2624

D. Transitional measures

2625 Substances of class 6.1 may be carried until 30 June 1995 in accordance with the requirements for Class 6.1 applicable until 31 December 1994. The transport document shall, in such cases, bear the inscription 'Carriage in accordance with the ADR in force before 1 January 1995'.

2626-2649

CLASS 6.2

INFECTIOUS SUBSTANCES

1. List of substances

2650 (1) Among the substances [1] covered by the title of Class 6.2, those which are listed in marginal 2651 or are covered by a collective heading of that marginal are subject to the conditions set out in marginal 2650 (2) to marginal 2675 and the provisions of this Annex and of Annex B. They are then considered as substances of this Directive.

(2) Class 6.2 comprises substances containing viable micro-organisms, including bacteria, viruses, rickettsia, parasites, fungi, also as recombinant, hybrid or mutant micro-organisms, that are known or reasonably believed to cause disease in animals or humans. They are subject to the provisions of this Class if they are capable of spreading diseases to humans or animals when exposure to them occurs.

Notes: 1. Genetically modified micro-organisms and organisms, biological products, diagnostic specimens and infected live animals shall be assigned to this Class if they meet the conditions for this Class.

2. Toxic toxins from plant, animal or bacterial sources which do not contain any infectious substances or organisms or which are not contained in them are substances of Class 6.1 (see marginal 2601, 90°, identification number 3172).

(3) Substances of Class 6.2 are subdivided as follows:

A. Infectious substances with a high risk potential

B. Other infectious substances

C. Empty packagings.

The substances of marginal 2651, 3° and 4°, are assigned to the group designated by the letter (b) on the basis of their degree of danger:

(b) dangerous substances.

(4) The assignment of substances which are not listed by name to 1°, 2° and 3° of marginal 2651, shall be made, on the basis of current scientific knowledge, in accordance with the following risk groups [2]:

(i) Risk group IV (high individual risk, high community risk) covers micro-organisms that can cause severe human or animal disease, which may present a high risk of spreading, and for which there is usually no effective prophylaxis or treatment available;

(ii) Risk group III (high individual risk, low community risk) covers micro-organisms that can cause severe human or animal disease and may present a high risk of spreading, but for which there is usually effective prophylaxis or treatment available;

(iii) Risk group II (moderate individual risk, limited community risk) covers micro-organisms that can cause human or animal disease, which are unlikely to spread, and for which there is usually effective prophylaxis or treatent available;

(iv) Risk group I (low individual and community risk) covers micro-organisms that are unlikely to cause human or animal disease.

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[1] For the purposes of this Class, viruses, micro-organisms as well as articles contaminated with these shall be considered as substances of this Class.

[2] See the World Health Organization's (WHO) *'Laboratory Biosafety Manual'*, 1983 Edition, and Directive 90/679/EEC (Official Journal of the European Communities, No L 374 of 31 December 1990, p. 1); they are not interchangeable with the packing groups in accordance with e.g. Appendix A.5.

2650 (cont'd)

Notes: 1. Micro-organisms of risk group I are not infectious substances within the meaning of this Class.

2. Genetically modified micro-organisms and organisms [1] are micro-organisms and organisms in which the genetic material has been deliberately altered by technical methods or by means that cannot occur naturally in nature.

3. Genetically modified micro-organisms which are infectious within the meaning of this Class, are substances of 1°, 2° or 3°. They may not however be assigned to 4°. Genetically modified micro-organisms which are not infectious substances within the meaning of this Class, may be substances of Class 9 (see marginal 2901, 13°, identification number 3245).

4. Genetically modified organisms, which are known or suspected to be dangerous to humans, animals or the environment, shall be carried in accordance with conditions specified by the competent authority of the country of origin.

(5) Substances and mixtures of substances of this Class shall be considered as solids for the packaging provisions of marginals 2654 and 2655 as long as they do not contain free liquid at a temperature of less than 45 °C.

(6) 'Biological products' are:

— finished biological preparations for human or veterinary use manufactured in accordance with the requirements of national public health authorities and moving under special approval or licence from such authorities, if required; or

— biological products transported prior to licensing for research or development purposes; or

— finished preparations for use in the experimental treatment of humans or animals and manufactured in accordance with the requirements of national public health authorities.

They also cover unfinished biological products prepared in accordance with procedures of specialized government agencies.

Diagnostic specimens are any human or animal material including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluids being transported for purposes of diagnosis or research, but excluding live infected animals.

Note: 'Biological products' and 'diagnostic specimens' are not considered as substances of this Class if they are known not to contain infectious substances.

(7) Live vertebrate or invertebrate animals shall not be used to carry an infectious agent unless the agent cannot be carried by any other means. Such animals shall be packed, marked, indicated, and carried in accordance with the relevant regulations governing the carriage of animals [2].

(8) For the carriage of substances of this Class, the maintenance of a specified temperature may be necessary.

A. Infectious substances with high risk potential

2651 1° *2814 infectious substance, affecting humans,*

2900 infectious substance, affecting animals only.

Notes: 1. Substances which, in accordance with marginal 2650 (4), are assigned to risk group IV, shall be assigned to this item.

2. Special conditions of packing are applicable to these substances (see marginals 2653 and 2654).

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[1] See also Directive 90/219/EEC, Official Journal of the European Communities No L 117 of 8 May 1990, p. 1.

[2] Such regulations are contained in, e.g. Directive 91/628/EEC (Official Journal of the European Communities No L 340 of 11 December 1992, p. 17) and in the Recommendations of the Council of Europe (Ministerial Committee) on the carriage of certain animal species.

2651 (cont'd) 2° *2814 infectious substance, affecting humans,*

2900 infectious substance, affecting animals only.

Notes: 1. Substances which, in accordance with marginal 2650 (4), are assigned to risk group III, shall be assigned to this item.

2. Special conditions of packing are applicable to these substances (see marginals 2653 and 2654).

B. Other infectious substances

3° (b) *2814 infectious substance, affecting humans,*

2900 infectious substance, affecting animals only.

Note: Substances which, in accordance with marginal 2650 (4), are assigned to risk group II, shall be assigned to this item.

4° (b) *3291 clinical waste, unspecified, n.o.s.*

Notes: 1. Unspecified wastes resulting from medical/veterinary treatment of humans/animals or from biological research, and which are unlikely to contain substances of this Class shall be assigned to this item.

2. Specified wastes shall be assigned to 1°, 2° or 3°.

3. Decontaminated clinical wastes or wastes resulting from biological research which previously contained infectious substances are not subject to the provisions of this Class.

C. Empty packagings

11° Uncleaned *empty packagings,* including *empty intermediate bulk containers (IBC), empty tank vehicles, empty demountable tanks* and *empty tank-containers,* uncleaned, which have contained substances of Class 6.2 (see marginal 2672).

2. Provisions

A. Packages

1. General conditions of packing

2652 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginals 2653 and 2656.

Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(2) In accordance with the provisions of marginals 2650 (3) and 3511 (2) or 3611 (2), the following shall be used:

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y' for dangerous substances classified under the letter (b) of each item;

Note: For the carriage of substances of Class 6.2 in tank-vehicles, demountable tanks or tank-containers see Annex B.

2. Special conditions for packing of certain substances

2653 (1) Packagings for substances of 1° and 2° shall include the following essential elements:

(a) An inner packaging comprising:

— a leakproof primary receptacle;

— a leakproof secondary packaging;

2653 *(cont'd)*

— absorbent material placed between the primary receptacle and the secondary packaging: if several primary receptacles are placed in a single secondary packaging, they shall be individually wrapped so as to prevent contact between them. The absorbent material, such as cotton wool,shall be in sufficient quantity to absorb the entire contents of the primary receptacles.

Whatever the intended temperature of the consignment, the primary receptacle or the secondary packaging shall be capable of withstanding without leakage an internal pressure producing a pressure differential of not less than 95 kPa (0,95 bar) and temperatures in the range – 40 °C to + 55 °C.

Note: Inner packagings containing infectious substances shall not be consolidated in an outer packaging with other types of goods.

(b) An outer packaging of adequate strength for its capacity, mass and intended use, and with a minimum external dimension of 100 mm.

(2) Packagings conforming to paragraph (1) shall be tested in accordance with the provisions of marginal 2654; the packaging design type shall be one permitted by the competent authority. Every packaging manufactured in accordance with the approved design type shall be marked in accordance with marginal 3512.

Tests for packagings in accordance with marginal 2653

2654 (1) Other than for packagings for live animals and organisms, samples of each packaging shall be prepared for testing as described in paragraph (2) and then subjected to the tests in paragraphs (3) to (5). If the nature of the packaging makes it necessary, equivalent preparation and tests are permitted, provided that these may be demonstrated to be at least as effective.

(2) Samples of each packaging shall be prepared as for carriage, except that the substance to be carried shall be replaced by water, or, where conditioning at – 18 °C is specified, by a mixture water/antifreeze. Each primary receptacle shall be filled to 98 % capacity.

(3) Packagings prepared as for carriage shall be subjected to the tests in the table, which, for test purposes, categorizes packagings according to their material characteristics. For outer packagings, the headings in the table relate to:

— fibreboard or similar materials whose performance may be rapidly affected by moisture;

— plastics which may embrittle at low temperature; and

— other materials such as metal whose performance is not affected by moisture or temperature.

If a primary receptacle and a secondary packaging [see marginal 2653 (1) (a)] are made of different materials, the material of the primary receptacle determines the appropriate test. In instances where a primary receptacle is made of two materials, the material most liable to damage shall determine the appropriate tests.

TABLE

Material of					Tests required				
Outer packaging			Inner packaging		In accordance with (3), letter				In accordance with (4)
Fibreboard	Plastics	Other	Plastics	Other	a)	b)	c)	d)	
X			X			X	X	When	X
X				X		X		dry	X
	X		X				X	ice	X
	X			X			X	is used	X
		X	X				X		X
		X		X	X				X

2654 *(cont'd)*

(a) Samples shall be subjected to free-fall drops on to a rigid, non-resilient, flat, horizontal surface from a height of 9 m. Where the samples are in the shape of a box five shall be dropped in sequence:

— one flat on to the bottom,

— one flat on to the top,

— one flat on to the long side,

— one flat on to the short side,

— one on to a corner.

Where the samples are in the shape of a drum, three shall be dropped in sequence:

— one diagonally on to the top chime, with the centre of gravity directly above the point of impact,

— one diagonally on to the base chime,

— one flat on to the side.

Following the appropriate drop sequence, there shall be no leakage from the primary receptacle(s) which shall remain protected by absorbent material in the secondary packaging.

(b) The samples shall be fully immersed in water for a period of at least 5 minutes and then allowed to drain for not more than 30 minutes at 23 °C and 50 ± 2 % relative humidity. It shall then be subjected to the test described in (a).

(c) The samples shall be conditioned in an atmosphere of – 18 °C or less for a period of at least 24 hours and within 15 minutes of removal from that atmosphere be subjected to the test described in (a). Where the samples contains dry ice, the conditioning period may be reduced to four hours.

(d) Where the packaging is intended to contain dry ice, a test additional to that specified in (a) or (b) or (c) shall be carried out. One sample shall be stored so that all the dry ice dissipates and then be subjected to the test described in (a).

(4) Packagings with a gross mass of 7 kg or less shall be subjected to the tests described in (a) below and packagings with a gross mass exceeding 7 kg to the tests in (b) below.

(a) Samples shall be placed on a level hard surface. A cylindrical steel rod with a mass of at least 7 kg, and a diameter not exceeding 38 mm, and whose impact end edges have a radius not exceeding 6 mm, shall be dropped in a vertical free fall from a height of 1 m, measured from the impact end to the impact surface of the sample. One sample shall be placed on its base. A second sample shall be placed in an orientation perpendicular to that used for the first. In each instance, the steel rod shall be aimed to impact the primary receptacle. Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

(b) Samples shall be dropped on to the end of a cylindrical steel rod. The rod shall be set vertically in a level hard surface. It shall have a diameter of 38 mm and the edges of the upper end a radius not exceeding 6 mm. The rod shall protrude from the surface a distance at least equal to that between the primary receptacle(s) and the outer surface of the outer packaging with a minimum of 200 mm. One sample shall be dropped in a vertical freefall from a height of 1 m, measured from the top of the steel rod. A second sample shall be dropped from the same height in an orientation perpendicular to that used for the first. In each instance, the packaging shall be so orientated that the steel rod could penetrate the primary receptacle(s). Following each impact, penetration of the secondary packaging is acceptable, provided that there is no leakage from the primary receptacle(s).

(5) As long as an equivalent level of performance is maintained, the following variations in the primary receptacles placed within the secondary packaging are allowed without the need for further testing of the completed packaging.

2654 *(cont'd)* Primary receptacles of equivalent or smaller size as compared to the tested primary receptacles may be used provided:

(a) the primary receptacles are of similar design to the primary receptacle tested (e.g. rounded, rectangular);

(b) the material of construction of the primary receptacles (e.g. glass, plastics, metal) has a resistance to impact and stacking pressure equivalent to or better than that of the primary receptacles initially tested;

(c) primary receptacles have the same or smaller openings and the closure is of equivalent design (e.g. screw-threaded plug, bung);

(d) sufficient additional cushioning material is used to fill up empty space and to prevent significant movement of the primary receptacles; and

(e) primary receptacles are oriented within the secondary packagings in the same manner as in the tested package.

2655 (1) Substances classified under 3° (b) and 4° (b) shall be packed in:

(a) steel drums conforming to marginal 3520; or

(b) aluminium drums conforming to marginal 3521; or

(c) steel jerricans conforming to marginal 3522; or

(d) plastics drums or jerricans conforming to marginal 3526; or

(e) composite packagings (plastics material) conforming to marginal 3537; or

(f) combination packagings conforming to marginal 3538; or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539; or

(h) metal IBCs conforming to marginal 3622; or

(i) rigid plastics IBCs conforming to marginal 3624; or

(j) (reserved)

(k) composite IBCs with plastics inner receptacles conforming to marginal 3625, with the exception of IBCs of types 11HZ2 and 31HZ2.

(2) Solid substances within the meaning of marginal 2650 (5) may also be packed in plywood drums conforming to marginal 3523 or in fibre drums conforming to marginal 3525, if necessary with one or more leakproof inner bags.

2656 Biological products and diagnostic specimens of 1° to 3° where a relatively low probability exists that infectious substances are present e.g. for routine screening tests or initial diagnosis, must meet all the provisions of this class except where the following conditions are met:

(1) The primary receptacles do not contain more than 50 ml for biological products, 100 ml for diagnostic specimens;

(2) The outer packaging does not contain more than:

— 50 ml for biological products when fragile primary receptacles are used;

— 100 ml for biological products when other than fragile primary receptacles are used;

— 500 ml for diagnostic specimens.

(3) The primary receptacles are leakproof; and

(4) The packaging is in accordance with the provisions of this class; however it need not be subjected to the tests.

2657 When substances of this Class are carried in deeply refrigerated liquid nitrogen, the inner packagings shall conform to the provisions for this Class and the containers for the nitrogen shall conform to the provisions of Class 2.

2658 (1) The openings of primary receptacles for liquids of 1° and 2° shall be closed so as to be leakproof by means of two devices placed in series, one of which shall be screw-threaded or secured in an equivalent manner.

(2) Receptacles for substances of 3° and 4° which evolve gases and which are carried at ambient temperature of more than 15 °C shall be fitted with a specific pathogen-tight vent in the lid, which shall be protected against external mechanical stresses.

With reusable receptacles, the filter of the vent shall be replaced before refilling.

(3) Plastics or fibreboard packagings intended for the carriage of wastes of 4° shall be resistant and, if the wastes contain sharp objects, shall be impenetrable to such objects.

(4) The closure of packagings for substances of 4° shall be so constructed that they are hermetically closed after filling and so designed that any subsequent opening is immediately evident.

2659-
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3. Mixed packing

2661 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of 1°, 2° and 3° may be packed together in a combination packaging conforming to marginal 3538, if the package is tested and approved in accordance with the provisions for substances of 1° and 2°.

(3) Substances of Class 6.2 shall not be packed together with substances and articles of other classes, nor with goods not subject to the provisions of this Directive. This does not apply to biological products and diagnostic specimens which are packed in accordance with marginal 2656 or to substances being carried as coolants, e.g. ice, dry ice or deeply refrigerated liquid nitrogen.

(4) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2652 shall be observed.

(5) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages (See Appendix A.9)

Marking

2662 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances of this Class shall bear a label conforming to model No 6.2.

(3) Packages containing substances of this Class carried in deeply refrigerated liquid nitrogen shall, in addition, bear a label conforming to model No 2.

(4) Packages containing substances of 3° and 4° in fragile receptacles which are not visible from the outside shall, in addition, bear on two opposite sides a label conforming to model No 12.

(5) Packages containing liquid substances of 3° in receptacles the closures of which are not visible from the outside, as well as packages containing vented receptacles and vented receptacles without outer packaging, shall, in addition, bear on two opposite sides a label conforming to model No 11.

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B. Particulars in the transport document

2664 The description of the goods in the transport document shall conform to one of the identification numbers and names printed in italics in marginal 2651, followed by the biological name of the substance (1) for substances of 1° to 3°.

(1) If the infectious substance is a genetically modified substance, the words 'genetically modified micro-organisms' shall be added.

(2) For biological products and diagnostic specimens which are offered for transport under the conditions of marginal 2656, the description of the goods shall be: 'Biological product/diagnostic specimen, containing ...' the infectious substance determining the classification under 1°, 2° or 3° to be entered.

The description of the goods shall be followed by *particulars of the Class, the item number,* if applicable, *the letter and the initials 'this Directive'* (or *'RID'*), e.g. '6.2, 3° (b), ADR.'

For the carriage of wastes [see marginal 2000 (5)] the description of the goods shall be: 'waste, containing ...,', the component(s) determining the classification of the waste under marginal 2002(8) to be entered under its/their chemical or biological name(s), e.g.: 'Waste, containing 2814. Infectious substance, affecting humans, Marburg virus, 6.2, 2° ADR'.

For the carriage of solutions or mixtures (such as preparations and wastes) containing two or more components subject to this Directive, in general not more than the two components which most predominantly contribute to the danger(s) of the solutions or mixtures need be shown. For wastes of 4°, the description printed in italics is sufficient: '3291 Clinical Waste, unspecified, n.o.s. 6.2, 4° (b), ADR'.

For the carriage of easily perishable substances, appropriate information shall be provided, e.g. 'Cool at +2/+4 °C' or 'carry in frozen state' or 'do not freeze'.

2665-
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C. Empty packagings

2672 (1) Empty packagings, including empty IBCs, uncleaned, of 11° shall be closed in the same manner and with the same degree of leakproofness as if they were full.

(2) Empty packagings, including empty IBCs, uncleaned, of 11° shall bear the same danger (cont'd) labels as if they were full.

(3) The description in the transport document shall conform to one of the descriptions printed in italics under 11°, e.g. 'Empty packagings, 6.2, 11°, ADR'. In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers and empty small containers, uncleaned, this description shall be completed by adding the words 'Last load', together with the name and item number of the goods last loaded, e.g.: 'Last load: 2900 Infectious substance, affecting animals, 3° (b)'.

2673

(1) The biological name given shall normally be that used in reference books, regularly appearing publications and scientific and technical texts. Trade names shall not be used for this purpose.

D. Other provisions

2674 Other provisions for substances of this Class which are enacted for reasons other than those of safety, are not affected (e.g. those concerning import and export, marketing or distribution, protection at work, veterinary purposes).

E. Transitional provisions

2675 Substances of Class 6.2 may be carried until 31 December 1995 in accordance with the provisions applicable for Class 6.2 until 31 December 1994. In such cases, the transport document shall bear the inscription: 'Carriage in accordance with the ADR in force before 1 January 1995'.

2676-
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CLASSE 7

RADIOACTIVE MATERIAL

Introduction

2700 (1) *Scope*

(a) Among the materials with a specific activity of more than 70 kBq/kg [2 nCi/g)] and articles containing such materials, only those listed in or assigned to an n.o.s. entry in marginal 2701 are to be accepted for carriage and then only under the conditions (1) set out in the appropriate schedules of marginal 2704 and in Appendix A.7 (marginals 3700 to 3799).

(b) The materials and articles referred to in (a) are materials and articles of this Directive.

Note: Cardiac pacemakers containing radioactive material, when they have been surgically implanted in medical patients, or radio-pharmaceuticals administered to a patient in the course of medical treatment, are not subject to the provisions of this Directive.

(2) *Definitions and Explanations*

A_1 and A_2

1. A_1 shall mean the maximum activity of special form radioactive material permitted in a Type A package. A_2 shall mean the maximum activity of radioactive material, other than special form radioactive material, permitted in a Type A package. (See Appendix A.7, Table 1).

Alpha Emitters of Low Toxicity

2. *Low toxicity alpha emitters* shall mean natural uranium; depleted uranium; natural thorium; uranium-235 or uranium-238; thorium-232; thorium-228 and thorium-230 when contained in ores and physical or chemical concentrates; radionuclides with a half life of less than ten days.

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(1) The provisions of Class 7 are based on the following principles and provisions of the International Atomic Energy Agency (IAEA):
Regulations for the Safe Transport of Radioactive Material, Safety series No 6, 1985 Edition, (As amended 1990) which also includes the general principles for Radiation Protection.
Regulations for the Safe Transport of Radioactive Material, Safety Series No 6 Supplement 1988.
Explanations and further information about these regulations can be found in the following documents:
1. IAEA 'Advisory Material for the IAEA Regulations for The Safe Transport of Radioactive Materials' (1985 Edition) Safety Series No 37, Third Edition (As amended 1990).
2. IAEA 'Explanatory Material for the IAEA Regulations for The Safe Transport of Radioactive Materials' (1985 Edition) Safety Series No 7, Second Edition (As amended 1990).
3. IAEA 'Basic Safety Standards for Radiation Protection' Safety Series No 9, 1982 Edition.
4. IAEA 'Emergency Response Planning and Preparedness for Transport Accidents Involving Radioactive Materials' Safety Series No 87, 1988 Edition.
5. IAEA 'Schedule of Requirements for the Transport of Specified Types of Material Radioactive Consignments' Safety Series No 80 (As amended 1990).

2700 *(cont'd)*

Approval

3. *Multilateral approval* shall mean approval by the relevant competent authority both of the country of origin of the design or shipment and of each country through or into which the consignment is to be transported.

4. *Unilateral approval* shall mean an approval of a design which is required to be given by the competent authority of the country of origin of the design only.

Container

5. A *container* for the carriage of material of this class shall be of a permanent enclosed character, rigid and strong enough for repeated use. It may be used as a packaging if the applicable provisions are met, and it may also be used to perform the functions of an overpack.

Containment system

6. *Containment system* shall mean the assembly of components of the packaging specified by the designer as intended to retain the radioactive material during transport.

Contamination

7. *Contamination* shall mean the presence of a radioactive substance on a surface in quantities in excess of 0,4 Bq/cm^2 (10^{-5} μi/cm^2) for beta and gamma emitters and low toxicity alpha emitters, or 0,04 Bq/cm^2 (10^{-6} μi/cm^2) for all other alpha emitters.

   Fixed contamination shall mean contamination other than non-fixed contamination.

   Non-fixed contamination shall mean contamination that can be removed from a surface during normal handling.

Design

8. *Design* shall mean the description of special form radioactive material, package, or packaging which enables such an item to be fully identified. The description may include specifications, engineering drawings, reports demonstrating compliance with regulatory provisions, and other relevant documentation.

Exclusive use

9. *Exclusive use* shall mean the sole use, by a single consignor, of a vehicle or of a large container with a minimum length of 6 m, in respect of which all initial, intermediate, and final loading and unloading is carried out in accordance with the directions of the consignor or consignee.

Fissile material

10. *Fissile material* shall mean uranium-233, uranium-235, plutonium-238, plutonium-239, plutonium-241, or any combination of these radionuclides. Unirradiated natural uranium and depleted uranium, and natural uranium or depleted uranium which has been irradiated in thermal reactors only, are not included in this definition.

Low specific activity material

11. *Low specific activity (LSA) material* shall mean radioactive material which by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply. External shielding materials surrounding the LSA material shall not be considered in determining the estimated average specific activity.

    LSA material shall be in one of three groups:

    (a) LSA-I

        (i) Ores containing naturally occurring radionuclides (e.g. uranium, thorium), and uranium or thorium concentrates of such ores;

        (ii) Solid unirradiated natural uranium or unirradiated depleted uranium or unirradiated natural thorium or their solid or liquid compounds or mixtures; or

        (iii) Radioactive material, other than fissile material, for which the A_2 value is unlimited.

2700 *(cont'd)*

b) LSA-II

(i) Water with tritium concentration up to 0,8 TBq/l (20 Ci/l); or

(ii) Other material in which the activity is distributed throughout and the estimated average specific activity does not exceed 10^{-4} A_2/g for solids and gases, and 10^{-5} A_2/g for liquids.

(c) LSA-III

Solids (e.g. consolidated wastes, activated material) in which:

(i) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);

(ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble matrix, so that, even under loss of packaging, the loss of radioactive material per package by leaching when placed in water for seven days would not exceed 0,1 A_2; and

(iii) The estimated average specific activity of the solid, excluding any shielding material, does not exceed 2×10^{-3} A_2/g.

Maximum normal operating pressure

12. *Maximum normal operating pressure* shall mean the maximum pressure above atmospheric pressure at mean sea-level that would develop in the containment system in a period of one year under the conditions of temperature and solar radiation corresponding to environmental conditions of transport in the absence of venting, external cooling by an ancillary system, or operational controls during transport.

Overpack

13. *Overpack* shall mean an enclosure, such as a box or bag, which need not meet the provisions for a container and which is used by a single consignor to consolidate into one handling unit a consignment of two or more packages for convenience of handling, stowage, and carriage. Overpack is not identical to outer packaging as defined in marginal 3510.

Package

14. *Package* shall mean the packaging with its radioactive contents as presented for transport. Package and packaging performance standards, in terms of retention of integrity of containment and shielding, depend upon the quantity and nature of the radioactive material transported.

Performance standards applied to packages are graded to take into account conditions of transport characterized by the following severity levels:

— conditions likely to be encountered in routine transport (in incident-free conditions);

— conditions of transport taking minor mishaps into account; and

— accident conditions of transport.

The performance standards include design provisions and tests. Each package shall be classified as follows:

(a) *Excepted package* is a packaging containing radioactive material (see Appendix A.7, Table V) that is designed to meet the general design provisions for all packagings and packages (see marginal 3732).

(b) (I) *Industrial Package Type 1* (IP-1) is a packaging, tank or container containing LSA material or SCO, (see definitions 11 and 22) that is designed to meet the general design provisions for all packagings and packages (see marginal 3732) and, in addition, for the specific design provision (see marginal 3733).

2700 *(cont'd)*

(II) *Industrial Package Type 2* (IP-2) is a packaging, tank or container containing LSA material or SCO (see definitions 11 and 22) that is designed to meet the general design provisions for all packagings and packages (see marginal 3732) and, in addition, the following specific design provisions:

(i) for a package, see marginal 3734;

(ii) for a tank, see marginal 3736 and Appendices B.1a and B.1b;

iii) for a container, see marginal 3736.

(III) *Industrial Package Type 3* (IP-3) is a packaging, tank or container containing LSA material or SCO, (see definitions 11 and 22) that is designed to meet the general design provisions for all packagings and packages (see marginal 3732) and, in addition, the following specific design provisions:

(i) for a package, see marginal 3735;

(ii) for a tank, see marginal 3736 and Appendices B.1a and B.1b;

iii) for a container, see marginal 3736.

(c) *Type A Package* is a packaging, tank or container containing an activity up to A_1 if Special Form Radioactive Material, or up to A_2 if not Special Form Radioactive Material, that is designed to meet the general design provisions for all packagings and packages (see marginal 3732) and the specific design provisions in marginal 3737 as appropriate.

(d) *Type B Package* is a packaging, tank or container containing an activity that may be in excess of A_1, if Special Form Radioactive Material, or in excess of A_2 if not Special Form Radioactive Material, that is designed to meet the general design provisions for all packagings and packages (see marginal 3732) and the specific design provisions in marginal 3737 and, as appropriate, marginals 3738-3740.

Packaging

15. *Packaging* shall mean the assembly of components necessary to enclose the radioactive contents completely. It may, in particular, consist of one or more receptacles, absorbent materials, spacing structures, radiation shielding, service equipment for filling, emptying, venting and pressure relief, and devices for cooling, for absorbing mechanical shocks, for providing handling and tiedown capability, for thermal insulation, and service devices integral to the package. The packaging may be a box, drum or similar receptacle, or may also be a container or tank consistent with definition 14.

Quality assurance

16. *Quality assurance* shall mean a systematic programme of controls and inspections applied by any organisation or body involved in the transport of radioactive material which is aimed at providing adequate confidence that the standard of safety prescribed in Appendix A.7 is achieved in practice.

Radiation level

17. *Radiation level* shall mean the corresponding dose equivalent rate expressed in millisievert (millirem) per hour (1).

Radioactive contents

18. *Radioactive contents* shall mean the radioactive material together with any contaminated solids, liquids and gases within the packaging.

(1) For the sake of clarity, the radiation level may also be indicated, in parentheses, in millirem per hour. It is recognized that millisievert or millirem are not the correct units that should apply to radiation exposure in all cases, nevertheless, these units are used exclusively for convenience.

2700 *(cont'd)*

Speciale arrangement

19. *Special arrangement* shall mean those provisions, approved by the competent authority, under which a consignment which does not satisfy all the applicable provisions of Schedules 5-12 of marginal 2704 may be transported. Consignments of this type require multilateral approval.

Special form radioactive material

20. *Special form radioactive material* shall mean either an indispersible solid radioactive material or a sealed capsule containing radioactive material (see marginal 3731).

Specific activity

21. *Specific activity* shall mean the activity of a radionuclide per unit mass of that nuclide. The specific activity of a material in which the radionuclide is essentially uniformly distributed is the activity per unit mass of the material.

Surface contaminated object

22. *Surface contaminated object* (SCO) shall mean a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces. SCO shall be in one of two groups:

(a) SCO-I: A solid object on which:

(i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4 Bq/cm^2 (10^{-4} $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 0,4 Bq/cm^2 (10^{-5} $\mu Ci/cm^2$) for all other alpha emitters; and

(ii) the fixed contamination on the accessible surface averaged over 300 cm^2(or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 (1 $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 4×10^3 Bq/cm^2 (0,1 $\mu Ci/cm^2$) for all other alpha emitters; and

(iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 4×10^4 Bq/cm^2 (1 $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 4×10^3 Bq/cm^2 (0,1 $\mu Ci/cm^2$) for all other alpha emitters.

(b) SCO-II: A solid object on which either the fixed or non-fixed contamination on the surface exceeds the applicable limits specified for SCO-I in (a) above and on which:

(i) the non-fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 400 Bq/cm^2 (10^{-2} $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 40 Bq/cm^2 (10^{-3} $\mu Ci/cm^2$) for all other alpha emitters; and

(ii) the fixed contamination on the accessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 (20 $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 8×10^4 Bq/cm^2 (2 $\mu Ci/cm^2$) for all other alpha emitters; and

(iii) the non-fixed contamination plus the fixed contamination on the inaccessible surface averaged over 300 cm^2 (or the area of the surface if less than 300 cm^2) does not exceed 8×10^5 Bq/cm^2 (20 $\mu Ci/cm^2$) for beta and gamma emitters and low toxicity alpha emitters or 8×10^4 Bq/cm^2 (2 $\mu Ci/cm^2$) for all other alpha emitters.

Transport index

23. *Transport index* (TI) shall mean a single number assigned to a package, overpack, tank or container, orr to unpackaged LSA-I or SCO-I, which is used to provide control over both nuclear criticality safety and radiation exposure (see marginal 3715). It is also used to establish content limits on certain packages, overpacks, tanks and containers; to establish categories for labelling; to determine whether transport under exclusive use shall be required; to establish spacing provisions during storage in transit; to establish mixed loading restrictions during transport under special arrangement and during storage in transit; and to define the number of packages allowed in a container or aboard a vehicle (see Section II of Appendix A.7).

2700 (cont'd)

Unirradiated thorium

24. *Unirradiated thorium* shall mean thorium containing not more than 10^{-7} g of uranium-233 per gram of thorium 232.

Unirradiated uranium

25. *Unirradiated uranium* shall mean uranium containing not more than 10^{-6} g of plutonium per gram of uranium-235 and not more than 9 MBq (0,20 mCi) of fission products per gram of uranium-235.

Uranium — natural, depleted, enriched

26. *Natural uranium* shall mean chemically separated uranium containing the naturally occurring distribution of uranium isotopes (approximately 99,28 % uranium-238, and 0,72 % uranium-235). Depleted uranium shall mean uranium containing a lesser mass percentage of uranium-235 than in natural uranium. Enriched uranium shall mean uranium containing a greater mass percentage of uranium-235 than in natural uranium. In all cases, a very small mass percentage of uranium-234 is present.

2701 (1) *List of Substances:*

Identification number (1) and name of the substance or object	Schedule
2910 Radioactive material, excepted package	
— *instruments* or *articles*	2
— *limited quantity of material*	1
— *articles manufactured from natural* or *depleted uranium* or *natural thorium*	3
— *empty packaging*	4
2912 Radioactive material, low specific activity (LSA), n.o.s.	
— *LSA-I*	5
— *LSA-II*	6
— *LSA-III*	7
— *under special arrangement*	13
2913 Radiactive material, surface contaminated objects (SCO)	
— *SCO-I* and *SCO-II*	8
— *under special arrangement*	13
2918 Radioactive material, fissile, n.o.s.	
— *in Type IF, Type AF, Type B(U)F* or *Type B(M)F packages*	12
— *under special arrangement*	13
2974 Radioactive material, special form n.o.s.	
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13
2975 Thorium metal, pyrophoric	
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	12
2976 Thorium nitrate, solid	
— *LSA-I*	5
— *LSA-II*	6
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13
2977 Uranium hexafluoride, fissile containing more than 1 % uranium-235	
— *in approved packages*	12
— *under special arrangement*	13

2701 *(cont'd)*

Identification number (1) and name of the substance or objet	Schedule
2978 Uranium, hexafluoride, fissile excepted or *non-fissile*	
— *LSA-I*	5
— *LSA-II*	6
— *under special arrangement*	13
2979 Uranium metal, pyrophoric	
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13
2980 Uranyl nitrate, hexahydrate solution	
— *LSA-I*	5
— *LSA-II*	6
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13
2981 Uranyl nitrate, solid	
— *LSA-I*	5
— *LSA-II*	6
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13
2982 Radioactive material n.o.s.	
— *in Type A packages*	9
— *in Type B(U) packages*	10
— *in Type B(M) packages*	11
— *under special arrangement*	13

(1) These numbers are taken from the United Nations Recommendations on the Transport of Dangerous Goods.

(2) The materials and articles of this Class contain one or more of the radionuclides referred to in Section I of Appendix A.7 (marginals 3700 and 3701).

(3) The list hereunder sets out the schedules of marginal 2704:

1. Limited Quantities of Radioactive Material in Excepted Packages.
2. Instruments or Articles in Excepted Packages.
3. Articles Manufactured from Natural Uranium, Depleted Uranium or Natural Thorium as Excepted Packages.
4. Empty Packagings as Excepted Packages.
5. Low Specific Activity Material (LSA-I).
6. Low Specific Activity Material (LSA-II).
7. Low Specific Activity Material (LSA-III).
8. Surface Contaminated Objects (SCO-I and SCO-II).
9. Radioactive Material in Type A Packages.
10. Radioactive Material in Type B(U) Packages.
11. Radioactive Material in Type B(M) Packages.
12. Fissile Material.
13. Radioactive Material Transported under Special Arrangement.

(4) The provisions for the various types of consignment are contained in 13 headings in accordance with marginal 2003 (3):

(i) Common provisions for Schedules 1 to 4 are summarised in marginal 2702;

(ii) Common provisions for Schedules 5 to 13 are summarised in marginal 2703.

Common Provisions for Schedules 1 to 4 of marginal 2704

2702

1. Materials

See appropriate schedule.

2. Packaging/Package

See appropriate schedule.

3. Maximum Radiation Level

5 μSv/h (0,5 mrem/h) at any point on the external surface of the package.

4. Contamination on Packages, Vehicles, Containers, Tanks and Overpacks

Non-fixed contamination on all external surfaces and in addition on the internal surfaces of vehicles, containers, tanks and overpacks used for carrying excepted packages shall be kept as low as practicable and shall not exceed the following limits:

(a) Beta/gamma/low-toxicity alpha emitters
0,4 Bq/cm^2 (10^{-5} μCi/cm^2)

(b) All other alpha emitters
0,04 Bq/cm^2 (10^{-6} μCi/cm^2)

5. Decontamination and Use of Vehicles, Equipment or Parts thereof

Vehicles, equipment or parts thereof which have become contaminated shall be decontaminated as soon as possible, and in any case before re-use, to levels not exceeding:

(a) for non-fixed contamination,
0,4 Bq/cm^2 (10^{-5} μCi/cm^2) for beta and gamma emitters and low toxicity alpha emitters; and
0,04 Bq/cm^2 (10^{-6} μCi/cm^2) for all other alpha emitters.

(b) a radiation level of 5 μSv/h (0,5 mrem/h) at the surface due to fixed contamination.

6. Mixed Packing

No provisions.

7. Mixed Loading

No provisions.

8. Marking and Danger Labels on Packages, Containers, Tanks and Overpacks

See appropriate schedule.

9. Danger Labels on Vehicles other than Tank-Vehicles

See appropriate schedule.

10. Transport Documents

See appropriate schedule.

11. Storage and Despatch

No provisions.

12. Carriage of Packages, Containers, Tanks and Overpacks

No provisions.

13. Other Provisions

(a) Accident provisions: see marginals 2710 and 3712.

(b) Damaged or leaking packages: see marginal 3712.

(c) Contamination surveys: see marginal 3712 (3).

(d) Quality assurance: see marginal 3766.

(e) Undeliverable consignments: see marginal 2715.

Common Provisions for Schedules 5 to 13 of marginal 2704

2703

1. *Materials*

See appropriate schedule.

2. Packaging/Package

See appropriate schedule.

3. Maximum Radiation Level

(a) The radiation levels for packages or overpacks not transported under exclusive use shall not exceed:

(i) 2 mSv/h (200 mrem/h) at any point on any external surface, and

(ii) 0,1 mSv/h (10 mrem/h) at 1 metre from that surface.

(b) The surface radiation levels for packages or overpacks transported under exclusive use may exceed 2 mSv/h (200 mrem/h) but under no circumstances shall exceed 10 mSv/h (1 000 mrem/h), provided that:

(i) the vehicle is equipped with an enclosure which prevents unauthorized access to the load during transport; and

(ii) the package or overpack is secured to retain its position within the enclosure during routine transport; and

(iii) there are no loading or unloading operations between the beginning and end of the shipment.

4. Contamination on Packages, Vehicles, Containers, Tanks and Overpacks

Non-fixed contamination on all external surfaces and in addition on the internal surfaces of vehicles, containers, tanks and overpacks used for transporting packages shall be kept as low as practicable and shall not exceed the following limits:

(a) Beta/gamma/low-toxicity alpha emitters:

0,4 Bq/cm^2 (10^{-5} μCi/cm^2) for consignments which also include excepted packages and/or non-radioactive goods;

4 Bq/cm^2 (10^{-4} μCi/cm^2) for all other consignments.

(b) All other alpha emitters:

0,04 Bq/cm^2 (10^{-6} μCi/cm^2) for consignments which also include excepted packages and/or non-radioactive goods;

0,4 Bq/cm^2 (10^{-5} μCi/cm^2) for all other consignments.

5. Decontamination and Use of Vehicles, Equipment or Parts thereof

Vehicles, equipment or parts thereof which have become contaminated above the limits in paragraph 4, or which show a surface radiation level in excess of 5μSv/h (0,5 mrem/h) shall be decontaminated as soon as possible, and in any case before re-use, to levels not exceeding:

(a) for non-fixed contamination, see provisions under 4,

(b) a radiation level of 5 μSv/h (0,5 mrem/h) at the surface due to fixed contamination.

6. Mixed Packing

See marginal 3711 (1).

7. Mixed Loading

(a) Packages bearing a label conforming to models Nos 7A, 7B or 7C shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos I, I.4, I.5, I.6 or 01.

(b) In all other cases mixed loading is permitted. However, mixed loading in a consignment under exclusive use shall only be arranged for by the consignor.

2703 *(cont'd)*

8. Marking and Danger Labels on Packages, Containers, Tanks and Overpacks

The following provisions apply to packages, containers, tanks and overpacks with non-fissile material.

For packages containing fissile material and for containers and overpacks which contain packages with fissile material, see in addition Schedule 12.

(a) Packages and overpacks, other than containers or tanks.

(i) Such packages and overpacks shall, depending on the category (see marginal 3718), bear labels conforming to models Nos 7A, 7B or 7C, completed in accordance with marginal 2706 (3). The labels shall be affixed to two opposite sides of the packages and overpacks.

(ii) Each label shall be marked with the maximum activity of the radioactive contents during transport.

(iii) Each yellow label shall be marked with the transport index for the package or overpack.

(iv) In the case of substances of the following identification numbers listed in marginal 2701 (1), the following additional labels shall also be affixed:

2975 Thorium metal, pyriphoric 2979 Uranium metal, pyrophoric	Model No 4.2
2976 Thorium nitrate, solid 2981 Uranyl nitrate, solid	Model No 05
2977 Uranium hexafluoride fissile, containing more than 1 % uranium 235 2978 Uranium hexafluoride, fissile excepted or non-fissile 2980 Uranyl nitrate hexahydrate solution	Model No 8

v) Packages with a gross mass exceeding 50 kg shall be plainly and durably marked with their permissible gross mass on the outside.

(vi) Each package except tank containers and overpacks shall be clearly marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

(vii) Any labels which do not relate to the contents shall be removed or covered.

(b) Containers, also when used as overpacks, and tanks.

(i) Such containers and tanks shall, depending on the category (see marginal 3718), bear labels conforming to models Nos 7A, 7B or 7C, completed in accordance with marginal 2706 (3).

Tanks, as well as large containers containing packages other than excepted packages, shall in addition bear labels conforming to model No 7D.

Instead of using labels conforming to model Nos 7A, 7B or 7C, and in addition labels conforming to model No 7D, enlarged labels conforming to model Nos 7A, 7B or 7C with the dimensions of model No 7D may alternatively be used.

The labels shall be affixed to all four sides of containers and tank-containers, and to both sides and the rear of tank-vehicles.

(ii) In the case of substances of the following identification numbers listed in marginal 2701 (1), the following additional labels shall also be affixed:

2975 Thorium metal, pyriphoric 2979 Uranium metal, pyrophoric	Model No 4.2
2976 Thorium nitrate, solid 2981 Uranyl nitrate, solid	Model No 05
2977 Uranium hexafluoride fissile, containing more than 1 % uranium 235 2978 Uranium hexafluoride, fissile excepted or non-fissile 2980 Uranyl nitrate hexahydrate solution	Model No 8

2703 *(cont'd)*

(iii) Tank-vehicles and tank-containers as well as vehicles and containers for carriage in bulk shall be marked in accordance with marginal 10 500 and Appendix B.5.

(iv) Except for mixed loads, each label shall be marked with the maximum activity of the radioactive contents of the container or overpack during transport, totalled for the entire contents. For mixed loads, see marginal 2706 (3).

(v) Each yellow label shall be marked with the transport index for the container or overpack.

(vi) Containers and tanks shall be plainly and durably marked on the outside with their permissible gross mass.

(vii) Any marking or danger label which does not relate to the contents shall be removed or covered.

9. Danger Labels on Vehicles other than Tank-Vehicles

(a) (i) For consignments of packaged or unpackaged radioactive material, labels conforming to model No 7D shall be affixed in a vertical orientation to the two side walls and the rear wall of the transport unit.

(ii) In the case of substances of the following identification numbers listed in marginal 2701 (1), the following additional labels shall also be affixed:

2975 Thorium metal, pyriphoric 2979 Uranium metal, pyrophoric	Model No 4.2
2976 Thorium nitrate, solid 2981 Uranyl nitrate, solid	Model No 05
2977 Uranium hexafluoride fissile, containing more than 1 % uranium 235 2978 Uranium hexafluoride, fissile excepted or non-fissile 2980 Uranyl nitrate hexahydrate solution	Model No 8

(b) Any danger label which does not relate to the contents shall be removed or covered.

10. Transport Documents

See appropriate schedule.

11. Storage and Despatch

(a) Segregation during storage is required from other dangerous goods, and from persons and undeveloped photographic plates and films:

(i) for segregation from other dangerous goods — see the provisions under heading 7;

(ii) for segregation from persons, from packages marked 'FOTO' and from mailbags — see marginal 2711 for segregation tables.

(b) Total transport index limitation for storage except LSA-I:

(i) The number of category II-yellow and category III-yellow packages, overpacks, tanks and containers stored in any one place shall be so limited that the total sum of the transport indexes in any individual group of such packages, overpacks, tanks or containers does not exceed 50. Such groups shall be stored so as to maintain a spacing of at least 6 m from each other.

(ii) Where the transport index of a single package, overpack, tank or container exceeds 50 or the total transport index on a vehicle exceeds 50, storage shall be such as to maintain a spacing of at least 6 m from other packages, overpacks, tanks, containers or vehicles carrying radioactive material.

12. Carriage of Packages, Containers, Tanks and Overpacks

(1) See appropriate schedule.

(2) (a) Segregation during transport is required from other dangerous goods and from persons and undeveloped photographic films and plates:

(i) for segregation from other dangerous goods — see the provisions under heading 7;

(ii) for segregation from persons, from packages marked 'FOTO' and from mailbags — see marginal 2711 for segregation tables.

2703 *(cont'd)*

(b) Total transport index limitation for carriage except LSA-I:

The total number of packages, overpacks, tanks and containers on a single vehicle shall be so limited, that the sum of the transport indexes does not exceed 50. For consignments under exclusive use this limit does not apply — see marginal 3711 (3).

(c) Any package or overpack having a transport index greater than 10 shall be transported only under exclusive use.

(d) Maximum radiation levels for vehicles:

(i) 2 mSv/h (200 mrem/h) at surface of vehicles;

(ii) 0,1 mSv/h (10 mrem/h) at 2 metres from surface of vehicles;

(iii) 0,02 mSv/h (2 mrem/h) at any normally occupied position in a vehicle, if personal monitoring devices are not used.

13. Other Provisions

(a) Determination of transport index: see marginal 3715.

(b) Accident provisions: see marginals 2710, 3712 and 10 385.

(c) Damaged or leaking packages: see marginal 3712.

(d) Contamination surveys: see marginal 3712 (3).

(e) Quality Assurance: see marginal 3766.

(f) Undeliverable consignments: see marginal 2715.

(g) Transport equipment and operations: see Annex B, Part I and marginal 71 000 et seq.

2704

Schedule 1

Limited quantities of radioactive material in excepted packages

Notes: 1. Radioactive material in quantities which offer a very limited radiation risk, may be transported in excepted packages.

2. For other hazardous properties, see the provisions in marginals 2002 (12) and (13), and 3770.

1. *Materials*

2910 Radioactive material, excepted package, limited quantity of material.

(a) Non-fissile radioactive material in amounts which do not exceed the limits specified in Table 1.

(b) Fissile material with an activity which does not exceed the limits specified in Table 1, and in addition, satisfying with regard to amounts, form and packaging the provisions given in marginal 3741 of Appendix A.7 allowing them to be regulated as non-fissile radioactive material packages.

TABLE 1

Activity limits, in terms of A_1 or A_2 values for excepted packages containing radioactive material (1) (2)

Nature of contents	Package limits
Solids	
Special Form	10^{-3} A_1
Other Forms	10^{-3} A_2
Liquids	10^{-4} A_2
Gases	
Tritium	2×10^{-2} A_2
Special Form	10^{-3} A_1
Other Forms	10^{-3} A_2

(1) For specific values of A_1 and A_2, see Table I of marginal 3700 of Appendix A.7.

(2) For mixtures of radionuclides, the methods for determining A_1 and A_2 are provided in marginal 3701 (3) of Appendix A.7.

2704 (cont'd)

2. *Packaging/Package*

Radioactive material in limited quantities may be transported in packagings, tanks and containers, provided that:

(a) The packaging shall be in accordance with the general provisions for all packagings and packages given in marginal 3732 of Appendix A.7 and in addition, for tanks, Appendices B.1a and B.1b.

(b) Packages containing fissile material shall meet at least one of the provisions specified in marginal 3741 of Appendix A.7.

(c) In particular, the package shall be designed so that during routine transport there shall be no leakage of radioactive contents. Radioactive material shall not be carrried in bulk.

3. *Maximum Radiation Level*

See marginal 2702.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2702.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2702.

6. *Mixed Packing*

No provisions.

7. *Mixed Loading*

No provisions.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) Packages

(i) Marking: see marginal 2702

Labelling: No provisions

(ii) The packaging shall be marked 'Radioactive' on an internal surface as a warning of the presence of radioactive material on opening the package.

(b) Containers

No provisions.

(c) Tanks

See Appendix B.1a/B.1b, marginal 211 760/ 212 760 and Appendix B.5.

(d) Overpacks

No provisions.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

No provisions.

2704 (cont'd)

10. *Transport Documents*

The transport document shall include the description '2910 Radioactive material, excepted package, limited quantity of material, 7, Schedule 1, ADR (or RID)'.

11. *Storage and Despatch*

No provisions.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

No provisions.

13. *Other Provisions*

See marginal 2702.

Schedule 2

Instruments or articles in excepted packages

Notes: 1. Specified quantities of radioactive material, which are enclosed in or form a component part of an instrument or other manufactured article, and which offer a very limited radiation risk, may be transported in excepted packages.

2. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2910 Radioactive material, excepted package, instruments or *articles.*

(a) Instruments and manufactured articles such as clocks, electronic tubes or apparatus having as a component part radioactive material in amounts which do not exceed the item and package limits specified in columns 2 and 3 of Table 2, provided the radiation level at 10 cm from the external surface of any unpackaged instrument or article does not exceed 0,1 mSv/h (10 mrem/h).

(b) Instruments and manufactured articles having fissile material in amounts not exceeding the limits specified in Table 2, and in addition, satisfying with regard to amounts, form and packaging the provisions given in marginal 3741 of Appendix A.7 allowing them to be regulated as non-fissile radioactive material packages, provided the radiation level at 10 cm from the external surface of any unpackaged instrument or article does not exceed 0,1 mSv/h (10 mrem/h).

2. *Packaging/Package*

(a) The packaging shall be in accordance with the general provisions for all packagings and packages given in marginal 3732 of Appendix A.7.

(b) Packages containing fissile material shall meet at least one of the provisions specified in marginal 3741 of Appendix A.7.

(c) The instruments and articles shall be securely packed.

(d) Transport of unpackaged radioactive material is not allowed.

2704
(cont'd)

TABLE 2

Activity limits, in terms of A_1 or A_2 values for excepted packages containing instruments and articles (1) (2)

Nature of contents	Item Limits	Package Limits
Solids		
Special Form	10^{-2} A_1	A_1
Other Forms	10^{-2} A_2	A_2
Liquids	10^{-3} A_2	10^{-1} A_2
Gases		
Tritium	2×10^{-2} A_2	2×10^{-1} A_2
Special Form	10^{-3} A_1	10^{-2} A_1
Other Forms	10^{-3} A_2	10^{-2} A_2

(1) For specific values of A_1 and A_2, see Table I of marginal 3700 of Appendix A.7.
(2) For mixtures of radionuclides, the methods for determining A_1 and A_2 are provided in marginal 3701 (3) of Appendix A.7.

3. *Maximum Radiation Level*

See marginal 2702.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2702.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2702.

6. *Mixed Packing*

No provisions.

7. *Mixed Loading*

No provisions.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) Instruments or articles

Each instrument or article (except radio-luminescent time-pieces or devices) shall bear the marking 'Radioactive'.

(b) Packages

See marginal 2702

(c) Containers

No provisions.

(d) Tanks

Not applicable.

(e) Overpacks

No provisions.

2704 (cont'd)

9. *Danger Labels on Vehicles other than Tank-Vehicles*

No provisions.

10. *Transport Documents*

The transport document shall include the description '2910 Radioactive materia, excepted package, instruments or articles, 7, Schedule 2, ADR (or RID)'.

11. *Storage and Despatch*

No provisions.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

No provisions.

13. *Other Provisions*

See marginal 2702.

Schedule 3

Articles manufactured from natural uranium, depleted uranium or natural thorium as excepted packages

Notes: 1. Articles manufactured from unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium which offer a very limited radiation risk may be transported as excepted packages.

2. For other hazardous properties, see also the provisions in marginal 3770.

1. Materials

2910 Radioactive material, excepted package, articles manufactured from natural uranium or *depleted uranium* or *natural thorium.*

Manufactured articles in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium,provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

Note: Such articles may for example be unused packagings intended for the transport of radioactive material.

2. *Packaging/Package*

The article serving as a packaging shall be in accordance with the general provisions for all packagings and packages given in marginal 3732 of Appendix A.7.

3. *Maximum Radiation Level*

See marginal 2702.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2702.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2702.

2704 (cont'd)

6. *Mixed Packing*

No provisions.

7. Mixed Loading

No provisions.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) Packages

See marginal 2702

(b) Containers

No provisions.

(c) Tanks

Not applicable.

(d) Overpacks

No provisions.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

No provisions.

10. *Transport Documents*

The transport document shall include the description '2910 Radioactive material, excepted package, articles manufactured from natural uranium or depleted uranium or natural thorium, 7, Schedule 3, ADR (or RID)'.

11. *Storage and Despatch*

No provisions.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

No provisions.

13. *Other Provisions*

See marginal 2702.

Schedule 4

Empty packagings as excepted packages

Notes: 1. Empty uncleaned packagings which have been used for the transport of radioactive material and which offer a very limited radiation risk, may be transported as excepted packages.

2. (a) Empty uncleaned packagings which, as a result of damage or other mechanical defects, can no longer be closed securely shall, if they cannot be carried in other packagings in accordance with the provisions of this Class, be carried under special arrangements (Schedule 13);

(b) Empty uncleaned packagings on which the internal non-fixed contamination (activity of the residue) exceeds the maximum values given in Section 1 (c) may only be carried as packages in accordance with the various schedules [marginal 2701 (3)], depending on the amount and form of their residual activity and contamination;

2704 *(cont'd)*

(c) Empty packagings which have been cleaned to such an extent that no further contamination exists in excess of the value of 0,4 Bq/cm² (10^{-5} μ Ci/cm²) for beta- or gamma-emitters and 0,04 Bq/cm² (10^{-6} μ Ci/cm²) for alpha-emitters and which do not contain any radioactive material with a specific activity of more than 70 kBq/kg (2 nCi/g) are no longer subject to the provisions of this Class.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2910 Radioactive material, excepted package, empty packaging

(a) Empty uncleaned packagings include empty uncleaned containers or tanks which have been used for the transport of radioactive material.

(b) If the packaging contains any uranium or thorium in its structure, the provision specified in paragraph 2 (c) below shall apply.

(c) The internal non-fixed contamination levels (activity of the residual contents) shall not exceed:

(i) for beta/gamma/low-toxicity alpha emitters, 400 Bq/cm² (10^{-2} μCi/cm²);

(ii) for all other alpha emitters, 40 Bq/cm² (10^{-3} μCi/cm²).

2. *Packaging/Package*

(a) The packaging shall be in accordance with the general provisions for all packagings and packages given in marginal 3732 of Appendix A.7.

(b) The packaging shall be in a well-maintained condition and securely closed.

(c) If the empty packaging includes natural uranium or depleted uranium or natural thorium in its structure, the outer surface of the uranium or thorium shall be covered with an inactive sheath made of metal or some other substantial material.

(d) Any labels displayed to meet marginal 2706 shall no longer be visible.

3. *Maximum Radiation Level*

See marginal 2702.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2702.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2702.

6. *Mixed Packing*

No provisions.

7. *Mixed Loading*

No provisions.

2704 (cont'd)

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) Packages

(i) Marking: see marginal 2702
Labelling: No provisions

(ii) Packages permanently marked in accordance with marginal 2705 need not have these markings removed.

(b) Containers

No provisions.

(c) Tanks

See Appendix B.1a/B.1b, marginal 211 760/ 212 760 and Appendix B.5.

(d) Overpacks

No provisions.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

No provisions.

10. *Transport Documents*

The transport document shall include the description '2910 Radioactive material, excepted package, empty packaging, 7, Schedule 4, ADR (or RID)'.

11. *Storage and Despatch*

No provisions.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

No provisions.

13. *Other Provisions*

See marginal 2702.

Schedule 5

Low specific activity material (LSA-I)

Notes: 1. LSA-I is the first of three groups of radioactive material which by its nature has a limited specific activity or for which limits of estimated average specific activity apply.

2. Fissile material is not permitted to be transported as LSA-I material.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2912 Radioactive material, low specific activity (LSA-I), n.o.s.

2976 Thorium nitrate, solid.

2978 Uranium hexafluoride, fissile excepted or *non-fissile.*

2980 Uranyl nitrate hexahydrate solution.

2981 Uranyl nitrate, solid.

2704 *(cont'd)*

Low specific activity material (LSA-I): radioactive material for which the radiation level at 3 m from the unshielded contents of a single package or in a single load of unpackaged material shall not exceed 10 mSv/h (1 000 mrem/h) and meeting also one of the following descriptions:

(a) ores containing naturally occurring radionuclides (e.g. uranium, thorium); or

(b) uranium and thorium concentrates of ores containing naturally occurring radionuclides; or

(c) solid unirradiated natural uranium or depleted uranium or natural thorium; or

(d) solid or liquid compounds or mixtures of unirradiated natural uranium or depleted uranium or natural thorium; or

(e) non-fissile radioactive material for which the A_2 value is unlimited.

2. *Packaging/Package*

(a) LSA-I material may be transported in packagings, tanks and containers, provided that:

(i) the packaging, which may be a tank or container, meets the design provisions for industrial packages IP-1 or IP-2 (see marginal 3733 or 3734 and in addition, for tanks, marginal 3736 and Appendices B.1a and B.1b) as appropriate for the form of the LSA-I material as specified in Table 3; and

(ii) the material is loaded into the packaging so that, in routine transport, there will be no escape of contents and no loss of shielding.

TABLE 3

Industrial package provisions for LSA-I material

Contents	Exclusive Use	Not Under Exclusive Use
Solids	IP-1	IP-1
Liquids	IP-1	IP-2

(b) LSA-I material may be transported in bulk if:

(i) for other than natural ores, it is transported so that, in routine transport, there will be no escape of contents from the vehicle and no loss of shielding, and it is transported under exclusive use; or

(ii) for natural ores, it is transported in a vehicle under exclusive use.

3. *Maximum Radiation Level*

See marginal 2703.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Overpacks or containers dedicated to the transport of LSA-I material under exclusive use shall be excepted from (a) above with regard to internal contamination only for as long as they remain under that exclusive use.

2704 (cont'd)

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

(a) See marginal 2703.

(b) A vehicle dedicated to the transport of LSA-I material under exclusive use shall be excepted from (a) above with regard to internal contamination only for as long as it remains in that exclusive use.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) For tanks, see Appendix B.1a/B.1b, marginal 211 760/ 212 760 and Appendix B.5.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions, see marginal 2716.

(b) The transport document shall include:

(i) the identification number and the name as per heading 1, together with the words 'Radioactive material, low specific activity (LSA-I), 7, Schedule 5, ADR (or RID)', e.g. '2976 Thorium nitrate, solid, radioactive material, low specific activity (LSA-I), 7, Schedule 5, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, '2912 Radioactive material, low specific activity (LSA-I), n.o.s., 7, Schedule 5, ADR (or RID)'.

Further details specified in marginals 2709 and 2710 shall also be included.

11. *Storage and Despatch*

(a) See marginal 2703.

(b) Total transport index limitation for storage: none.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

(b) Total activity in a single vehicle: no limit.

13. *Other Provisions*

See marginal 2703.

2704
(cont'd)

Schedule 6

Low specific activity material (LSA-II)

Notes: 1. LSA-II is the second of three groups of radioactive material which, by its nature, has a limited specific activity or for which limits of estimated average specific activity apply.

2. If fissile material is present, the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2912 Radioactive material, low specific activity (LSA-II), n.o.s.

2976 Thorium nitrate, solid.

2978 Uranium hexafluoride, fissile excepted or non-fissile.

2980 Uranyl nitrate hexahydrate solution.

2981 Uranyl nitrate, solid.

Low Specific Activity Material (LSA-II): radioactive material for which the radiation level at 3 m from the unshielded contents of a single package shall not exceed 10 mSv/h (1 000 mrem/h) and meeting one of the following descriptions:

(a) water with tritium concentration up to 0,8 TBq/l (20 Ci/l); or

(b) solids and gases with activity distributed throughout of not more than 10^{-4} A_2/g; or

(c) liquids with activity distributed throughout of not more than 10^{-5} A_2/g.

2. *Packaging/Package*

(a) LSA-II material must be transported in packagings, which may be tanks or containers.

(b) The packaging, tank or container shall meet the design provisions for industrial packages IP-2 or IP-3 (see marginal 3734 or 3735 and in addition, for tanks, marginal 3736 and Appendices B.1a and B.1b) as appropriate for the form of the LSA-II material as specified in Table 4.

(c) The material shall be loaded into the packaging, tank or container so that, in routine transport, there will be no escape of contents and no loss of shielding.

TABLE 4

Industrial package provisions for LSA-II material

Contents	Exclusive Use	Not Under Exclusive Use
Solids	IP-2	IP-2
Liquids and gases	IP-2	IP-3

3. *Maximum Radiation Level*

See marginal 2703.

2704 (cont'd)

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Overpacks or containers dedicated to the transport of LSA-II material under exclusive use may be excepted from (a) above with regard to internal contamination only for as long as they remain under that exclusive use.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

(a) See marginal 2703.

(b) A vehicle dedicated to the transport of LSA-II material under exclusive use shall be excepted from (a) above with regard to internal contamination only for as long as it remains in that exclusive use.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) For tanks, see Appendix B.1a/ B.1b, marginal 211 760/ 212 760 and Appendix B.5.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include:

(i) the identification number and the name as per heading 1, together with the words 'Radioactive material, low specific activity (LSA-II), 7, Schedule 6, ADR (or RID)' e.g. '2976 Thorium nitrate, solid, radioactive material, low specific activity (LSA-II), 7, Schedule 6, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, '2912 Radioactive material, low specific activity (LSA-II), n.o.s., 7, Schedule 6, ADR (or RID)'.

Further details specified in marginals 2709 and 2710 shall also be included.

11. *Storage and Despatch*

See marginal 2703.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

2704 *(cont'd)*

(b) Total activity in a single vehicle shall not exceed the values specified in Table 5.

TABLE 5

Vehicle activity limits for LSA-II material

Nature of contents	Vehicle limit
Non-combustible solids	No limit
Combustible solids, and all liquids and gases	100 A_2

13. *Other Provisions*

See marginal 2703.

Schedule 7

Low specific activity material (LSA-III)

Notes: 1. LSA-III is the third of three groups of radioactive material which, by its nature, has a limited specific activity or for which limits of estimated average specific activity apply.

2. If fissile material is present, the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2912 Radioactive material, low specific activity (LSA-III), n.o.s.

Low Specific Activity Material (LSA-III): solid radioactive material for which the radiation level at 3 m from the unshielded contents of a single package shall not exceed 10 mSv/h (1 000 mrem/h) and meeting the following conditions:

(a) the radioactive material is distributed throughout a solid or collection of solid objects or is essentially uniformly distributed in a solid compact binding agent, (e.g. concrete, bitumen, ceramic); and

(b) the radioactive material is relatively insoluble, or is intrinsically contained in a relatively insoluble matrix; and

(c) the estimated average specific activity does not exceed 2×10^{-3} A_2/g.

2. *Packaging/Package*

(a) LSA-III material must be transported in packagings which may be containers. Transport in tanks is not applicable.

(b) The packaging or container shall meet the design provisions for industrial packages IP-2 (see marginal 3734) if transported in exclusive use, or IP-3 (see marginal 3735) if not transported in exclusive use.

(c) The material shall be loaded into the packaging or container so that, in routine transport, there will be no escape of contents and no loss of shielding.

3. *Maximum Radiation Level*

See marginal 2703.

2704 (cont'd)

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Overpacks or containers dedicated to the transport of LSA-III material under exclusive use may be excepted from (a) above with regard to internal contamination only for as long as they remain under that exclusive use.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

(a) See marginal 2703.

(b) A vehicle dedicated to the transport of LSA-III material under exclusive use shall be excepted from (a) above with regard to internal contamination only for as long as it remains in that exclusive use.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

See marginal 2703.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include the description: '2912, Radioactive Material, Low Specific Activity (LSA-III) n.o.s., 7, Schedule 7, ADR (or RID)'. Further details specified in marginals 2709 and 2710 shall also be included.

11. *Storage and Despatch*

See marginal 2703.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

(b) Total activity in a single vehicle shall not exceed the values specified in Table 6.

TABLE 6

Vehicle activity limits for LSA-III material

Nature of contents	Vehicle limit
Non-combustible solids	No limit
Combustible solids	100 A_2

2704 (cont'd) 13. *Other Provisions*

See marginal 2703.

Schedule 8

Surface contaminated objects (SCO-i and SCO-II)

Notes: 1. A surface contaminated object (SCO) is a solid object which is not itself radioactive but which has radioactive material distributed on its surfaces. Surface contaminated objects shall be in one of two groups, either SCO-I or SCO-II, depending on the maximum allowable contamination level (see Table 7).

2. If fissile material is present the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2913 Radioactive material, surface contaminated objects (SCO-I or SCO-II)

(a) Solid, non-radioactive objects contaminated on the surface to a level not exceeding the contamination levels specified in Table 7 when the contamination is averaged over an area of 300 cm^2 (or the area of the surface if less than 300 cm^2).

TABLE 7

Allowable surface contamination for SCO

	Type of contamination	Non-fixed on accessible surface	Fixed on accessible surface	Sum of fixed and non-fixed on the inaccessible surface
SCO-I	Beta/gamma/low toxicity alpha emitters	4 Bq/cm^2 (10^{-4} μCi/cm^2)	4×10^4 Bq/cm^2 (1 μCi/cm^2)	4×10^4 Bq/cm^2 (1 μCi/cm^2)
	All other alpha emitters	0,4 Bq/cm^2 (10^{-5} μCi/cm^2)	4×10^3 Bq/cm^2 (0,1 μCi/cm^2)	4×10^3 Bq/cm^2 (0,1 μCi/cm^2)
SCO-II	Beta/gamma/low toxicity alpha emitters	400 Bq/cm^2 (10^{-2} μCi/cm^2)	8×10^5 Bq/cm^2 (20 μCi/cm^2)	8×10^5 Bq/cm^2 (0,1 μCi/cm^2)
	All other alpha emitters	40 Bq/cm^2 (10^{-3} μCi/cm^2)	8×10^4 Bq/cm^2 (2 μCi/cm^2)	8×10^4 Bq/cm^2 (2 μCi/cm^2)

(b) The radiation level at 3 m from the unshielded content of a single package or from a single object or collection of objects, if unpackaged, shall not exceed 10 mSv/h (1 000 mrem/h).

2. *Packaging/Package*

(a) SCO-I and SCO-II may be transported in packagings provided that:

(i) the packaging, which may be a container, meets the design provisions for industrial packages IP-1 (see marginal 3733) for SCO-I, or IP-2 (see marginal 3734) for SCO-II; and

(ii) the objects are loaded into the packaging so that, in routine transport, there will be no escape of contents and no loss of shielding.

2704 *(cont'd)*

(b) SCO-I may be transported unpackaged, provided that:

(i) it is transported in a vehicle or container so that, in routine transport, there will be no escape of contents and no loss of shielding; and

(ii) it shall be transported under exclusive use if the contamination on the accessible and the inaccessible surfaces is greater than 4 Bq/cm^2 (10^{-4} μCi/cm^2) for beta and gamma emitters and low toxicity alpha emitters or 0,4 Bq/cm^2 (10^{-5} μCi/cm^2) for all other alpha emitters; and

(iii) measures shall be taken to ensure that radioactive material is not released into the vehicle if it is expected that non-fixed contamination exists on inaccessible surfaces in excess of 4 Bq/cm^2 (10^{-4} μCi/cm^2) for beta and gamma emitters and low toxicity alpha emitters, or 0,4 Bq/cm^2 (10^{-5} μCi/cm^2) for all other alpha emitters.

(c) SCO-II shall not be transported unpackaged.

3. *Maximum Radiation Level*

See marginal 2703.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Overpacks or containers dedicated to the transport of SCO under exclusive use may be excepted from (a) above with regard to internal contamination only for as long as they remain under that exclusive use.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

(a) See marginal 2703.

(b) A vehicle dedicated to the transport of SCO under exclusive use shall be excepted from (a) above with regard to internal contamination only for as long as it remains in that specific exclusive use.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

See marginal 2703.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include the description: '2913 Radioactive material, Surface Contaminated Object (SCO-I) or (SCO-II), 7, Schedule 8, ADR (or RID)'. Further details specified in marginals 2709 and 2710 shall also be included.

2704 (cont'd)

11. *Storage and Despatch*

See marginal 2703.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

(b) Total activity in a single vehicle shall not exceed 100 A_2.

13. *Other Provisions*

See marginal 2703.

Schedule 9

Radioactive material in type a packages

Notes: 1. Radioactive material in quantities which offer a limited radiological risk (see marginal 2700 (2) 1.) may be carried in Type A packages, which shall be designed to withstand conditions of transport including minor mishaps.

2. If fissile material is present the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2974 Radioactive material, special form, n.o.s.

2975 Thorium metal, pyrophoric.

2976 Thorium nitrate, solid.

2979 Uranium metal, pyrophoric.

2980 Uranyl nitrate hexahydrate solution.

2981 Uranyl nitrate, solid.

2982 Radioactive material, n.o.s.

The contents of a Type A package shall be restricted to radioactive material:

(a) with an activity not exceeding A_1 (see marginals 3700 and 3701) if in special form; or

(b) with an activity not exceeding A_2 (see marginals 3700 and 3701) if other than in special form.

2. *Packaging/Package*

(a) The packaging, which may also be a tank or container, shall meet the provisions for Type A packages specified in marginal 3737 and in addition, for tanks, Appendices B.1a and B.1b.

(b) In particular, the Type A package shall be designed so that, under conditions of transport including minor mishaps, it will prevent loss or dispersal of the radioactive contents, and loss of shielding integrity which would result in more than a 20 % increase in the external radiation level at any point.

(c) If the radioactive contents are special form radioactive material, competent authority approval of the design for the special form radioactive material is required.

(d) The outside of the Type A package shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that it has not been opened.

2704 (cont'd)

3. *Maximum Radiation Level*

See marginal 2703.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2703.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2703.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Each Type A package shall be legibly and durably marked on the outside with the words 'Type A'.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include:

(i) the identification number and the name as per heading 1, together with the words 'Radioactive material in Type A package, 7, Schedule 9, ADR (or RID)', e.g. '2976 Thorium nitrate, solid, radioactive material in Type A package, 7, Schedule 9, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, '2974 Radioactive material, special form, n.o.s., in Type A package, 7, Schedule 9, ADR (or RID)', or '2982 Radioactive material, n.o.s., in Type A package, 7, Schedule 9, ADR (or RID)', as the case may be.

Further details specified in marginals 2709 and 2710 shall also be included.

11. *Storage and Despatch*

See marginal 2703.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

See marginal 2703.

13. *Other Provisions*

See marginal 2703.

2704
(cont'd)

Schedule 10

Radioactive material in Type B(U) packages

Notes: 1. Radioactive material which exceeds in quantity the Type A package limits may be carried in a Type B(U) package which shall be designed so that it is unlikely to release its radioactive contents or lose its shielding in accident conditions of transport.

2. If fissile material is present the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2974 Radioactive material, special form, n.o.s.

2975 Thorium metal, pyrophoric.

2976 Thorium nitrate, solid.

2979 Uranium metal, pyrophoric.

2980 Uranyl nitrate hexahydrate solution.

2981 Uranyl nitrate, solid.

2982 Radioactive material, n.o.s.

The limit on the total activity in a Type B(U) package shall be as is prescribed in the design approval certificate for that package.

2. *Packaging/Package*

(a) The packaging, which may also be a tank or container, shall meet the provisions for Type B packages specified in marginal 3738, the provisions for Type B(U) packages specified in marginal 3739 and in addition, for tanks, Appendices B.1a and B.1b.

(b) In particular, the Type B(U) package shall be designed so that:

(i) under conditions of transport including minor mishaps, it will restrict the loss or dispersal of the radioactive contents to no more than $A_2 \times 10^{-6}$ per hour, and prevent loss of shielding integrity which would result in more than a 20 % increase in the external radiation level at any point; and

(ii) it will be capable of withstanding the damaging effects of a transport accident as demonstrated by retaining containment and shielding integrity to the extent required by marginals 3738 and 3739.

(c) Approval of the design of Type B(U) packages in accordance with marginal 3752 is required by the competent authority of the country of origin of the design (unilateral approval).

(d) If the radioactive contents are special form radioactive material competent authority approval of the design for the special form radioactive material is required.

(e) The outside of the Type B(U) package shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that it has not been opened.

3. *Maximum Radiation Level*

See marginal 2703.

2704 (cont'd)

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2703.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2703.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Each Type B(U) package shall be legibly and durably marked on the outside with:

(i) the identification mark allocated to that design by the competent authority;

(ii) a serial number to uniquely identify each packaging which conforms to that design;

(iii) the wording 'TYPE B(U)'; and

(iv) the trefoil symbol shown in marginal 2705 (5) embossed or stamped on the outermost fire and water- resistant receptacle.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include:

(i) the identification number and the name as per heading 1, together with the words 'Radioactive material in Type B(U) package, 7, Schedule 10, ADR (or RID)', e.g. '2976 Thorium nitrate, solid, radioactive material in Type B(U) package, 7, Schedule 10, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, '2974 Radioactive material, special form, n.o.s., in Type B(U) package, 7, Schedule 10, ADR (or RID)', or '2982 Radioactive material, n.o.s., in Type B(U) package, 7, Schedule 10, ADR (or RID)', as the case may be.

Further details specified in marginals 2709 and 2710 shall also be included.

(c) The unilateral approval certificate for the package design is required.

(d) Before each shipment of any Type B(U) package, the consignor shall be in possession of all the relevant competent authority approval certificates and shall ensure that copies of them have been submitted, before the first shipment, to the competent authority of each country through or into which the package is to be transported.

(e) Before each shipment where the activity is greater than 3×10^3 A_2 or 3×10^3 A_1, as appropriate, or 1 000 TBq (20 kCi), whichever is the lower, the consignor must notify the competent authorities of all countries affected by the movement, preferably at least seven days in advance.

2704 (cont'd)

11. *Storage and Despatch*

(a) See marginal 2703.

(b) The consignor shall have complied with the relevant pre-use and pre-shipment provisions of marginal 3710.

(c) Any provisions in the competent authority approval certificates shall be observed.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

(b) If the average surface heat flux from a Type B(U) package could exceed 15 W/m^2, any special stowage provisions specified in the competent authority package approval certificate must be observed.

(c) If the temperature of the accessible surface of the Type B(U) package could exceed 50 °C in the shade, carriage is permitted only under exclusive use, for which the surface temperature is limited to 85 °C. Account may be taken of barriers or screens intended to give protection to transport workers without the barriers or screens being subject to any test.

13. *Other Provisions*

See marginal 2703.

Schedule 11

Radioactive material in Type B(M) packages

Notes: 1. Radioactive material which exceeds in quantity the Type A package limits may be carried in a Type B(M) package which shall be designed so that it is unlikely to release its radioactive contents or lose its shielding integrity in accident conditions of transport.

2. If fissile material is present the provisions of Schedule 12 shall be met in addition to the provisions of this Schedule.

3. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2974 Radioactive material, special form, n.o.s.

2975 Thorium metal, pyrophoric.

2976 Thorium nitrate, solid.

2979 Uranium metal, pyrophoric.

2980 Uranyl nitrate hexahydrate solution.

2981 Uranyl nitrate, solid.

2982 Radioactive material, n.o.s.

The limit on the total activity in a Type B(M) package shall be as is prescribed in the design approval certificate for that package.

2704 (cont'd)

2. *Packaging/Package*

(a) The packaging, which may also be a tank or container, shall meet the provisions for Type B packages specified in marginal 3738, the provisions for Type B(M) packages specified in marginal 3740 and in addition, for tanks, Appendices B.1a and B.1b.

(b) In particular, the Type B(M) package shall be designed so that:

(i) under conditions of transport including minor mishaps, it will restrict the loss or dispersal of the radioactive contents to no more than $A_2 \times 10^{-6}$ per hour, and prevent loss of shielding which would result in more than a 20 % increase in the external radiation level at any point; and

(ii) it will be capable of withstanding the damaging effects of a transport accident as demonstrated by retaining containment and shielding integrity to the extent required by marginals 3738 and 3739.

(c) Intermittent venting during transport may be permitted if compensating operational controls are approved by all the competent authorities involved.

(d) Supplementary operational controls necessary to ensure safety of the Type B(M) package during transport or to compensate for the deficiencies from the Type B(U) provisions and any restrictions on mode or conditions of transport shall be approved by all the competent authorities involved.

(e) Approval of the design of Type B(M) packages in accordance with marginal 3753 is required both by the competent authority of the country of origin of the design and of each country through or into which the packages are transported (multilateral approval).

(f) If the radioactive contents are special form radioactive material, competent authority approval of the design for the special form radioactive material is required.

(g) The outside of the Type B(M) package shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that it has not been opened.

3. *Maximum Radiation Level*

See marginal 2703.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See marginal 2703.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2703.

6. *Mixed Packing*

See marginal 2703.

7. *Mixed Loading*

See marginal 2703.

2704 (cont'd)

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Each Type B(M) package shall be legibly and durably marked on the outside with:

(i) the identification mark allocated to that design by the competent authority;

(ii) a serial number to uniquely identify each packaging which conforms to that design;

(iii) the wording 'TYPE B(M)'; and

(iv) the trefoil symbol shown in marginal 2705 (5) embossed or stamped on the outermost fire and water-resistant receptacle.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include:

(i) the identification number and the name as per heading 1, together with the words 'Radioactive material in Type B(M) package, 7, Schedule 11, ADR (or RID)', e.g. '2976 Thorium nitrate, solid, radioactive material in Type B(M) package, 7, Schedule 11, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, '2974 Radioactive material, special form, n.o.s., in Type B(M) package, 7, Schedule 11, ADR (or RID)', or '2982 Radioactive material, n.o.s., in Type B(M) package, 7, Schedule 11, ADR (or RID)', as the case may be.

Further details specified in marginals 2709 and 2710 shall also be included.

(c) The multilateral approval certificates for the package design are required.

(d) If the package is designed to allow for controlled intermittent venting or if the total contents exceed 3×10^3 A_2 or 3×10^3 A_1, as appropriate, or 1 000 TBq (20 kCi), whichever is the lower, certificates of multilateral approval of shipment are required unless the competent authorities involved authorize transport by a specific provision in the certificates for approval of the package design.

(e) Before each shipment of any Type B(M) package, the consignor shall be in possession of all relevant approval certificates.

(f) Before each shipment, the consignor shall notify the competent authorities of all countries affected by the movement, preferably at least seven days in advance.

11. *Storage and Despatch*

(a) See marginal 2703.

(b) The consignor shall have complied with the relevant pre-use and pre-shipment provisions of marginal 3710.

(c) Any provisions in the certificates of approval of the design or the shipment issued by the competent authorities involved must be observed.

2704 (cont'd)

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703 12. (2), (a) to (d).

(b) If the average surface heat flux from a Type B(M) package could exceed 15 W/m^2, any special stowage provisions specified in the competent authority package design approval certificate must be observed.

(c) If the temperature of the accessible surface of the Type B(M) package could exceed 50 °C in the shade, carriage is permitted only under exclusive use, for which the surface temperature is limited to 85 °C. Account may be taken of barriers or screens intended to give protection to transport workers without the barriers or screens being subject to any test.

13. *Other Provisions*

See marginal 2703.

Schedule 12

Fissile material

Notes: 1. Radioactive material which is also fissile material must be packaged, transported and stored so as to meet the provisions for nuclear criticality safety, as stated in this Schedule, and the provisions appropriate to its radioactivity, as stated in Schedules 6 to 11, as appropriate.

2. For other hazardous properties, see also the provisions in marginal 3770.

1. *Materials*

2918 Radioactive material, fissile, n.o.s.

2977 Uranium hexafluoride, fissile containing more than 1,0 % uranium-235.

Fissile material is uranium-233, uranium-235, plutonium-238, plutonium-239, plutonium-241, or any combination of the foregoing, except for unirradiated natural or depleted uranium and natural or depleted uranium which has been irradiated in thermal reactors only.

Consignments of fissile material shall also be in full compliance with the provisions of one of the other Schedules, as appropriate to the radioactivity of the consignment.

2. *Packaging/Package*

(a) The following materials are excepted from the special packaging provisions stated in this Schedule, but must meet the provisions of one of the other Schedules appropriate to the radioactivity of the material:

(i) Fissile material in quantity not exceeding 15 g per package under conditions fully described in marginal 3741 of Appendix A.7.

(ii) Homogeneous hydrogenous solutions in concentrations and quantities limited in accordance with Table III of marginal 3703 of Appendix A.7.

(iii) Enriched uranium distributed homogeneously with not more than 1 % of uranium-235, and with a total plutonium and uranium-233 content not exceeding 1 % of the mass of uranium-235, provided that if the uranium-235 is present in metallic, oxide or carbide forms, it must not form a lattice arrangement within the package.

(iv) Material containing not more than 5 g of fissile material in any 10 litre volume.

(v) Packages containing not more than 1 kg of plutonium in which not more than 20 % by mass consists of plutonium-239, plutonium-241 or any combination of those radionuclides.

2704 *(cont'd)*

(vi) Solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 % by mass with total plutonium and uranium-233 content not exceeding 0,1 % of the mass of uranium-235, and a minimum nitrogen to uranium atomic ratio of 2.

(b) Otherwise packages for fissile material shall meet the design provisions for the type of package necessary for the radioactivity of the fissile material and, in addition, shall meet the additional provisions for packages containing fissile material stated in marginal 3741 of Appendix A.7.

(c) Each design of package for fissile material must be approved by the competent authority of the country of origin of the design and by the competent authorities of each of the countries through or into which the package is to be transported, i.e. multilateral approval is required.

(d) The outside of packages for fissile material shall incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that it has not been opened.

3. *Maximum Radiation Level*

See appropriate Schedule.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

See appropriate Schedule.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See appropriate Schedule.

6. *Mixed Packing*

Only articles or documents which are necessary for the use of the radioactive material are permitted in the package, provided that there is no interaction between them and the packaging or its contents that would reduce the safety (including nuclear criticality safety) of the package.

7. *Mixed Loading*

See marginal 2703.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See appropriate Schedule.

(b) Packages shall be legibly and durably marked externally with:

(i) 'TYPE A', 'TYPE B(U)', 'TYPE B(M)' as appropriate;

(ii) competent authority identification mark.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

See marginal 2703.

2704 (cont'd)

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include the description: '2918 Radioactive material, fissile, n.o.s., in Type IF or Type AF or Type B(U)F or Type B(M)F package, 7, Schedule 12, ADR (or RID)'; or '2977 Uranium hexafluoride, fissile, containing more than 1,0 % uranium-235, radioactive material in approved package, 7, Schedule 12, ADR (or RID)', as the case may be. Further details specified in marginals 2709 and 2710 shall also be included.

(c) The multilateral approval certificates for the fissile material package design are required.

(d) Before each shipment of any fissile material package, the consignor shall be in possession of all relevant approval certificates.

(e) Certificates of multilateral shipment approval are required for packages containing fissile material if the sum of the transport indexes of the packages in the consignment exceeds 50.

(f) For additional documentation provisions, see appropriate Schedule.

11. *Storage and Despatch*

See marginal 2703.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703, 12 (2), (a) to (d).

(b) For consignments under exclusive use, the total transport index limit shall be 100.

(c) Packages of fissile material for which the transport index for nuclear criticality control exceeds 0 shall not be carried in an overpack.

13. *Other Provisions*

See marginal 2703.

Schedule 13

Radioactive material transported under special arrangement

Note: Consignments of radioactive material which do not satisfy all of the applicable provisions of the Schedules 5-12 may be transported under 'special arrangement' [1] subject to the implementation of special provisions approved by the competent authorities. These provisions shall ensure that the overall level of safety in transport and in-transit storage is at least equivalent to that which would be provided if all the applicable provisions had been met.

1. *Materials:*

Materials with substance identification numbers *2912, 2913, 2918, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981* and *2982,* see marginal 2701.

Radioactive materials which may be shipped under special arrangement include any of those materials covered by Schedules 5-11 and, if applicable, Schedule 12.

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[1] The 'special arrangement' should not be confused with the 'special agreement' as covered by Article 4, paragraph 3, of the ADR and by marginals 2010 and 10 602.

2704 (cont'd)

2. *Packaging/Package*

(a) As authorised by the competent authority approval certificate for special arrangement.

(b) Multilateral approval is required.

3. *Maximum Radiation Level*

As authorised by the competent authority approval certificate for special arrangement.

4. *Contamination on Packages, Vehicles, Containers, Tanks and Overpacks*

As authorised by the competent authority approval certificate for special arrangement.

5. *Decontamination and Use of Vehicles, Equipment or Parts thereof*

See marginal 2703.

6. *Mixed Packing*

As authorised by the competent authority approval certificate for special arrangement.

7. *Mixed Loading*

Mixed loading is only permitted if specially authorized by the competent authorities.

8. *Marking and Danger Labels on Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703. However consignments under special arrangement shall always bear III-YELLOW labels conforming to model No 7C.

(b) In addition, other labelling and marking provisions approved by the competent authorities shall be fulfilled.

9. *Danger Labels on Vehicles other than Tank-Vehicles*

(a) See marginal 2703.

(b) In addition, other provisions approved by the competent authorities shall be fulfilled.

10. *Transport Documents*

(a) For a summary of the approval and notification provisions see marginal 2716.

(b) The transport document shall include:

(i) the identification number as per heading 1 and the name as per marginal 2701, together with the words 'Radioactive material, under special arrangement, 7, Schedule 13, ADR (or RID)', e.g. '2976 Thorium nitrate, solid, radioactive material, under special arrangement, 7, Schedule 13, ADR (or RID)'; or

(ii) in the case of material not otherwise specified, the identification number as per heading 1 and the name as per marginal 2701, together with the words 'under special arrangement, 7, Schedule 13, ADR (or RID)', e.g. '2918 Radioactive material, fissile, n.o.s., under special arrangement, 7, Schedule 13, ADR (or RID)'.

2704 *(cont'd)* Further details specified in marginals 2709 and 2710 shall also be included.

(c) Each consignment shall require multilateral approval.

(d) Before each shipment, the consignor shall be in possession of all relevant approval certificates.

(e) Before each shipment the consignor must notify the competent authorities of all countries affected by the movement, preferably at least seven days in advance.

11. *Storage and Despatch*

(a) See marginal 2703.

(b) Specific storage and despatch provisions approved by the competent authorities shall be fulfilled.

(c) Unless specifically excepted by the competent authority approval certificates, the consignor shall have complied with the relevant pre-use and pre-shipment provisions of marginal 3710.

12. *Carriage of Packages, Containers, Tanks and Overpacks*

(a) See marginal 2703.

(b) Specific carriage provisions approved by the competent authorities shall be fulfilled.

13. *Other Provisions*

See marginal 2703.

Marking and Labelling

Note: For radioactive materials having other hazardous properties, the labelling shall also be in accordance with the provisions for the other hazardous properties [see marginal 3770 (3)].

Marking of Packages, including Tanks and Containers

2705 (1) Each package of gross mass exceeding 50 kg shall have its permissible gross mass legibly and durably marked on the outside of the packaging.

(2) Each package, except tanks, containers and overpacks and excepted packages of schedules 1 to 4 shall be clearly and durably marked with the identification number of the goods to be entered in the transport document preceded by the letters 'UN'.

(3) Each package which conforms to a Type A package design shall be legibly and durably marked on the outside of the packaging with 'TYPE A'.

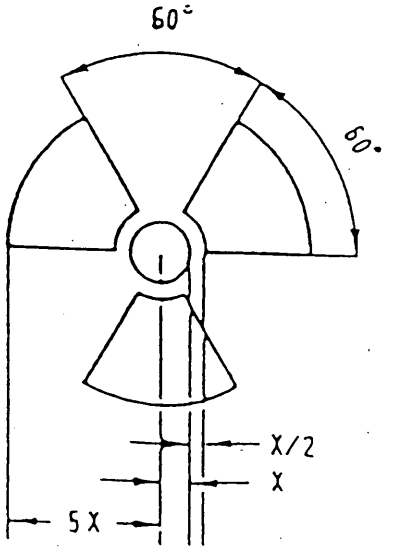
(4) Each package which conforms to a design approved under marginals 3752-3755 shall be legibly and durably marked on the outside of the packaging with:

(a) the identification mark allocated to that design by the competent authority;

(b) a serial number to identify uniquely each packaging which conforms to that design; and

(c) in the case of a Type B(U) or Type B(M) package design, with 'TYPE B(U)' or 'TYPE B(M)'.

2705 *(cont'd)* (5) Each package which conforms to a Type B(U) or Type B(M) package design shall have the outside of the outermost receptacle which is resistant to the effects of fire and water plainly marked by embossing, stamping, or other means resistant to the effects of fire and water with the trefoil symbol shown in the model below.



Basic trefoil symbol with proportions based on a central circle of radius X. The minimum allowable size of X shall be 4 mm.

Labelling of Packages, including Tanks and Containers, and of Overpacks

2706 (1) Each package, overpack, tank and container shall bear the labels which conform to the model No 7A, 7B or 7C according to the appropriate category. Any labels which do not relate to the contents shall be removed or covered. For radioactive materials having other dangerous properties see marginal 3770.

(2) The labels shall be affixed to two opposite sides of the outside of a package or overpack, on the outside of all four sides of a container or tank-container, or in the case of tank-vehicles to the two side walls and the rear wall of the transport unit.

(3) Each label shall be completed with the following information in a clear and indelible manner:

(a) Contents:

(i) Except for LSA-I material, the name of the radionuclide as taken from Table I of Appendix A.7, using the symbols prescribed therein. For mixtures of radionuclides, the most restrictive nuclides must be listed to the extent the space on the line permits. The group of LSA or SCO shall be shown following the name of the radionuclide. The terms 'LSA-II', 'LSA-III', 'SCO-I' and 'SCO-II' shall be used for this purpose;

(ii) For LSA-I material, the term 'LSA-I' is all that is necessary: the name of the radionuclide is not necessary.

(b) Activity:

The maximum activity of the radioactive contents during transport expressed in units of becquerel (Bq) [and, if desired curie (Ci)] with the appropriate SI prefix. [See marginal 2001 (1)]. For fissile material, the total mass in units of gram (g) or multiples thereof, may be used in place of activity.

2706 *(cont'd)* (c) For overpacks, tanks, and containers, the 'contents' and 'activity' entries on the label shall bear the information required in (a) and (b) of this paragraph respectively, totalled together for the entire contents of the overpack, tank, or container except that on labels for overpacks or containers containing mixed loads of packages with different radionuclides, such entries may read 'see transport document'.

(d) Transport index:

See marginal 3715 (3) (no transport index entry required for category I-WHITE).

Additional Marking of Tanks and Vehicles

2707 See marginal 10 500 and Appendix B.5.

Additional Labelling of Containers for carriage in bulk, Containers, Tanks and Vehicles

2708 (1) Tanks and large containers carrying packages other than excepted packages shall bear labels conforming to model No 7D. However, instead of using a label conforming to model Nos 7A, 7B or 7C together with a label conforming to model No 7D, it is permitted as an alternative to use enlarged labels conforming to model Nos 7A, 7B or 7C with the dimensions of model No 7D. Every label shall be affixed in a vertical orientation on all four sides of a container or of a tank-container or, in the case of a tank-vehicle, to the two side walls and the rear wall of the transport unit.

(2) Vehicles carrying packages, overpacks, tank-containers or containers bearing any of the labels conforming to model Nos 7A, 7B or 7C shall display the label conforming to model No 7D on both sides and at the rear. In addition vehicles carrying consignments under exclusive use shall display the label conforming to model No 7D on both sides and at the rear.

(3) Any labels which do not relate to the contents shall no longer be visible.

Additional Particulars of Consignment

2709 In addition to the description of the goods given in the relevant schedule, the consignor shall include in the transport document for each consignment of radioactive material the following information:

(a) the words 'The nature of the goods and the packaging are in conformity with the provisions of ADR.';

(b) the name or symbol of each radionuclide or, for mixture of radionuclides, an appropriate general description or a list of the most restrictive nuclides;

(c) a description of the physical and chemical form of the material, or a statement that the material is special form radioactive material. A generic description is acceptable for chemical form;

(d) the maximum activity of the radioactive contents during transport expressed in units of becquerel (Bq) [and, if desired, curie (Ci)] with the appropriate SI prefix, see marginal 2001 (1). For fissile material, the total mass of fissile material in units of gram (g), or appropriate multiples thereof, may be used in place of activity;

(e) the category of the package, i.e. I-WHITE, II-YELLOW or III-YELLOW;

(f) the transport index (for categories II-YELLOW and III-YELLOW only);

(g) for a consignment of fissile material, where all of the packages in the consignment are excepted under marginal 3703, the words 'Fissile excepted';

(h) the identification mark for each competent authority approval certificate (special form radioactive material, special arrangement, package design, or shipment) applicable to the consignment;

2709 *(cont'd)*

(i) for consignments of packages in an overpack or container, a detailed statement of the contents of each package within the overpack or container and, where appropriate, of each overpack or container in the consignment. If packages are to be removed from the overpack or container at a point of intermediate unloading, appropriate transport documentation shall be made available;

(j) when a consignment is required to be shipped under exclusive use, the statement 'Exclusive use shipment'.

Instruction to Carriers

2710 (1) The consignor shall provide with the transport document information regarding actions, if any, that are required to be taken by the carrier. The information shall include at least the following points:

(a) supplementary operational provisions for loading, stowage, transport, handling and unloading of the package, overpack, container, or tank including any special stowage provisions for the safe dissipation of heat [see marginal 2712 (2)] or a statement that no such provisions are necessary;

(b) any necessary routeing instructions;

(c) written instructions appropriate to the consignment. See marginal 10 385 (1), (2) and (3) and marginal 71 385.

(2) In all cases where approval of the shipment or prior notification to the competent authority is required, the carriers must be informed, if possible, at least 15 days in advance and in any case at least 5 days in advance, in order that they may take in good time any measures required for the transport.

(3) The consignor shall be in a position to provide the certificates of the competent authorities to the carriers before loading, unloading, and any trans-shipment.

Transport

Segregation during transport

2711 (1) Packages, overpacks, containers and tanks shall be segregated during transport:

(a) for radiation control purposes, from places occupied by persons in accordance with Table 8 and from undeveloped photographic film and mailbags, in accordance with Table 9;

Note: Mailbags shall be assumed to contain undeveloped film and plates and therefore be separated from radioactive material in the same way.

and

(b) from other dangerous goods in accordance with marginal 2703, heading 7.

TABLE 8

Minimum distances between packages of category II-YELLOW or of category III-YELLOW and persons

Sum of transport indexes not more than	Minimum distances in metres, no shielding material intervening, from living accommodations or regularly occupied working space in the case of exposure time not exceeding 250 hours per annum
2	1,0
4	1,5
8	2,5
12	3,0
20	4,0
30	5,0
40	5,5
50	6,5

2711 (cont'd) *Note:* The above table is based upon a dose limit of 5 mSv (500 mrem) in any 12 month period.

TABLE 9

Minimum distances between packages of category II-YELLOW or of category III-YELLOW and packages bearing the word 'FOTO', or mailbags

Note: Mailbags shall be assumed to contain undeveloped film and plates and therefore be separated from radioactive material in the same way.

Total number of packages not more than		Sum of transport indexes not more than	Journey or storage duration, in hours							
Category			1	2	4	10	24	48	120	240
III-YELLOW	II-YELLOW		Minimum distances in metres							
		0,2	0,5	0,5	0,5	0,5	1	1	2	3
		0,5	0,5	0,5	0,5	1	1	2	3	5
	1	1	0,5	0,5	1	1	2	3	5	7
	2	2	0,5	1	1	1,5	3	4	7	9
	4	4	1	1	1,5	3	4	6	9	13
	8	8	1	1,5	2	4	6	8	13	18
1	10	10	1	2	3	4	7	9	14	20
2	20	20	1,5	3	4	6	9	13	20	30
3	30	30	2	3	5	7	11	16	25	35
4	40	40	3	4	5	8	13	18	30	40
5	50	50	3	4	6	9	14	20	32	45

Stowage for Transport

2712 (1) Packages shall be so loaded in vehicles that they cannot shift dangerously, upset or fall.

(2) Provided that its average surface heat flux does not exceed 15 W/m^2 and that the immediately surrounding cargo is not in sacks or bags, a package or overpack may be carried among packaged general cargo without any special stowage provisions except as may be specifically required by the competent authority in an applicable approval certificate.

(3) Except in the case of shipment under special arrangement, mixing of packages of different kinds of radioactive material, including fissile material, and mixing of different kinds of packages with different transport indexes is permitted without specific competent authority approval. In the case of shipments under special arrangement, mixing shall not be permitted except as specifically authorized under the special arrangement.

(4) The following provisions shall apply to the loading of tank-vehicles and the loading of packages, overpacks, tank-containers and containers on to vehicles:

(a) The transport index of a tank-vehicle shall not exceed the limits in Table 10. The total number of packages, overpacks, tanks and containers aboard a single vehicle shall be so limited that the total sum of the transport indexes aboard the vehicle does not exceed the values shown in Table 10.

For consignments of LSA-I material there shall be no limit on the sum of the transport indexes.

(b) The radiation level under conditions likely to be encountered in routine transport shall not exceed 2 mSv/h (200 mrem/h) at any point on, and 0,1 mSv/h (10 mrem/h) at 2 m from, the external surface of the vehicle.

2712 *(cont'd)* (5) Any package or overpack having a transport index greater than 10 shall be transported only under exclusive use.

TABLE 10

Transport index limits for containers and vehicles

Type of container or vehicle	Limit on total sum of transport indexes in a single container or aboard a vehicle			
	Not under exclusive use		Under exclusive use	
	Non-fissile Material	Fissile Material	Non-fissile Material	Fissile Material
Small container	50	50	not applicable	not applicable
Large container	50	50	no limit	100
Vehicle	50	50	no limit	100

Additional Provisions

2713 (1) For consignments under exclusive use, the radiation level shall not exceed:

(a) 10 mSv/h (1 000 mrem/h) at any point on the external surface of any package or overpack, and may only exceed 2 mSv/h (200 mrem/h) provided that:

(i) the vehicle is equipped with an enclosure which prevents unauthorized access to the load during transport; and

(ii) provisions are made to secure the package or overpack so that its position within the vehicle remains fixed during routine transport; and

(iii) there are no loading or unloading operations between the beginning and end of the shipment;

(b) 2 mSv/h (200 mrem/h) at any point on the outer surfaces of the vehicle including the upper and lower surfaces, or, in the case of an open vehicle at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, and on the lower external surface of the vehicle; and

(c) 0,1 mSv/h (10 mrem/h) at any point 2 m from the vertical planes represented by the outer lateral surfaces of the vehicle, or, if the load is transported in an open vehicle, at any point 2 m from the vertical planes projected from the outer edges of the vehicle.

(2) The radiation level at any normally occupied position of the vehicle shall not exceed 0,02 mSv/h (2 mrem/h) unless the persons occupying such positions are provided with personal monitoring devices.

Storage in transit

2714 (1) Packages, overpacks, containers and tanks shall be segregated during storage in transit:

(a) for radiation exposure control purposes, from places occupied by persons, in accordance with Table 8 of marginal 2711 and from undeveloped photographic film and mailbags, in accordance with Table 9 of marginal 2711;

Note: Mailbags shall be assumed to contain undeveloped film and plates and therefore be separated from radioactive material in the same way.

(b) from other dangerous goods in accordance with marginal 2703, heading 7.

2714 *(cont'd)* (2) The number of category II-YELLOW and category III-YELLOW packages, overpacks, tanks and containers stored in any one place shall be so limited that the total sum of the transport indexes in any individual group of such packages, overpacks, tanks or containers does not exceed 50. Groups of such packages, overpacks, tanks and containers shall be stored so as to maintain a spacing of at least 6 m from other groups of such packages, overpacks, tanks or containers.

(3) If the transport index of a single package, overpack, tank or container exceeds 50 or the total transport index of a vehicle exceeds 50, as permitted in Table 10, storage shall be such as to maintain a spacing of at least 6 m from other groups of packages, overpacks, tanks, containers or vehicles carrying radioactive material.

(4) Consignments in which the only radioactive contents are LSA-I materials shall be excepted from the provisions of paragraphs (2) and (3) above.

(5) Except in the case of shipment under special arrangement, mixed loading of packages of different kinds of radioactive material, including fissile material, and mixed loading of different kinds of packages with different transport indexes is permitted without specific competent authority approval. In the case of shipment under special arrangement, mixed loading shall not be permitted except as specifically authorized under the special arrangement.

Undeliverable Consignments

2715 If neither the consignor nor the consignee can be identified, or if the consignment cannot be delivered to the consignee and the carrier has no instructions from the consignor the consignment shall be placed in a safe location and the competent authority shall be informed as soon as possible, and a request made for instructions on further action.

Summary of approval and prior notification provisions

2716

Subject	Schedule Number	Competent Authority approval required		Consignor required to notify the competent authorities of the country of origin and of the countries en route (1) before each shipment	Marginals
		Country of origin	Countries en route (1)		
Calculation of unlisted A_1 and A_2 values	—	Yes	Yes	No	3750 f)
Excepted packages					3713
— package design	—	No	No	No	
— shipment	1 to 4	No	No	No	
LSA material (2) and SCO (2)/ Industrial packages types 1, 2 or 3					2700(2), 3714, 3714, 3733, 3734, 3735, 3736
— package design	—	No	No	No	
— shipment	5 to 8	No	No	No	
Type A packages (2)					2700(2), 3737
— package design	—	No	No	No	
— shipment	9	No	No	No	
Type B(U) packages (2)					2700(2), 3719, 3739, 3752
— package design	—	Yes	No	See Note 1	
— shipment	10	No	No	See Note 2	

2716 *(cont'd)*

Subject	Schedule Number	Competent Authority approval required		Consignor required to notify the competent authorities of the country of origin and of the countries en route (1) before each shipment	Marginals
		Country of origin	Countries en route (1)		
Type B(M) packages (2)					2700(2), 3719, 3740, 3753, 3757
— package design	—	Yes	Yes	No	
— shipment	11	See Note 3	See Note 3	Yes	
Packages for fissile material					3741, 3754, 3757
— package design	—	Yes (3)	Yes (3)	No	
— shipment	12	—	—	—	
Sum of transport indexes					
Not more than 50	—	No (4)	No (4)	See Note 2	
Greater than 50	—	Yes	Yes	See Note 2	
Special form radioactive material					3731, 3751, 3761
— design	—	Yes	No	No	
— shipment	See Note 4	See Note 4	See Note 4	See Note 4	
Special Arrangement					3719, 3758, 3762
— shipment	13	Yes	Yes	Yes	
Type B(U) packages, Type B(M) packages and packages containing fissile material, which meet the provisions of ADR applicable on 31 December 1989	—	Yes	Yes	See Note 1	3755

(1) Countries from, through or into which the consignement is transported.
(2) If the radioactive contents are fissile material which is not excepted from the provisions for packages containing fissile material, then the provisions for fissile material packages apply, see marginal 3741.
(3) Designs of packages for fissile material may also require approval in respect of one of the other items in the table.
(4) Shipments may, however, require approval in respect of one of the other items in the table.

Notes: 1. Before first shipment of any package requiring competent authority approval of the design, the consignor must ensure that a copy of the approval certificate for that design has been submitted to the competent authority of each country en route: see marginal 3719 (1).

2. Notification required if contents exceed 3×10^3 A_1, or 3×10^3 A_2, or 1 000 TBq (20 kCi); see marginal 3719 (2).

3. Multilateral approval of shipment required if contents exceed 3×10^3 A_1, or 3×10^3 A_2, or 1 000 TBq (20 kCi); or if controlled intermittent venting is allowed, see marginal 3757.

4. See approval and prior notification provisions for the applicable package.

2717-
2799

CLASS 8

CORROSIVE SUBSTANCES

1. List of substances

2800 (1) Among the substances and articles covered by the title of Class 8, those which are listed in marginal 2801 or are covered by a collective heading in that marginal are subject to the conditions set out in marginals 2800 (2) to 2822 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive.

Note: For the quantities of substances listed in marginal 2801 which are not subject to the provisions for this Class, either in this Annex or in Annex B, see marginal 2801a.

(2) The title of Class 8 covers substances which by chemical action attack epithelial tissue — of skin or mucous membranes — with which tey are in contact, and substances which in the event of leakage are capable of damaging or destroying other goods, or means of transport, and may also cause other hazards. The title of this Class also covers other substances which form a corrosive liquid only in the presence of water, or which produce corrosive vapour or mist in the presence of natural moisture of the air.

(3)

(a) Substances and articles of Class 8 are subdivided as follows:

A. Acid substances;

B. Basic substances;

C. Other corrosive substances;

D. Articles containing corrosive substances;

E. Empty packagings.

(b) Substances and articles of Class 8 which are classified under the various items of marginal 2801 other than substances of 6°, 14° and 15° shall be assigned to one of the following groups designated by the letter (a), (b) and (c) according to their degree of corrosivity:

(a) highly corrosive;

(b) corrosive;

(c) slightly corrosive.

(c) Allocation of substances to groups (a), (b) and (c) has been on the basis of experience taking into account such additional factors as inhalation risk [1] and reactivity with water (including the formation of dangerous decomposition products). The degree of corrosivity of substances not specifically named, including mixtures, can be judged by the length of time of contact necessary to produce full thickness destruction of human skin.

Substances which are judged not to cause full thickness destruction of human skin shall still be considered for their potential to cause corrosion to certain metal surfaces. In making this grouping, account should be taken of human experience in instances of accidental exposure. In the absence of human experience, the grouping should be based on data obtained from animal experiments in accordance with OECD Guideline 404 [2].

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[1] A substance or preparation meeting the criteria of Class 8 having an inhalation toxicity of dusts and mists (LC_{50}) in the range of group(a), but toxicity through oral ingestion or dermal contact only in the range of group(c) or less, shall be allocated to Class 8.

[2] OECD Guidelines for Testing of Chemicals, No 404 'Acute Dermal Irritation/Corrosion' (1992).

2800 *(cont'd)*

(d) Substances that cause full thickness destruction of intact skin tissue within an observation period up to 60 minutes starting after the exposure time of 3 minutes or less are substances of group (a).

(e) Substances that cause full thickness destruction of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than 3 minutes but not more than 60 minutes are substances of group (b).

(f) The following are substances of group (c):

— substances that cause full thickness destruction of intact skin tissue within an observation period up to 14 days starting after the exposure time of more than 60 minutes but not more than 4 hours;

— substances which are judged not to cause full thickness destruction of intact skin tissue, but which exhibit a corrosion rate on steel or aluminium surfaces exceeding 6,25 mm a year at a test temperature of 55 °C. For the purposes of testing steel, type P3 (ISO 2604 (IV); 1975) or a similar type, and for testing aluminium, non-clad types 7075-T6 or AZ5GU-T6 shall be used.

(4) If substances of Class 8, as a result of admixtures, come into different categories of risk from those to which the substances specifically named in marginal 2801 belong, these mixtures or solutions shall be assigned to the items and groups to which they belong on the basis of their actual degree of danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

(5) On the basis of the criteria set out in (3), it may also be determined whether the nature of a solution or a mixture specifically named or containing a specifically named substance is such that the solution or mixture is not subject to the provisions for this class.

(6) For the packaging requirements of marginals 2805 (2), 2806 (3) and 2807 (3), substances and mixtures of substances having a melting point above 45 °C are considered to be solids.

(7)

(a) Flammable corrosive liquids having a flashpoint below 23 °C, other than substances of 54° (a) and 68° (a), are substances of Class 3 (see marginal 2301, items 21° to 26°).

(b) Flammable, slightly corrosive liquids having a flashpoint between 23 °C and 61 °C, are substances of Class 3 (see marginal 2301, 33°).

(c) Corrosive substances which are highly toxic by inhalation, as defined in marginal 2600 (3), are substances of Class 6.1 (see marginal 2601).

(8) The chemically unstable substances of Class 8 are to be accepted for carriage only if the necessary steps have been taken to prevent their dangerous decomposition or polymerization during carriage. To this end it should in particular be ensured that receptacles do not contain any substance liable to promote these reactions.

(9) 1910 calcium oxide and 2812 sodium aluminate, identification numbers assigned in the United Nations Recommendations on the Transport of Dangerous Goods, are not subject to the provisions of this Directive.

(10) The flashpoint referred to below shall be determined in the manner described in Appendix A.3.

A. Acid substances

Inorganic substances

2801 1° Sulphuric acid and similar substances:

(a) *1829 sulphur trioxide, inhibited* (sulphuric anhydride, inhibited), *1831 sulphuric acid, fuming* (oleum), *2240 chromosulphuric acid;*

2801 *(cont'd)*

(b) *1794 lead sulphate* with more than 3 % free acid, *1830 sulphuric acid* with more than 51 % acid, *1832 sulphuric acid, spent, 1833 sulphurous acid, 1906 sludge acid, 2308 nitrosylsulphuric acid, 2583 alkylsulphonic acids, solid* with more than 5 % free sulphuric acid or *2583 arylsulphonic acids, solid* with more than 5 % free sulphuric acid, *2584 alkylsulphonic acids, liquid* with more than 5 % free sulphuric acid or *2584 arylsulphonic acids, liquid* with more than 5 % free sulphuric acid, *2796 sulphuric acid* with not more than 51 % acid or *2796 battery fluid, acid, 2837 bisulphates, aqueous solution* (hydrogensulphate, aqueous solution).

Notes: 1. 2585 alkylsulphonic or arylsulphonic acids, solid and 2586 alkylsulphonic or arylsulphonic acids, liquid with not more than 5 % free sulphuric acid are substances of item 34°.

2. Lead sulphate with not more than 3 % free acid is not subject to the provisions of ADR.

3. Chemically unstable mixtures of sulphuric acid, spent, are not to be accepted for carriage.

(c) *2837 bisulphates, aqueous solution* (hydrogensulphate, aqueous solution).

2° Nitric acids:

(a) 1. *2031 nitric acid,* other than red fuming, with more than 70 % acid.

2. *2032 nitric acid, red fuming;*

(b) 2031 nitric acid, other than red fuming, with not more than 70 % acid.

3° Nitrating acid mixtures:

(a) *1796 nitrating acid mixture* with more than 50 % nitric acid, *1826 nitrating acid mixture, spent* with more than 50 % nitric acid;

(b) 1796 nitrating acid mixture with not more than 50 % nitric acid, 1826 nitrating acid mixture, spent with not more than 50 % nitric acid.

Notes: 1. 1798 nitrohydrochloric acid is not to be accepted for carriage.

2. Chemically unstable mixtures of nitrating acid or mixtures of residual sulphuric and nitric acids, not denitrated, are not to be accepted for carriage.

4° Perchloric acid solution:

(b) *1802 perchloric acid* with not more than 50 % acid, by mass in aqueous solution.

Notes: 1. 1873 perchloric acid aqueous solution with more than 50 % but not more than 72 % pure acid, by mass are substances of Class 5.1 [(see marginal 2501, item 3° (a)].

2. Perchloric acid aqueous solution with more than 72 % pure acid, by mass, or mixtures of perchloric acid with any liquid other than water, are not to be accepted for carriage.

5° Aqueous solutions of hydrogen halides, with the exception of hydrofluoric acid:

(b) *1787 hydriodic acid, 1788 hydrobromic acid, 1789 hydrochloric acid;*

(c) *1787 hydriodic acid, 1788 hydrobromic acid, 1789 hydrochloric acid, 1840 zinc chloride solution, 2580 aluminium bromide solution, 2581 aluminium chloride solution, 2582 ferric chloride solution* (iron trichloride solution).

Note: Hydrogen bromide, anhydrous and hydrogen chloride, anhydrous are substances of Class 2 [see marginal 2201, 3° (at) and 5° (at)].

6° Hydrogen fluoride and hydrofluoric acid solutions with more than 85 % hydrogen fluoride:

1052 hydrogen fluoride, anhydrous, 1790 hydrofluoric acid with more than 85 % hydrogen fluoride.

Note: Special packing provisions are applicable to these substances (see marginal 2803).

2801 *(cont'd)*

7° Solutions of hydrogen fluoride with not more than 85 % hydrogen fluoride:

(a) *1786 hydrofluoric acid and sulphuric acid mixture, 1790 hydrofluoric acid* with more than 60 % but not more than 85 % hydrogen fluoride;

(b) *1790 hydrofluoric acid* with not more than 60 % hydrogen fluoride, *2817 ammonium hydrogendifluoride solution* (ammonium bifluoride solution);

(c) *2817 ammonium hydrogendifluoride solution* (ammonium bifluoride solution).

8° Fluoro-acid substances:

(a) *1777 fluorosulphonic acid;*

(b) *1757 chromic fluoride solution, 1768 difluorophosphoric acid, anhydrous, 1775 fluoroboric acid, 1776 fluorophosphoric acid, anhydrous, 1778 fluorosilicic acid, 1782 hexafluorophosphoric acid;*

(c) *1757 chromic fluoride solution.*

9° Solid fluorides and other solid fluorinated substances which, in contact with moist air or water, emit hydrogen fluoride:

(b) *1727 ammonium hydrogendifluoride, solid, 1756 chromic fluoride, solid, 1811 potassium hydrogendifluoride* (potassium bifluoride), *2439 sodium hydrogendifluoride* (sodium bifluoride), *1740 hydrogendifluorides, n.o.s.;*

(c) *1740 hydrogendifluorides, n.o.s.*

Note: 2505 ammonium fluoride, 1812 potassium fluoride, 1690 sodium fluoride, 2674 sodium fluorosilicate and 2856 fluorosilicates, n.o.s. are substances of Class 6.1 [see marginal 2601, 63° (c), 64° (c) or 87° (c)].

10° Liquid fluorides and other liquid fluorinated substances which, in contact with moist air or water, emit hydrogen fluoride:

(b) *1732 antimony pentafluoride, 2851 boron trifluoride dihydrate.*

Note: 1745 bromine pentafluoride, 1746 bromine trifluoride and 2495 iodine pentafluoride are substances of Class 5.1 (see marginal 2501, 5°).

11° Solid halides and other solid halogenated substances, with the exception of fluorine compounds, which, in contact with moist air or water, emit acid fumes:

(b) *1725 aluminium bromide, anhydrous, 1726 aluminium chloride anhydrous, 1733 antimony trichloride, 1806 phosphorus pentachloride, 1939 phosphorus oxybromide, 2691 phosphorus pentabromide, 2869 titanium trichloride mixture.*

Note: Solid hydrated forms of aluminium bromide and aluminium chloride are not subject to the provisions of this Directive.

(c) *1773 ferric chloride, anhydrous* (iron (III) chloride, anhydrous), *2331 zinc chloride, anhydrous, 2440 stannic chloride pentahydrate, 2475 vanadium trichloride, 2503 zirconium tetrachloride, 2508 molybdenum pentachloride, 2802 copper chloride, 2869 titanium trichloride mixture.*

Note: Ferric chloride hexahydrate is not subject to the provisions of this Directive.

12° Liquid halides and other liquid halogenated substances, with the exception of fluorine compounds, which, in contact with moist air or water, emit acid fumes:

(a) *1754 chlorosulphonic acid* with or without sulphur trioxide, *1758 chromium oxychloride* (chromyl chloride), *1809 phosphorus trichloride, 1828 sulphur chlorides, 1834 sulphuryl chloride, 1836 thionyl chloride, 2444 vanadium tetrachloride, 2692 boron tribromide* (boron bromide), *2879 selenium oxychloride;*

(b) *1730 antimony pentachloride, liquid, 1731 antimony pentachloride solution, 1792 iodine monochloride, 1808 phosphorus tribromide, 1810 phosphorus oxychloride* (phosphoryl chloride), *1817 pyrosulphuryl chloride, 1818 silicon tetrachloride, 1827 stannic chloride, anhydrous, 1837 thiophosphoryl chloride, 1838 titanium tetrachloride, 2443 vanadium oxytrichloride;*

(c) *1731 antimony pentachloride solution.*

2801 (cont'd)

13° Solid hydrogen sulphates:

(b) *2506 ammonium hydrogen sulphate* (ammonium bisulphate), *2509 potassium hydrogen sulphate* (potassium bisulphate).

14° Bromine or bromine solutions:

1744 bromine or *1744 bromine solution.*

Note: Special packing provisions are applicable to these substances (see marginal 2804).

15° Inorganic acid substance in molten form:

2576 phosphorus oxybromide, molten.

16° Solid inorganic acid substances and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *1905 selenic acid, 3260 corrosive solid, acidic, inorganic, n.o.s.;*

(b) *1807 phosphorus pentoxide* (phosphoric acid, anhydrous), *3260 corrosive solid, acidic, inorganic, n.o.s.;*

(c) *2507 chloroplatinic acid, solid, 2578 phosphorus trioxide, 2834 phosphorous acid, 2865 hydroxylamine sulphate, 2967 sulphamic acid, 3260 corrosive solid, acidic, inorganic, n.o.s.*

17° Liquid inorganic acid substances and solutions and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3264 corrosive liquid, acidic, inorganic, n.o.s.;*

(b) *1755 chromic acid solution, 3264 corrosive liquid, acidic, inorganic, n.o.s.;*

(c) *1755 chromic acid solution, 1805 phosphoric acid, 2693 bisulphites, aqueous solution, n.o.s., 3264 corrosive liquid, acidic, inorganic, n.o.s.*

Note: 1463 chromium trioxide, anhydrous (chromic acid, solid) is a substance of Class 5.1 [(see marginal 2501, 31° (b)].

Organic substances

31° Solid carboxylic acids and anhydrides and solid halogenated carboxylic acids and anhydrides:

(b) *1839 trichloroacetic acid, 1938 bromoacetic acid;*

(c) *2214 phthalic anhydride* with more than 0,05 % of maleic anhydride, *2215 maleic anhydride, 2698 tetrahydrophthalic anhydrides* with more than 0,05 % of maleic anhydride, *2823 crotonic acid.*

Notes: 1. Phthalic anhydride and tetrahydrophthalic anhydrides with not more than 0,05 % of maleic anhydride are not subject to the provisions of this class.

2. Phthalic anhydride with not more than 0,05 % of maleic anhydride carried or handed over for carriage in the molten state at a temperature above its flashpoint is a substance of Class 3 (see marginal 2301, 61°).

32° Liquid carboxylic acids and anhydrides and liquid halogenated carboxylic acids and anhydrides:

(a) *2699 trifluoroacetic acid;*

(b) 1. *1764 dichloroacetic acid, 1779 formic acid, 1940 thioglycolic acid, 2564 trichloroacetic acid solution, 2790 acetic acid solution* with not less than 50 % but not more than 80 % acid, by mass;

2. *1715 acetic anhydride, 2218 acrylic acid, inhibited, 2789 acetic acid, glacial* or *2789 acetic acid solution,* with more than 80 % acid, by mass;

2801 (cont'd)

(c) *1848 propionic acid, 2496 propionic anhydride, 2511 2-chloropropionic acid, 2531 methacrylic acid, inhibited, 2564 trichloroacetic acid solution, 2739 butyric anhydride, 2790 acetic acid solution* with more than 25 % but less than 50 % acid, by mass, *2820 butyric acid, 2829 caproic acid.*

Note: Acetic acid solutions with not more than 25 % pure acid by mass, are not subject to the provisions of this Directive.

33° Complex compounds of boron trifluoride:

(a) *2604 boron trifluoride diethyl etherate* (boron trifluoride ether complex);

(b) *1742 boron trifluoride acetic acid complex, 1743 boron trifluoride propionic acid complex.*

Note: 2965 boron trifluoride dimethyl etherate is a substance of Class 4.3 [see marginal 2471, 2° (b)].

34° Alkylsulphonic and arylsulphonic acids and alkylsulphuric acids:

(b) *1803 phenolsulphonic acid, liquid, 2305 nitrobenzenesulphonic acid, 2571 alkylsulphuric acids;*

(c) *2585 alkylsulphonic acids, solid* with not more than 5 % free sulphuric acid or *2585 arylsulphonic acids, solid* with not more than 5 % free sulphuric acid, *2586 alkylsulphonic acids, liquid* with not more than 5 % free sulphuric acid or *2586 arylsulphonic acids, liquid* with not more than 5 % free sulphuric acid.

Note: 2583 alkylsulphonic or arylsulphonic acids, solid and 2584 alkylsulphonic or arylsulphonic acids, liquid with more than 5 % free sulphuric acid are substances of 1° (b).

35° Organic acid halides:

(b) 1. *1716 acetyl bromide, 1729 anisoyl chloride, 1736 benzoyl chloride, 1765 dichloroacetyl chloride, 1780 fumaryl chloride, 1898 acetyl iodide, 2262 dimethylcarbamoyl chloride, 2442 trichloroacetyl chloride, 2513 bromoacetyl bromide, 2577 phenylacetyl chloride, 2751 diethylthiophosphoryl chloride, 2798 phenylphosphorus dichloride, 2799 phenylphosphorus thiodichloride.*

2. *2502 valeryl chloride;*

(c) *2225 benezenesulphonyl chloride.*

36° Alkyl and aryl chlorosilanes having a flashpoint above 61 °C:

(b) *1728 amyltrichlorosilane, 1753 chlorophenyltrichlorosilane, 1762 cyclohexenyltrichlorosilane, 1763 cyclohexyltrichlorosilane, 1766 dichlorophenyltrichlorosilane, 1769 diphenyldichlorosilane, 1771 dodecyltrichlorosilane, 1781 hexadecyltrichlorosilane, 1784 hexyltrichlorosilane, 1799 nonyltrichlorosilane, 1800 octadecyltrichlorosilane, 1801 octyltrichlorosilane, 1804 phenyltrichlorosilane, 2434 dibenzyldichlorosilane, 2435 ethylphenyldichlorosilane, 2437 methylphenyldichlorosilane, 2987 chlorosilanes, corrosive, n.o.s.*

Note: Chlorosilanes which emit flammable gases in contact with water or moist air are substances of Class 4.3 (see marginal 2471, 1°).

37° Alkylchlorosilanes and arylchlorosilanes, having a flashpoint between 23 °C and 61 °C inclusive:

(b) *1724 alkyltrichlorosilane, stabilized, 1747 butyltrichlorosilane, 1767 diethyldichlorosilane, 1816 propyltrichlorosilane, 2986 chlorosilanes, corrosive, flammable, n.o.s.*

Note: Chlorosilanes which emit flammable gases in contact with water or moist air are substances of Class 4.3 (see marginal 2471, 1°).

38° Alkylphosphoric acids:

(c) *1718 butyl acid phosphate, 1793 isopropyl acid phosphate, 1902 diisooctyl acid phosphate, 2819 amyl acid phosphate.*

39° Solid organic acid substances and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *2430 alkylphenols, solid, n.o.s.* (including C_2-C_{12} homologues), *3261 corrosive solid, acidic, organic, n.o.s.;*

2801 (cont'd)

(b) *2430 alkylphenols, solid, n.o.s.* (including C_2-C_{12} homologues), *2670 cyanuric chloride, 3261 corrosive solid, acidic, organic, n.o.s.;*

(c) *2430 alkylphenols, solid, n.o.s.* (including C_2-C_{12} homologues), *3261 corrosive solid, acidic, organic, n.o.s.*

40° Liquid organic acid substances and solutions and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3145 alkylphenols, liquid, n.o.s.* (including C_2-C_{12} homologues), *3265 corrosive liquid, acidic, organic, n.o.s.;*

(b) *3145 alkylphenols, liquid, n.o.s. (including C_2-C_{12} homologues), 3265 corrosive liquid, acidic, organic, n.o.s.;*

(c) *3145 alkylphenols, liquid, n.o.s.* (including C_2-C_{12} homologues), *3265 corrosive liquid, acidic, organic, n.o.s.*

B. Basic substances

Inorganic substances

41° Basic solid compounds of alkali metals:

(b) *1813 potassium hydroxide, solid* (caustic potash), *1823 sodium hydroxide, solid* (caustic soda), *1825 sodium monoxide* (sodium oxide), *2033 potassium monoxide* (potassium oxide), *2678 rubidium hydroxide, 2680 lithium hydroxide monohydrate, 2682 caesium hydroxide;*

(c) *1907 soda lime* with more than 4 % sodium hydroxide, *3253 disodium trioxosilicate pentahydrate* (sodium metasilicate pentahydrate).

Note: Soda lime with not more than 4 % sodium hydroxide is not subject to the provisions of this Directive.

42° Solutions of alkaline substances:

(b) *1814 potassium hydroxide solution* (potash lye), *1819 sodium aluminate solution, 1824 sodium hydroxide solution* (soda lye), *2677 rubidium hydroxide solution, 2679 lithium hydroxide solution, 2681 caesium hydroxide solution, 2797 battery fluid, alkali, 1719 caustic alkali, liquid, n.o.s.;*

(c) *1814 potassium hydroxide solution* (potash lye), *1819 sodium aluminate solution, 1824 sodium hydroxide solution* (soda lye), *2677 rubidium hydroxide solution, 2679 lithium hydroxide solution, 2681 caesium hydroxide solution, 1719 caustic alkali liquid, n.o.s.*

43° Ammonia solutions:

(c) *2672 ammonia solution,* relative density between 0,88 and 0,957 at 15 °C in water with more than 10 % but not more than 35 % ammonia.

Notes: 1. Ammonia solutions with more than 35 % ammonia are substances of Class 2 [see marginal 2201, 9° (at)].

2. Ammonia solutions with not more than 10 % ammonia are not subject to the provisions of this Directive.

44° Hydrazine and its aqueous solutions:

(a) *2029 hydrazine, anhydrous;*

(b) *2030 hydrazine hydrate* or *2030 hydrazine, aqueous solution* with not less than 37 % but not more than 64 % hydrazine, by mass;

Note: 3293 hydrazine, aqueous solution with not more than 37 % hydrazine, by mass, is a substance of Class 6.1 [see marginal 2601, 65° (c)].

2801 (cont'd)

45° Sulphides and hydrogen sulphides and their aqueous solutions:

(b) 1. *1847 potassium sulphide, hydrated* with not less than 30 % water of crystallization, *1849 sodium sulphide, hydrated* with not less than 30 % water, *2818 ammonium polysulphide solution, 2949 sodium hydrosulphide, hydrated* with not less than 25 % water of crystallization;

2. *2683 ammonium sulphide solution;*

(c) *2818 ammonium polysulphide solution.*

Note: 1382 anhydrous potassium sulphide and 1385 anhydrous sodium sulphide and their hydrates with less than 30 % water of crystallization, and 2318 sodium hydrosulphide with less than 25 % water of crystallization are substances of Class 4.2 [see marginal 2431, 13° (b)].

46° Solid inorganic basic substances and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3262 corrosive solid, basic, inorganic, n.o.s.;*

(b) *3262 corrosive solid, basic, inorganic, n.o.s.;*

(c) *3262 corrosive solid, basic, inorganic, n.o.s.*

47° Liquid inorganic basic substances and solutions and mixtures of these substances (such as (cont'd) preparations and wastes) which cannot be classified under other collective headings:

(a) *3266 corrosive liquid, basic, inorganic, n.o.s.;*

(b) *3266 corrosive liquid, basic, inorganic, n.o.s.;*

(c) *3266 corrosive liquid, basic, inorganic, n.o.s.*

Organic substances

51° Tetra-alkylammonium hydroxides:

(b) *1835 tetramethylammonium hydroxide.*

52° Solid amines and polyamines:

(a) *3259 amines, solid, corrosive, n.o.s.* or *3259 polyamines, solid, corrosive, n.o.s.;*

(b) *3259 amines, solid, corrosive, n.o.s.* or *3259 polyamines, solid, corrosive, n.o.s.;*

(c) *2280 hexamethylenediamine, solid, 2579 piperazine* (diethylenediamine), *3259 amines, solid, corrosive, n.o.s.* or *3259 polyamines, solid, corrosive, n.o.s.*

53° Liquid amines and polyamines or amino-alcohols, highly corrosive or corrosive, having a flashpoint above 61 °C:

(a) *2735 amines, liquid, corrosive, n.o.s.* or *2735 polyamines, liquid, corrosive, n.o.s.;*

(b) *1761 cupriethylenediamine solution, 1783 hexamethylenediamine solution, 2079 diethylenetriamine, 2259 triethylenetetramine, 2735 amines, liquid, corrosive, n.o.s.* or *2735 polyamines, liquid, corrosive, n.o.s.;*

(c) *1761 cupriethylenediamine solution,* 1783 hexamethylenediamine solution, *2269 3,3'-iminodipropylamine* (bisaminoproylamine, dipropylenetriamine), *2289 isophoronediamine, 2320 tetraethylenepentamine, 2326 trimethylcyclohexylamine, 2327 trimethylhexamethylenediamines, 2491 ethanolamine, 2491 ethanolamine solution, 2542 tributylamine, 2565 dicyclohexylamine, 2815 N-aminoethylpiperazine, 3055 2-(2-aminoethoxy)ethanol, 2735 amines, liquid, corrosive, n.o.s.* or *2735 polyamines, liquid, corrosive, n.o.s.*

2801 (cont'd)

54° Liquid amines and polyamines, highly corrosive or corrosive, flammable having a boiling point greater than 35 °C:

(a) *2734 amines, liquid, corrosive, flammable, n.o.s.* or *2734 polyamines, liquid, corrosive, flammable, n.o.s.;*

(b) *1604 ethylenediamine, 2051 2-dimethylaminoethanol, 2248 di-n-butylamine, 2258 1,2-propylenediamine, 2264 dimethylcyclohexylamine, 2357 cyclohexylamine, 2619 benzyldimethylamine, 2685 N,N-diethylethylenediamine, 2734 amines, liquid, corrosive, flammable, n.o.s.* or *2734 polyamines, liquid, corrosive, flammable, n.o.s.*

55° Solid organic basic substances and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3263 corrosive solid, basic, organic, n.o.s.;*

(b) *3263 corrosive solid, basic, organic, n.o.s.;*

(c) *3263 corrosive solid, basic, organic, n.o.s.*

56° Liquid organic basic substances and solutions and mixtures ofthese substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3267 corrosive liquid, basic, organic, n.o.s.;*

(b) *3267 corrosive liquid, basic, organic, n.o.s.;*

(c) *3267 corrosive liquid, basic, organic, n.o.s.*

C. Other corrosive substances

61° Chlorite and hypochlorite solutions:

(b) *1791 hypochlorite solution* with not less than 16 % available chlorine, *1908 chlorite solution,* with not less than 16 % available chlorine;

(c) *1791 hypochlorite solution* with more than 5 % but less than 16 % available chlorine, *1908 chlorite solution,* with more than 5 % but less than 16 % available chlorine.

Notes: 1. Chlorite and hypochlorite solutions with not more than 5 % available chlorine are not subject to the provisions of this Directive.

2. Solid chlorites and hypochlorites are substances of Class 5.1 (see marginal 2501, 14°, 15° and 29°).

62° Chlorophenolates and phenolates:

(c) *2904 chlorophenolates, liquid* or *2904 phenolates, liquid, 2905 chlorophenolates, solid* or *2905 phenolates, solid.*

63° Formaldehyde solutions:

(c) *2209 formaldehyde solution* with not less than 25 % formaldehyde.

Notes: 1. 1198 formaldehyde solutions, flammable are substances of Class 3 [see marginal 2301, 33° (c)].

2. Formaldehyde solutions, non-flammable, with less than 25 % formaldehyde are not subject to the provisions of this Directive.

64° Chloroformates and chlorothioformates:

(a) *1739 benzyl chloroformate;*

(b) *2826 ethyl chlorothioformate.*

Note: Chloroformates having predominantly toxic properties are substances of Class 6.1 (see marginal 2601, 10°, 17°, 27° and 28°).

2801 *(cont'd)*

65° Solid corrosive substances and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *1759 corrosive solid, n.o.s.;*

(b) *1770 diphenylmethyl bromide, 1759 corrosive solid, n.o.s., 3147 dye, solid, corrosive, n.o.s.* or *3147 dye intermediate, solid, corrosive, n.o.s.; 3244 solids containing corrosive liquid, n.o.s.*

Note: Mixtures of solids not subject to the provisions of this Directive and corrosive liquids may be carried under number 3244, without being subject to the classification criteria of marginal 2800 (3), provided there is no free liquid visible at the time the substance is loaded or at the time the transport unit is closed. Each packaging shall correspond to a design type which has passed the leakproofness test for group (b) level.

(c) *2803 gallium, 1759 corrosive solid, n.o.s., 3147 dye, solid, corrosive, n.o.s.* or *3147 dye intermediate, solid, corrosive, n.o.s.*

Note: Special conditions of packing are applicable to 2803 gallium [see marginal 2807 (4)].

66° Liquid corrosive substances and solutions and mixtures of these substances (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *1760 corrosive liquid, n.o.s., 1903 disinfectant, liquid, corrosive, n.o.s.;*

(b) *2226 benzotrichloride* (trichloromethylbenzene), *2705 1-pentol* (3-methyl-2-pentene-4-yne-1-ol), *3066 paint* (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *3066 paint related material* including paint thinning or reducing compound, *1760 corrosive liquid, n.o.s., 1903 disinfectant, liquid, corrosive, n.o.s., 2801 dye, liquid, corrosive, n.o.s.* or *2801 dye intermediate, liquid, corrosive, n.o.s.;*

(c) *2809 mercury, 3066 paint* (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or *3066 paint related material* including paint thinning or reducing compound, *1760 corrosive liquid, n.o.s., 1903 disinfectant, liquid, corrosive, n.o.s., 2801 dye, liquid, corrosive, n.o.s.* or *2801 dye intermediate, liquid, corrosive, n.o.s.*

Notes: 1. Special conditions of packing are applicable to 2809 mercury [see marginal 2807 (4)].

2. Any substance of this Directive specifically listed by name under other items may not be carried under the entries for 3066 paint or 3066 paint related material.

Substances carried under these entries may contain 20 % or less nitrocellulose provided the nitrocellulose contains not more than 12,6 % nitrogen.

67° Solid corrosive substances and mixtures of these substances, (such as preparations and wastes), flammable, which cannot be classified under other collective headings:

(a) *2921 corrosive solid, flammable, n.o.s.;*

(b) *2921 corrosive solid, flammable, n.o.s.*

68° Liquid corrosive substances and solutions and mixtures of these substances, (such as preparations and wastes), flammable, having a boiling point greater than 35 °C, which cannot be classified under other collective headings:

(a) *2920 corrosive liquid, flammable, n.o.s.;*

(b) *2920 corrosive liquid, flammable, n.o.s.*

2801 *(cont'd)*

69° Solid corrosive substances and mixtures of these substances, self-heating, (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3095 corrosive solid, self-heating, n.o.s.;*

(b) *3095 corrosive solid, self-heating, n.o.s.*

70° Liquid corrosive substances and solutions and mixtures of these substances, self-heating, (such as preparations and wastes), which cannot be classified under other collective headings:

(a) *3301 corrosive liquid, self-heating, n.o.s.;*

(b) *3301 corrosive liquid, self-heating, n.o.s.*

71° Solid corrosive substances and mixtures of these substances, (such as preparations and wastes) which, in contact with water, emit flammable gases, and which cannot be classified under other collective headings:

(a) *3096 corrosive solid, water-reactive, n.o.s.;*

(b) *3096 corrosive solid, water-reactive, n.o.s.*

Note: The term 'Water-reactive' denotes a substance which, in contact with water, emits flammable gases.

72° Liquid corrosive substances and solutions and mixtures of these substances (such as preparations and wastes) which, in contact with water, emit flammable gases and which cannot be classified under other collective headings:

(a) *3094 corrosive liquid, water-reactive, n.o.s.;*

(b) *3094 corrosive liquid, water-reactive, n.o.s.*

Note: The term 'water-reactive' denotes a substance which, in contact with water, emits flammable gases.

73° Solid corrosive substances and mixtures of these substances, oxidizing, (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3084 corrosive solid, oxidizing, n.o.s.;*

(b) *3084 corrosive solid, oxidizing, n.o.s.*

74° Liquid corrosive substances and solutions and mixtures of these substances, oxidizing, (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *3093 corrosive liquid, oxidizing, n.o.s.;*

(b) *3093 corrosive liquid, oxidizing, n.o.s.*

75° Solid corrosive substances and mixtures of these substances, toxic (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *2923 corrosive solid, toxic, n.o.s.;*

(b) *2923 corrosive solid, toxic, n.o.s.;*

(c) *2923 corrosive solid, toxic, n.o.s.*

76° Liquid corrosive substances and solutions and mixtures of these substances, toxic, (such as preparations and wastes) which cannot be classified under other collective headings:

(a) *2922 corrosive liquid, toxic, n.o.s.;*

(b) *2922 corrosive liquid, toxic, n.o.s.;*

(c) *2922 corrosive liquid, toxic, n.o.s.*

2801 (cont'd)

D. Articles containing corrosive substances

81° Batteries:

(c) *2794 batteries, wet, filled with acid,* electric storage, *2795 batteries, wet, filled with alkali,* electric storage, *2800 batteries, wet, non-spillable,* electric storage, *3028 batteries, dry containing potassium hydroxide solid,* electric storage.

Notes: 1. Special conditions of packing are applicable to these articles [see marginal 2807 (5)]

2. Batteries (identification number 2800) can be considered as non-spillable provided that they are capable of withstanding the vibration and pressure differential tests given below, without leakage of battery fluid.

Vibration test: The battery is rigidly clamped to the platform of a vibration machine and a simple harmonic motion having an amplitude of 0,8 mm (1,6 mm maximum total excursion) is applied. The frequency is varied at the rate of 1 Hz/min between the limits of 10 Hz to 55 Hz. The entire range of frequencies and return is traversed in 95 ± 5 minutes for each mounting position (direction of vibration) of the battery. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for equal time periods.

Pressure differential test: Following the vibration test, the battery is stored for six hours at 24 °C ± 4 °C while subjected to a pressure differential of at least 88 kPa. The battery is tested in three mutually perpendicular positions (to include testing with fill openings and vents, if any, in an inverted position) for at least six hours in each position.

82° Other articles containing corrosive substances:

(b) *1774 fire extinguisher charges,* corrosive liquid, *2028 bombs, smoke, non-explosive* with corrosive liquid, without initiating device.

E. Empty packagings

91° *Empty packagings,* including *empty intermediate bulk containers* (IBCs), *empty tankvehicles, empty demountable tanks, empty tank-containers,* uncleaned, as well as *empty vehicles* for carriage in bulk and *empty small* bulk *containers,* uncleaned, having contained substances of Class 8.

2801a Neither the provisions of this class contained in this Annex nor those contained in Annex B are aplicable to:

(1) Substances of 1° to 5°, 7° to 13°, 16°, 17°, 31° to 47°, 51° to 56° and 61° to 76°, carried in conformity with the following provisions:

(a) Substances classified under (a) of each item:

Liquids: not more than 100 ml per inner packaging and not more than 400 ml per package;

Solids: not more than 500 g per inner packaging and not more than 2 kg per package.

(b) Substances classified under (b) of each item:

Liquids: not more than 1 litre per inner packaging and not more than 4 litres per package;

Solids: not more than 3 kg per inner packaging and not more than 12 kg per package.

(c) Substances classified under (c) of each item:

Liquids: not more than 3 litres per inner packaging and not more than 12 litres per package;

Solids: not more than 6 kg per inner packaging and not more than 24 kg per package.

These quantities of substances shall be carried in combination packagings which at least meet the conditions of marginal 3538.

The 'General conditions of packing' of marginal 3500 (1), (2) and (5) to (7) shall be observed.

(2) Non-spillable batteries with identification number 2800 of 81° if at temperature of 55 °C, the electrolyte will not flow from a ruptured or cracked case and there is no free liquid to flow and if when packaged for carriage, the terminals are protected from short circuits.

(3) Manufactured articles or instruments containing not more than 1 kg mercury of 66° (c).

2. Provisions

A. Packages

1. General conditions of packing

2802 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in marginals 2803 to 2808.

(2) Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 2800 (3) (b) and 3511 (2) or 3611 (2) respectively the following shall be used:

— packagings of packing group I, marked with the letter 'X', for the highly corrosive substances classified under the letter (a) of each item;

— packagings of packing group II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for the corrosive substances classified under the letter (b) of each item;

— packagings of packing group III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs of packing group III or II, marked with the letter 'Z' or 'Y', for the slightly corrosive substances classified under the letter (c) of each item.

Note: For the carriage of substances of Class 8 in tank-vehicles, demountable tanks or tank-containers, and for the carriage in bulk of solids of this Class, see Annex B.

2. Special conditions for packing of certain substances

2803 Hydrogen fluoride, anhydrous and hydrofluoric acid solution containing more than 85 % hydrogen fluoride of 6° shall be packed in pressure receptacles made of carbon steel or suitable alloy steel. The following pressure receptacles shall be permitted:

(a) cylinders having a capacity not exceeding 150 litres;

(b) receptacles having a capacity of not less than 100 litres and not more than 1 000 litres (for example, cylindrical receptacles fitted with rolling hoops or receptacles mounted on skids).

The pressure receptacles shall satisfy the relevant requirements of Class 2 (see marginals 2211, 2213 (1) and (2), 2215, 2216 and 2218).

The wall thickness of the pressure receptacles shall not be less than 3 mm.

Before being used for the first time, pressure receptacles shall be subjected to a hydraulic pressure test at a pressure of not less than 1 MPa (10 bar) gauge pressure. The pressure test shall be repeated every eight years and shall be accompanied by an internal inspection of the pressure receptacles and a check of their equipment. In addition, the resistance of the pressure receptacles to corrosion shall be checked by means of suitable instruments (e.g. by ultrasound), and the condition of the equipment verified, every two years.

The tests and inspections shall be carried out under the supervision of an expert approved by the competent authority.

The maximum mass of the contents per litre of capacity for hydrogen fluoride, anhydrous or hydrofluoric acid solution shall not exceed 0,84 kg.

2804 (1) Bromine and bromine solution of 14° shall be packed in glass inner packagings, containing not more than 2,5 litres each, or in polyvinylidene fluoride (PVDF) inner packagings containing not more than 15 litres each which shall be placed in combination packagings conforming to marginal 3538. The combination packagings shall be tested and approved in accordance with Appendix A.5 for packing group I.

2804 *(cont'd)*

(2) Bromine containing less than 0,005 % water, or between 0,005 % and 0,2 % water, provided that in the latter case measures are taken to prevent corrosion of the lining of the receptacles, may also be carried in receptacles satisfying the following conditions:

(a) the receptacles shall be made of steel and be equipped with a leakproof lining made of lead or of some other material affording equivalent protection and with a hermetic closure; receptacles made of monel metal or nickel, or with a nickel lining, shall also be permitted;

(b) the capacity of the receptacles shall not exceed 450 litres;

(c) the receptacles shall not be filled to more than 92 % of their capacity or more than 2,86 kg per litre of capacity;

(d) the receptacles shall be welded and designed for a calculation pressure of not less than 2,1 MPa (21 bar) gauge pressure. The materials and workmanship shall in other respects meet the relevant requirements of Class 2 [see marginal 2211 (1)]. The initial test of unlined steel receptacles shall be subject to the provisions of Class 2 [see marginals 2215 (1) and 2216 (1)];

(e) the closures shall project as little as possible from the receptacle and be fitted with protective caps. The closures and caps shall be fitted with gaskets made of a material not capable of being attacked by bromine. The closures shall be in the upper part of the receptacles in such a manner that they can in no case be in permanent contact with the liquid phase;

(f) the receptacles shall be provided with fittings enabling them to stand stably upright, and with lifting attachments (rings, flanges, etc.) at the top, which shall be tested at twice the working load.

(3) Before being put into service, receptacles in conformity with (2) above shall be subjected to a leakproofness test at a pressure of at least 200 kPa (2 bar) gauge pressure. The leakproofness test shall be repeated every two years and shall be accompanied by an internal inspection of the receptacle and a check of its tare. The test and the inspection shall be carried out under the supervision of an expert approved by the competent authority.

(4) Receptacles in conformity with (2) shall bear, in clearly legible and durable characters:

— the name of the manufacturer or the manufacturing mark and the number of the receptacle,

— the word 'Bromine',

— tare mass of the receptacle and the permissible maximum mass of the filled receptacle,

— date (month, year) of the initial test and of the latest periodical test,

— stamp of the expert who carried out the tests and inspections.

2805

(1) Substances classified under (a) of the various items shall be packed in:

(a) non-removable head steel drums conforming to marginal 3520, or

(b) non-removable head aluminium drums conforming to marginal 3521, or

(c) non-removable head steel jerricans conforming to marginal 3522, or

(d) non-removable head plastics drums of a capacity not exceeding 60 litres or nonremovable head plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings with inner packagings of glass, plastics or metal conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539.

Note 1 to (d): The permissible period of use for packagings intended for the carriage of nitric acid of 2°(a) and hydrofluoric acid solution of 7°(a) shall be two years from the date of their manufacture.

Note 2 to (f) and (g): Inner packagings or receptacles of glass shall not be permitted for fluorides of 7°(a), 8°(a) or 33°(a).

2805 *(cont'd)*

(2) Solid substances within the meaning of marginal 2800 (5) may also be packed in:

(a) removable head drums conforming to marginals 3520 for steel, 3521 for aluminium, 3523 for plywood, 3525 for fibreboard, or 3526 for plastics material, or in removable head jerricans conforming to marginals 3522 for steel or 3526 for plastics material, if necessary with one or more sift-proof inner bags; or

(b) combination packagings conforming to marginal 3538, with one or more sift-proof inner bags.

2806

(1) Substances classified under (b) of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums or plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539.

Note 1 to (a), (b), (c) and (d): Simplified conditions are applicable to removable head drums and jerricans for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solid substances (see marginals 3512, 3553, 3554 and 3560).

Note 2 to (d): The permissible period of use for packagings intended for the carriage of nitric acid containing more than 55 % pure acid of 2° (b) and hydrofluoric acid solution of 7° (b) shall be two years from the date of their manufacture.

Note 3 to (f) and (g): Inner packagings or receptacles of glass shall not be permitted for fluorides of 7° (b), 8° (b), 9° (b), 10° (b) or 33° (b).

(2) Substances classified under (b) of the various items which have a vapour pressure at 50 °C of not more than 110 kPa (1,10 bar) may also be packed in metal IBCs conforming to marginal 3622, rigid plastics IBCs conforming to marginal 3624 or composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

(3) Solid substances within the meaning of marginal 2800 (5) may also be packed in:

(a) drums conforming to marginals 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags, or

(b) water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material, 3535 for plastics film or 3536 for water-resistant paper, provided the goods are carried as a full load or the bags are secured on pallets, or

(c) composite IBCs with plastics inner receptacle conforming to marginal 3625, fibreboard IBCs conforming to marginal 3626 or wooden IBCs conforming to marginal 3627, or

(d) flexible IBCs conforming to marginal 3623 with the exception of IBCs of types 13H1, 13L1 and 13M1, and provided that the goods are carried as a full load or the flexible IBCs are loaded on pallets.

(4) Articles of 82° shall be packed as follows:

(a) fire extinguisher charges, corrosive liquid, in wooden boxes conforming to marginals 3527, 3528 or 3529, or fibreboard boxes conforming to marginal 3530, or expanded plastics boxes of type 4H1 conforming to marginal 3531.

2806 *(cont'd)* (b) bombs, smoke, non-explosive with corrosive liquid, without initiating device, individually with cushioning material in boxes, tubes or partitioned compartments in either wooden boxes conforming to marginals 3527, 3528 or 3529, or steel boxes of type 4A conforming to marginal 3532.

2807 (1) Substances classified under (c) except gallium of 65° (c) and mercury of 66° (c), of the various items shall be packed in:

(a) steel drums conforming to marginal 3520, or

(b) aluminium drums conforming to marginal 3521, or

(c) steel jerricans conforming to marginal 3522, or

(d) plastics drums or plastics jerricans conforming to marginal 3526, or

(e) composite packagings (plastics material) conforming to marginal 3537, or

(f) combination packagings conforming to marginal 3538, or

(g) composite packagings (glass, porcelain or stoneware) conforming to marginal 3539, or

(h) light gauge metal packagings conforming to marginal 3540.

Note to (a), (b), (c), (d) and (h): Simplified conditions are applicable to removable head drums, jerricans and light gauge metal packagings for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C and for solid substances (see marginals 3512, 3552 to 3554 and 3560).

(2) Substances classified under (c) except gallium of 65° (c) and mercury of 66° (c), of the various items which have a vapour pressure at 50 °C of not more than 110 kPa (1,10 bar) may also be packed in metal IBCs conforming to marginal 3622, rigid plastics IBCs conforming to marginal 3624 or composite IBCs with rigid plastics inner receptacle conforming to marginal 3625.

(3) Solid substances within the meaning of marginal 2800 (5) may also be packed:

(a) in drums conforming to marginals 3523 for plywood, or 3525 for fibreboard, if necessary with one or more sift-proof inner bags, or

(b) in water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material or 3535 for plastics film or 3536 for water-resistant paper, or

(c) in flexible IBCs conforming to marginal 3623 with the exception of IBCs of types 13H1, 13L1 and 13M1 or in composite IBCs with flexible plastics inner receptacle conforming to marginal 3625 or in fibreboard IBCs conforming to marginal 3626 or wooden IBCs conforming to marginal 3627.

(4)

(a) Gallium of 65° (c) and mercury of 66° (c) shall be packed in combination packagings conforming to marginal 3538. These combination packagings may consist of glass, porcelain, stoneware or plastics inner packagings, maximum net quantity of 10 kg.

The following outer packagings may be used:

— natural wood boxes conforming to marginal 3527;

— plywood boxes conforming to marginal 3528;

— reconstituted wood boxes conforming to marginal 3529;

2807 *(cont'd)*

— fibreboard boxes conforming to marginal 3530;

— plastics boxes conforming to marginal 3531;

— removable-head steel drums conforming to marginal 3520;

— removable-head steel jerricans conforming to marginal 3522;

— plywood drums conforming to marginal 3523;

— fibre drums conforming to marginal 3525;

— or in removable head plastics drums conforming to marginal 3526.

(b) Mercury may also be packed in welded steel bottles with inner vaulted bottoms as single packagings. The closure shall be a bolt with a conical thread and the opening shall not exceed 20 mm.

(5)

(a) Articles of 81°, except batteries, wet, non-spillable, shall be fastened with inert cushioning material or in an equivalent manner in wooden boxes or in rigid plastics boxes or in a wooden slatted crate. Batteries shall be insulated against short-circuiting.

(b) Non-spillable type batteries (identification number 2800) shall be protected against short-circuits and shall be securely packed in strong outer packagings.

Note: Non-spillable batteries which are an integral part of, and necessary for, the operation of mechanical or electronic equipment, shall be securely fastened in the battery holder on the equipment and protected in such a manner as to prevent damage and short circuits.

(c) Articles of 81° may be carried on pallets. They shall be stacked and adequately secured in tiers separated by a layer of non-conductive material. Battery terminals shall not, in any case, support the weight of other superimposed elements. Batteries shall be isolated in such a manner as to prevent short-circuits.

Each battery need not be marked and labelled if the pallet load bears a marking and a danger label.

2808 Packagings, including IBCs, containing 1791 hypochlorite solution of 61° shall be fitted with a vent conforming to marginals 3500 (8) or 3601 (6) respectively.

2809 Molten phosphorus oxybromide of 15° may be carried only in tank vehicles (see Appendix B.1a) or in tank-containers (see Appendix B.1b).

2810

3. Mixed packing

2811 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of different items of this Class in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together and/or with goods not subject to the provisions of this Directive [see marginal 2800 (8)], in a combination packaging conforming to marginal 3538 provided they do not react dangerously with one another.

(3) Substances of 4° shall not be packed together with other goods, except with substances of 3° of Class 5.1, marginal 2501. Substances of 6° and 14° shall not be packed together with other goods.

(4) Substances classified under (a) of the various items shall not be packed together with substances and articles of classes 1 and 5.2 and material of class 7.

2811 (cont'd) (5) Except as otherwise specially provided, liquid substances classified under (a) of the various items, in quantities not exceeding 0,5 litre per inner packaging and 1 litre per package, and substances classified under (b) or (c) of the various items, in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together in a combination packaging conforming to marginal 3538 with substances or articles of other Classes, provided that mixed packing is also permitted for the substances and articles of these Classes, and/or with goods which are not subject to the provisions of this Directive [see marginal 2800 (8)], provided they do not react dangerously with one another.

(6) The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat,

(b) emission of flammable and/or toxic gases,

(c) formation of corrosive liquids,

(d) formation of unstable substances.

(7) The mixed packing of acid substances with basic substances in a package shall not be permitted if the two substances are packed in fragile packagings.

(8) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2802 shall be complied with.

(9) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages

Marking

2812 (1) Each package shall be clearly marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

Danger labels

(2) Packages containing substances or articles of Class 8 shall bear a label conforming to model No 8.

(3) Packages containing substances of 32° (b) 2., 33° (a), 35° (b) 2., 37°, 54°, 64° (b) and 68° shall, in addition bear a label conforming to model No 3.

(4) Packages containing substances of 44° (a) and 45° (b) 2. shall in addition bear labels conforming to models Nos 3 and 6.1.

(5) Packages containing substances of 67° shall in addition bear a label conforming to model No 4.1.

(6) Packages containing substances of 69° and 70° shall in addition bear a label conforming to model No 4.2.

(7) Packages containing substances of 71° and 72° shall in addition bear a label conforming to model No 4.3.

(8) Packages containing substances of 3° (a), 4°, 73° and 74° shall in addition bear a label conforming to model No 05.

(9) Packages containing substances of 2° (a) 2. shall in addition bear labels conforming to models Nos 05 and 6.1.

2812 *(cont'd)* (10) Packages containing substances listed below shall in addition bear a label conforming to model No 6.1:

Item number	Substance identification number	Substance
1° (a)	1831	Sulphuric acid, fuming (oleum)
6°		All substances
7°		All substances
9° (b)	1811	Potassium hydrogendifluoride (potassium bifluoride)
10° (b)	1732	Antimony pentafluoride
12° (a)	1809	Phosphorus trichloride
	2879	Selenium oxychloride
14°		All substances
44° (b)		All substances
45° (b) 1. en (c)	2818	Ammonium polysulphide solution
53° (b) en)c)	1761	Cupriethylenediamine solution
75°		All substances
76°		All substances

(11) Packages containing fragile receptacles not visible from the outside shall in addition bear on two opposite sides a label conforming to model No 12.

(12) Packages containing liquids in receptacles, the closures of which are not visible from the outside, as well as packages containing vented receptacles or vented receptacles without outer packaging, shall in addition bear on two opposite sides a label conforming to model No 11.

2813

B. Particulars in transport document

2814 The description of the goods in the transport document shall conform to one of the substance identification numbers and one of the names printed in italics in marginal 2801.

If the substance is not mentioned by name but is assigned to an n.o.s. entry the description of the goods shall consist of the identification number and the n.o.s. designation, followed by the chemical or technical name [1].

The description of the goods shall be followed by *particulars of the Class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or *'RID'*), e.g. '8, 1°(a), ADR'.

For the carriage of wastes [see marginal 2000 (5)] the description of the goods shall be: 'Waste, containing ...', the component(s) which has/have been used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste containing 1824 sodium hydroxide solution, 8, 42° (b) ADR'.

For the carriage of solutions or mixtures (such as preparations and wastes) containing several components subject to the this Directive, it will not in general be necessary to refer to more than two components which predominantly contribute to the danger or dangers of the solutions and mixtures. For the carriage of solutions and mixtures containing only one component subject to the provisions of this Directive, the words 'solution' or 'mixture' should be added as part of the name in the transport document [see marginal 2002 (8)].

When a solid substance is handed over for carriage in the molten state, the description of the goods shall be completed by the word 'molten', unless it is already included in the name.

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[1] The technical name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose.

2814 (cont'd) If a solution or mixture specifically named or containing a specifically named substance is not subject to the conditions of this Class, in accordance with marginal 2800 (5), the consignor may enter in the transport document: 'Not Goods of Class 8'.

2815-2821

C. Empty packagings

2822 (1) Uncleaned empty packagings, including empty IBCs, of 91° shall be closed in the same manner and with the same degree of leakproofness as if they were full.

(2) Uncleaned empty packagings, including empty IBCs, of 91° shall bear the same danger labels as if they were full.

(3) The description in the transport document shall conform to one of the names printed in italics in 91°, e.g. 'Empty packagings, 8, 91°, ADR'.

In the case of empty tank-vehicles, empty demountable tanks, empty tank-containers and empty small bulk containers, uncleaned, this description shall be completed by adding the words 'Last load' together with the name and item number of the goods last loaded, e.g. 'Last load: 1830 sulphuric acid, 1° (b)'.

2823-2824

D. Transitional measures

2825 Substances of class 8 may be carried until 30 June 1995 in accordance with the requirements for Class 8 applicable until 31 December 1994. The transport document shall, in such cases, bear the inscription 'Carriage in accordance with the ADR in force before 1 January 1995'.

2826-2899

CLASS 9

MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

1. List of substances

2900 The heading of Class 9 covers substances and articles which, during carriage, present a danger not covered by the headings of other classes. Those substances and articles listed in marginal 2901 are subject to the conditions set out in marginals 2901 to 2920 and to the provisions of this Annex and of Annex B. They are then considered as substances and articles of this Directive [1].

Substances of Class 9 which are listed under the various items of marginal 2901 shall be assigned to one of the following groups designated by the letter (b) or (c) according to their degree of danger:

letter (b) — dangerous substances

letter (c) — substances presenting a minor danger.

Note: For the classification of solutions and mixtures (such as preparations and wastes), see also marginal 2002 (8).

[1] For the quantities of substances or articles of marginal 2901 which are not subject to the provisions for this Class contained either in this Annex or in Annex B, see marginal 2901a.

A. Substances which, on inhalation as fine dust, may endanger health

2901 1° Asbestos and mixtures containing asbestos, such as:

(b) *2212 Blue asbestos* (crocidolite), *2212 brown asbestos* (amosite or mysorite),

(c) *2590 White asbestos* (chrysotile, actinolite, anthophyllite or tremolite)

Note: Talc containing tremolite and/or actinolite is a substance of 1° (c), No 2590.

B. Substances and apparatus which in the event of fire may form dioxins

2° Polychlorinated and polyhalogenated biphenyls (PCBs) and terphenyls (PCTs) and mixtures containing these substances:

(b) *2315 polychlorinated biphenyls, 3151 polyhalogenated biphenyls, liquid* or *3151 polyhalogenated terphenyls, liquid, 3152 polyhalogenated biphenyls, solid* or *3152 polyhalogenated terphenyls, solid.*

Note: Mixtures with a PCB or PCT content of not more than 50 mg/kg are not subject to the provisions of this Directive.

3° *Apparatus* such as transformers, condensers and apparatus containing substances of 2° (b) or mixtures thereof.

C. Substances evolving flammable vapour

4° Expandable polymers containing flammable liquids with a flash-point not exceeding 55 °C.

(c) *2211 polymeric beads, expandable,* evolving flammable vapour.

D. Lithium batteries

Note: Special packing conditions are applicable to these articles (see marginal 2906).

5° *3090 lithium batteries, 3091 lithium batteries contained in equipment*

Notes: 1. Each cell shall not contain more than 12 g of lithium. The quantity of lithium contained in each battery shall not be more than 500 g. With the approval of the competent authority of the country of origin, the quantity of lithium in each cell may be raised to 60 g and a package may contain up to 2 500 g of lithium; the competent authority shall determine the conditions of carriage as well as the type and duration of the test.

2. Cells and batteries shall be equipped with an effective means of preventing external short circuits. Each cell and battery shall incorporate a safety venting device or be designed in such a manner that will preclude a violent rupture under normal conditions of carriage. Batteries containing cells or series of cells connected in parallel shall be equipped with diodes to prevent reverse current flow. Batteries contained in equipment shall be protected against short circuits and be securely held in place.

3. Cells and batteries shall be so designed and constructed that they are capable of meeting the following tests:

Test 1: the cell or battery shall be subjected to a thermal stability test at 75 °C for 48 hours and show no evidence of distortion, leakage or internal heating. This test shall be performed on at least 10 cells and one battery of each type taken from production each week.

Test 2: as a result of intentional short circuiting, the cell or battery shall be rendered inert, preferably without venting (through the use of internal fusing devices). If venting does occur, an open flame shall be applied to the venting fumes to prove that an explosive condition does not exist. This test shall be performed on at least three cells and one battery of each type taken from production each week.

2901 *(cont'd)*

4. Cells which have been discharged to the extent that the open circuit voltage is less than two volts or two thirds of the voltage of the undischarged cell, whichever is the lower, or batteries containing one or more such cells are not to be accepted for carriage.

5. Cells of batteries contained in equipment shall not be capable of being discharged during carriage to the extent that the open circuit voltage falls below two volts or two thirds of the voltage of the undischarged cell, whichever is the lower.

6. Articles of 5° which do not meet these conditions are not to be accepted for carriage.

E. Life-saving appliances

Note: Special packing conditions are applicable to these articles (see marginal 2907).

6° *2990 life-saving appliances, self-inflating,* such as aircraft evacuation chutes and aircraft survival kits.

Note: These appliances present a hazard if the self-inflating device is activated during carriage, and may also include one or more of the following substances or articles of this Directive as equipment:

signal devices of Class 1, such as smoke and illumination signal flares:

non-flammable, non-toxic gases of Class 2;

flammable substances of Classes 3 or 4.1;

organic peroxides of Class 5.2, as components of repair kits;

electric storage batteries of Class 8.

7° *3072 life-saving appliances, not self-inflating,* including one or more of the following substances or articles of ADR as equipment:

signal devices of Class 1, such as smoke and illumination signal flares;

non-flammable, non-toxic gases of Class 2;

flammable substances of Classes 3 or 4.1;

organic peroxides of Class 5.2, as components of repair kits;

electric storage batteries or corrosive solids of Class 8.

8° Motor vehicle components

(c) *3268 air bag inflators* or *3268 air bag modules* or *3268 seat-belt pre-tensioners* or *3268 seat-belt modules*

Notes: 1. This item applies to articles which may be classified in Class 1 in accordance with marginal 2100 (2) (b), which are used as life-saving vehicle air bags or seat-belts, when carried as component parts and when the 'air bag inflators', 'seat-belt pre-tensioners', 'air bag modules' or 'seat-belt modules' packaged as for carriage have been tested in accordance with test series 6 (c) of part I of the Recommendations on the Transport of Dangerous Goods, Tests and Criteria [1], with no explosion of the device, no fragmentation of device casings, and no projection hazard or thermal effect, which would significantly hinder firefighting or other emergency response efforts in the immediate vicinity.

2. Such air bags or seat-belts installed in vehicles or in completed vehicle components such as steering columns, door panels, etc. are not subject to the provisions of this Directive.

[1] Recommendations on the Transport of Dangerous Goods, Tests and Criteria (Second edition), published by the United Nations Organization under the symbol ST/SG/AC.10/11/Rev. 1.

2901 (cont'd)

F. Environmentally hazardous substances

Note: Assignment of a substance to 11°or 12°shall be as indicated in Appendix A.3, section G, marginals 3390 to 3396.

11° Liquid substances pollutant to the aquatic environment and solutions and mixtures of such substances (such as preparations and wastes), which cannot be classified in the other classes, or in items 1° to 8°, 13° and 14° of this Class.

(c) *3082 Environmentally hazardous substance, liquid, n.o.s.*, such as:

alcohol C_6-C_{17} (secondary) poly (3-6) ethoxylate
alcohol C_{12}-C_{15} poly (1-3) ethoxylate
alcohol C_{13}-C_{15} poly (1-6) ethoxylate
alpha-cypermethrin
butyl benzyl phthalate
chlorinated paraffins (C_{10}-C_{13})
1-chlorooctane
cresyl diphenyl phosphate
cyfluthrin
decyl acrylate
di-n-butyl phthalate
1, 6-dichlorohexane
diisopropylbenzenes
isodecyl acrylate
isodecyl diphenyl phosphate
isoctyl nitrate
malathion
resmethrin
triaryl phosphates
tricresyl phosphates
triethylbenzene
trixylenyl phosphate

12° Solid substances pollutant to the aquatic environment and mixtures of such substances (such as preparations and wastes) which cannot be classified in the other classes, or in items 1° to 8°, 13° and 14° of this class.

(c) *3077 Environmentally hazardous substance, solid, n.o.s.*, such as:

chlorohexidine
chlorinated paraffins (C_{10}-C_{13})
p-dichlorobenzene
diphenyl
diphenyl ether
fenbutadin oxide
mercurous chloride (calomel)
tributyltin phosphate
zinc bromide

13° Genetically modified micro-organisms.

Notes: 1. Genetically modified micro-organisms are micro-organisms in which the genetic material has been deliberately altered by technical means or by such means that cannot occur naturally.

2. Genetically modified micro-organisms which are infectious are substances of Class 6.2 (see marginal 2651, items 1° to 3°, identification numbers 2814 and 2900).

3. Genetically modified micro-organisms within the meaning of this item are those which are not dangerous for humans and animals, but which could alter animals, plants, microbiological substances and ecosystems in such a way as cannot occur naturally.

2901 (cont'd)

(b) *3245 Genetically modified micro-organisms*

Notes: 1. Genetically modified micro organisms which have received a consent for deliberate release into the environment (1), are not subject to the provisions of this Class of ADR.

2. For the purpose of the packaging requirements of marginal 2903, substances and mixtures of substances are deemed to be solids if they do not contain free liquid at a temperature less than 45 °C.

3. Live vertebrate or invertebrate animals shall not be used to carry substances classified under this item unless the substance can be carried no other way.

14° Genetically modified organisms

Note: Genetically modified organisms, which are known or suspected to be dangerous to the environment shall be carried in accordance with conditions specified by the competent authority of the country of origin.

G. Empty packagings

Notes: 1. Empty packagings with residues from their previous contents adhering to the outside are not to be accepted for carriage.

2. Uncleaned empty containment vessels for apparatus of 3° are not to be accepted for carriage.

21° *Empty packagings,* including *empty intermediate bulk containers* (IBCs), *empty tank-vehicles, empty demountable tanks* and *empty tank-containers,* uncleaned, which have contained substances of 1° or 2° of Class 9.

2901a (1) Substances classified under (b) or (c) of 1°, 2°, 4° and 11° to 13° carried in conformity with the following provisions are not subject to the provisions for this class contained in this Annex or in Annex B:

(a) Substances classified under letter (b) of each item:

liquids, up to 500 ml per inner packaging and up to 2 litres per package;

solids, up to 1 kg per inner packaging and up to 4 kg per package.

(b) Substances classified under letter (c) of each item:

liquids, up to 3 litres per inner packaging and up to 12 litres per package:

solids, up to 6 kg per inner packaging and up to 24 kg per package.

These quantities of substances shall be carried in combination packagings conforming at least to the conditions of marginal 3538.

The 'General packing conditions' of marginal 3500 (1), (2) and (5) to (7) shall be complied with.

(2) The following substances and articles of 1° are furthermore not subject to the provisions for this Class contained in this annex and in Annex B:

(a) asbestos so immersed or fixed in a natural or artificial binder material (such as cement, plastics, asphalt, resins or mineral ore) that no escape of hazardous quantities of respirable asbestos fibres can occur during carriage;

(b) finished products containing asbestos when they are so packed that no escape of hazardous quantities of respirable asbestos fibres can occur during transport.

(3) Apparatus of 3° containing liquids of 2° (b), up to 500 ml per apparatus and up to 2 litres per package, are not subject to the provisions for this Class contained in this Annex or in Annex B. The apparatus shall, however, be packed in conformity with marginal 2905 (1) (a).

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(1) See in particular Part C of Directive 90/220/EEC (Official Journal of the European Community, No L 117, of 8 May 1990, pp. 18-20), which sets out the authorization procedures for the European Community.

2901a *(cont'd)* (4) Lithium batteries of 5° conforming to the following provisions, and equipment containing only such batteries, are not subject to the provisions for this Class contained in this Annex and in Annex B:

(a) each cell with a liquid cathode contains not more than 0,5 g of lithium or lithium alloy, and each cell with a solid cathode contains not more than 1 g of lithium or lithium alloy;

(b) each battery with a solid cathode contains not more than an aggregate quantity of 2 g of lithium or lithium alloy and each battery with a liquid cathode contains not more than an aggregate quantity of 1 g of lithium or lithium alloy;

(c) each cell or battery containing a liquid cathode is hermetically sealed;

(d) cells are separated so as to prevent short circuits;

(e) batteries are separated so as to prevent short circuits and are packed in strong packagings, except when installed in electronic devices;

(f) if a liquid cathode battery contains more than 0,5 g of lithium or lithium alloy, or a solid cathode battery contains more than 1 g of lithium or lithium alloy, it does not contain a liquid or gas which is considered dangerous unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

2. Provisions

A. Packages

1. General conditions of packing

2902 (1) Packagings shall satisfy the conditions of Appendix A.5, unless special conditions for the packing of certain substances are prescribed in section A.2.

(2) Intermediate bulk containers (IBCs) shall satisfy the conditions of Appendix A.6.

(3) In accordance with the provisions of marginals 2900 and 3511 (2) or 3611 (2) the following shall be used:

packagings of packing groups II or I, marked with the letter 'Y' or 'X', or IBCs of packing group II, marked with the letter 'Y', for the dangerous substances classified under the letter (b) of each item;

packagings of packing groups III, II or I, marked with the letter 'Z', 'Y' or 'X', or IBCs, marked with the letter 'Z' or 'Y', for the less dangerous substances classified under the letter (c) of each item.

Note: For the carriage of substances of Class 9 in tank vehicles, demountable tanks or tank-containers, and for the carriage in bulk of solids of this class, see Annex B.

2. Special conditions of packing

2903 (1) Substances classified under (b) of the various items of marginal 2901 shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

(d) in plastics drums or plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538; or

2903 *(cont'd)*

(g) in metal IBCs conforming to marginal 3622, rigid plastics IBCs conforming to marginal 3624 or composite IBCs with a rigid plastics inner receptacle conforming to marginal 3625.

Note to (a), (b), (c) and (d): Simplified conditions are applicable to removable head drums and jerricans for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C (see marginals 3512, 3553, 3554 and 3560) and for solids.

(2) Solid substances with a melting-point above 45 °C may also be packed:

(a) in drums conforming to marginal 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags, or

(b) in water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material, 3535 for plastics film or 3536 for water-resistant paper, provided the goods are dispatched as a full load or the bags are secured on pallets, or

(c) in composite IBCs with flexible plastics inner receptacle conforming to marginal 3625, fibreboard IBCs conforming to marginal 3626 or wooden IBCs conforming to marginal 3627, or

(d) in flexible IBCs conforming to marginal 3623 with the exception of IBCs of types 13L1 and 13M1, provided that the goods are carried as a full load or the flexible IBCs are loaded on pallets.

2904 (1) Substances classified under (c) of the various items of marginal 2901 shall be packed:

(a) in steel drums conforming to marginal 3520; or

(b) in aluminium drums conforming to marginal 3521; or

(c) in steel jerricans conforming to marginal 3522; or

(d) in plastics drums or plastics jerricans conforming to marginal 3526; or

(e) in composite packagings (plastics material) conforming to marginal 3537; or

(f) in combination packagings conforming to marginal 3538; or

(g) in composite packagings (glass, porcelain or stoneware) conforming to marginal 3539; or

(h) in light gauge metal packagings conforming to marginal 3540; or

(i) in metal IBCs conforming to marginal 3622, rigid plastics IBCs conforming to marginal 3624 or composite IBCs conforming to marginal 3625.

Note to(a),(b),(c),(d)and (h): Simplified conditions are applicable to removable head, jerricans and light gauge metal packagings for viscous substances having a viscosity of more than 200 mm^2/s at 23 °C (see marginals 3512, 3552 to 3554 and 3560) and for solids.

(2) Solid substances with a melting-point above 45 °C may also be packed:

(a) in drums conforming to marginal 3523 for plywood or 3525 for fibreboard, if necessary with one or more sift-proof inner bags; or

(b) in water-resistant bags conforming to marginals 3533 for textile material, 3534 for woven plastics material, 3535 for plastics film or 3536 for water-resistant paper; or

2904 *(cont'd)*

(c) in flexible IBCs conforming to marginal 3623, fibreboard IBCs conforming to marginal 3626 or wooden IBCs conforming to marginal 3627.

Note: IBCs conforming to marginal 3626 containing substances of 4° (c) and transported as a full load need only meet the requirements of marginal 3621 (1) to (3), (5) and (6).

(3) Substances of 4° (c) may also be packed in tightly closed leakproof packagings which need only meet the conditions of marginal 3500 (1), (2) and (5) to (7).

(4) Articles of 8° (c) shall be packed in combination packagings conforming to marginal 3538 and to a design type tested and approved for packing group III.

2905

(1) Apparatus of 3° shall be packed:

(a) in leakproof packagings; or

(b) in leakproof containers.

(2) Apparatus of 3° may also be carried in leakproof receptacles (containment vessels) which must be able to hold, in addition to the apparatus, at least 1,25 times the substances of 2° (b) present in the apparatus. There must be sufficient inert material in the receptacles to absorb at least 1,1 times the substances of 2° (b) which are contained in the apparatus. The apparatus and the receptacles shall be so designed as to avoid any leak of liquid under normal conditions of carriage.

2906

(1) Articles of 5° shall be packed in:

(a) boxes conforming to marginal 3527 for natural wood, 3528 for plywood or 3530 for fibreboard, or

(b) in drums conforming to marginal 3523 for plywood, 3525 for fibre or 3526 for plastics, removable head; or

(c) in combination packagings with inner packagings of fibreboard and outer packagings of steel or aluminium conforming to marginal 3538. The inner packagings shall be separated from each other and from the inner surfaces of the outer packagings using non-combustible cushioning material of at least 25 mm thickness. The combination packagings shall conform to a design type which has been tested and approved, in accordance with Appendix A.5, for packing group II. No single packaging or inner packaging of a combination packaging shall contain more than 500 g of lithium (see, however, marginal 2901, 5°, Note 1).

(2) Lithium batteries of 5° shall be packed and be securely stowed so as to prevent movement which could lead to short circuits.

(3) Equipment containing lithium batteries of 5° shall be secured against movement within the packaging and be so packed as to prevent accidental operation during carriage.

2907

(1) Life-saving appliances of 6° shall be packed, individually, in strong outer packagings.

(2) Substances and articles of ADR contained within life-saving appliances of 6° or 7° as equipment shall be packed in inner packagings. These inner packagings shall be so stowed as to prevent any movement within the appliances.

(3) Non-flammable, non-toxic gases of Class 2 shall be contained in cylinders conforming to marginal 2202 which may be connected to the life-saving appliance.

(4) Signal devices of Class 1 shall be packed in plastics or fibreboard inner packagings.

2907 *(cont'd)* (5) Strike-anywhere matches of Class 4.1 (marginal 2401, 2° (c), No 1331) shall be packed in inner packagings to prevent any movement.

2908 (1) If substances of 13° are carried in deeply refrigerated nitrogen, the inner packagings shall conform to the provisions of this Class and the receptacles for the nitrogen shall satisfy the provisions of Class 2.

(2) Live animals in accordance with 13°, Note 3, shall be packed, marked, described and carried in accordance with the relevant regulations for the carriage of animals [1].

2908-2910

3. Mixed packing

2911 (1) Substances covered by the same item number may be packed together in a combination packaging conforming to marginal 3538.

(2) Substances of different items of Class 9 except substances of 13°, in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together and/or with goods not subject to the provisions of this Directive, in a combination packaging conforming to marginal 3538.

(3) Substances of Class 9 except substances of 13°, in quantities not exceeding, per inner packaging, 3 litres for liquids and/or 5 kg for solids, may be packed together in a combination packaging conforming to marginal 3538 with substances or articles of other classes, provided that mixed packing is also permitted for the substances and articles of these classes, and/or with goods which are not subject to the provisions of this Directive, provided they do not react dangerously with one another.

(4) The following are considered dangerous reactions:

(a) combustion and/or giving off considerable heat;

(b) emission of inflammable and/or toxic gases;

(c) formation of corrosive liquids;

(d) formation of unstable substances.

(5) Substances of 13° shall not be packed together in a combination packaging conforming to marginal 3538 with other goods. This shall not apply to substances added as coolants, e.g. ice, dry ice or deeply refrigerated liquid nitrogen.

(6) The provisions of marginals 2001 (7), 2002 (6) and (7) and 2902 shall be complied with.

(7) If wooden or fibreboard boxes are used, a package shall not weigh more than 100 kg.

4. Marking and danger labels on packages (see Appendix A.9)

Marking

2912 (1) Each package shall be clearly and durably marked with the identification number of the goods to be entered in the transport document, preceded by the letters 'UN'.

(2) Packagings containing substances of 4° (c) shall bear the following marking: 'Keep away from any source of ignition'. This marking shall be in an official language of the forwarding country, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

Danger labels

(3) Packages containing substances or articles of this Class, with the exception of substances of 4° (c), shall bear a label conforming to model No 9.

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[1] Such regulations are contained in, e.g., Directive 91/628/EEC (Official Journal of the European Community No L 340 of 11 December 1992, p. 17) and in the Recommendations of the Council of Europe (Ministerial Committee) on the carriage of certain animal species.

2912 *(cont'd)* (4) Packages containing substances of 2° (b) having a flash-point up to and including 61 °C shall, in addition, bear a label conforming to model No 3.

(5) Packages containing articles of 6° or 7° shall not bear a label conforming to model No 9 unless the article is fully enclosed by packaging, crates or other means that prevent the ready identification of the article.

(6) New packages containing substances of 13° carried in deeply refrigerated nitrogen shall also bear a label conforming to model No 2.

(7) Packages containing fragile receptacles not visible from the outside shall bear on two opposite sides a label conforming to model No 12.

(8) Packages containing liquids in receptacles the closures of which are not visible from the outside shall bear on two opposite sides a label conforming to model No 11.

2913

B. Particulars in the transport document

2914 (1) The description of the goods in the transport document shall conform to one of the identification numbers — except for substances of 14° — and one of the names printed in italics in marginal 2901. If the substance is not mentioned by name, but is assigned to an n.o.s. entry, the description of the goods shall consist of the identification number and the n.o.s. designation, followed by the chemical or technical [1] name of the substance, or for substances of 13°, by the biological name [1] of the substance. The description of the goods shall be followed by *particulars of the class, the item number,* if applicable, *the letter, and the initials 'ADR'* (or '*RID*'), e.g. '9, l° (b), ADR'.

For the carriage of wastes [see marginal 2000 (5)], the description of the goods shall be: 'Waste, containing...', the component(s) used for the classification of the waste under marginal 2002 (8) to be entered under its/their chemical name(s), e.g. 'Waste containing 2212 brown asbestos, 9, l° (b), ADR'.

For the carriage of solutions and mixtures (such as preparations and wastes) containing several components subject to the provisions of this Directive, it will not in general be necessary to refer to more than two components which predominantly contribute to the danger or dangers of the solutions and mixtures.

For the carriage of solutions and mixtures containing only one component subject to the provisions of this Directive, the words 'solution' or 'mixture' shall be added as part of the name in the transport document [see marginal 2002 (8)].

When a solid substance is handed over for carriage in the molten state, the description of the goods shall be completed by the word 'molten', unless it is already included in the name.

For the carriage of easily perishable substances of 13° appropriate information shall be given, e.g.: 'Cool at + 2°/+ 4 °C' or 'Carry in frozen state' or 'Do not freeze'.

(2) For the carriage of articles of 5° with the approval of the competent authority (see Note 1 to marginal 2901, 5°), a copy of the approval with the conditions of carriage shall be attached to the transport document. This approval shall be drawn up in an official language of the forwarding country and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

2915-2920

(1) The technical or biological name shall be a name currently used in scientific and technical handbooks, journals and texts. Trade names shall not be used for this purpose. In the case of pesticides, the name to be entered should be that given in Standard ISO 1750:1981 if listed.

C. Empty packagings

2921 (1) If the empty packagings including IBCs, uncleaned, of 21° are bags, these shall be placed in boxes or waterproof bags to prevent any leakage of the substance.

(2) Other empty packagings including IBCs, uncleaned, of 21° shall be closed in the same way and present the same degree of leakproofness as if they were full.

(3) Empty packagings, uncleaned, of 21° shall bear the same danger labels as if they were full.

(4) The description in the transport document shall conform to one of the names printed in italics in 21°, e.g. 'Empty packaging, 9, 21°, ADR'. In the case of empty tank-vehicles, empty demountable tanks and empty tank-containers uncleaned, this description shall be completed by adding the words 'Last load' together with the name and item number of the goods last loaded, e.g. 'Last load: 2212 brown asbestos, 1° (b)'.

2922-
2999

PART III

APPENDICES TO ANNEX A

APPENDIX A.1

3000-
3099

A. STABILITY AND SAFETY CONDITIONS RELATING TO EXPLOSIVE SUBSTANCES AND ARTICLES, FLAMMABLE SOLIDS AND ORGANIC PEROXIDES

General

3100 The following conditions are the minima for substances and articles accepted for carriage.

Conditions relating to explosive substances and articles

3101 (1) Testing for assignment to Class 1

Any substance or article having or suspected of having explosive properties shall be considered for assignment to Class 1 in accordance with the tests, procedures and criteria prescribed in Part I ('Tests and criteria for the classification of explosive substances and articles') of the 'Recommendations on the Transport of Dangerous Goods: Tests and Criteria' published by the United Nations Organization as document ST/SG/AC.10/11, first edition (hereafter called the Test Manual).

A substance or article assigned to Class 1 can only be accepted for carriage when it has been assigned to a name or n.o.s. entry listed in marginal 2101 and meets the criteria of the Test Manual.

(2) Classification

The substances and articles of Class 1 shall be assigned to the appropriate division and compatibility group in accordance with the procedures and criteria prescribed in the Test Manual.

(3) Assignment to an item number, identification number and name

The substances and articles of Class 1 shall be assigned to an item number, an identification number and a name or n.o.s. entry listed in Table 1 of marginal 2101.

Interpretation of the names of substances and articles in the individual item numbers of Table 1 of marginal 2101 shall be based upon the glossary in marginal 3170.

Explosive substances and articles shall only be assigned to an n.o.s. entry if they cannot be assigned to a name in Table 1 of marginal 2101. Assignment to an n.o.s. entry shall be made by the competent authority of the country of origin.

(4) Exudation test

(a) Substances of item 4°, identification number 0081 (Explosive blasting, type A) shall, if they contain more than 40 % liquid nitric ester, in addition to the testing specified above satisfy the following exudation test.

(b) The apparatus for testing blasting explosive for exudation (figs. 1 to 3) consists of a hollow bronze cylinder. This cylinder, which is closed at one end by a plate of the same metal, has an internal diameter of 15,7 mm and a depth of 40 mm. It is pierced by 20 holes 0,5 mm in diameter (four sets of five holes) on the circumference. A bronze piston, cylindrically fashioned over a length of 48 mm and having a total length of 52 mm, slides into the vertically placed cylinder. The piston, whose diameter is 15,6 mm, is loaded with a mass of 2,220 g so that a pressure of 120 kPa (1,20 bar) is exerted on the base of the cylinder.

3101 *(cont'd)*

(c) A small plug of blasting explosive weighing 5 to 8 g, 30 mm long and 15 mm in diameter, is wrapped in very fine gauze and placed in the cylinder; the piston and its loading mass are then placed on it so that the blasting explosive is subjected to a pressure of 120 kPa (1,20 bar). The time taken for the appearance of the first signs of oily droplets (nitroglycerine) at the outer orifices of the cylinder holes is noted.

(d) The blasting explosive is considered satisfactory if the time elapsing before the appearance of the liquid exudations is more than five minutes, the test having been carried out at a temperature of 15 °C to 25 °C.

Test of blasting explosive for exudation

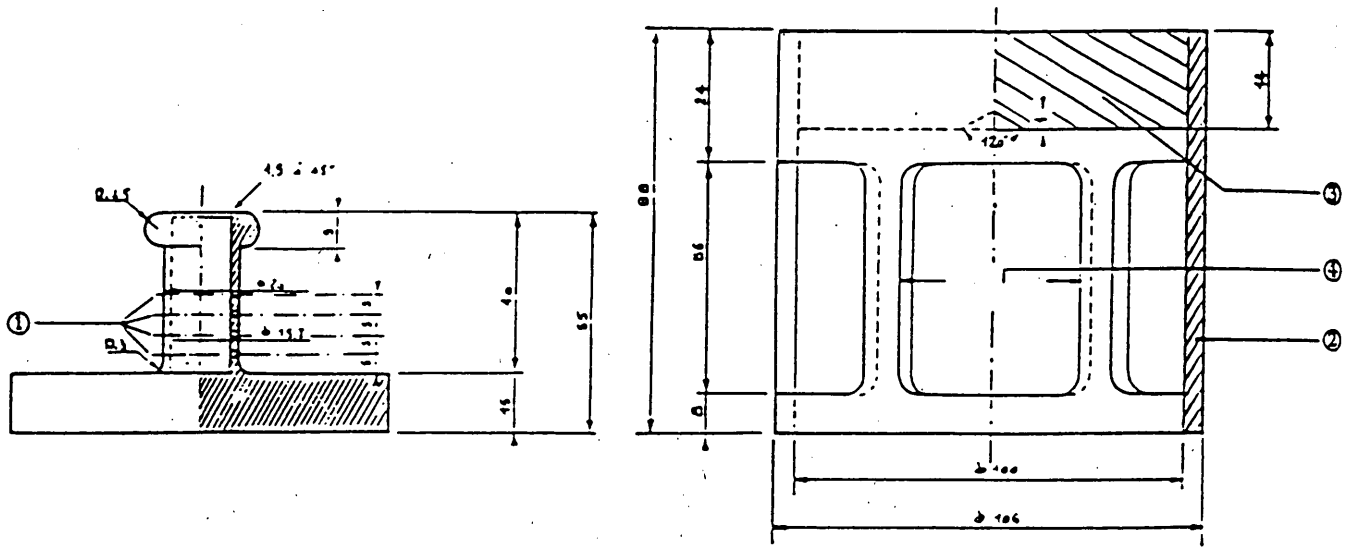


Figure 1: Bell-form charge, mass 2 220 g., capable of being suspended from a bronze piston

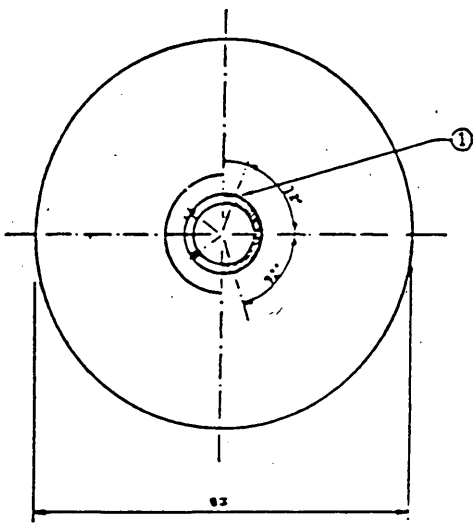


Figure 2: Hollow bronze cylinder, closed at one end; Plan and cut dimensions in mm.

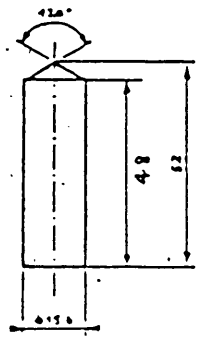


Figure 3: Cylindrical bronze piston; dimensions in mm.

① 4 series of 5 holes at 0,5 Ø

② copper

③ iron plate with centre cone at the inferieur face

④ 4 openings, approximately 46 × 56, set at even intervals on the periphery

Conditions relating to nitrated cellulose mixtures of Class 4.1

3102 (1) Nitrocellulose of marginal 2401, 24° (a) heated for half an hour at 132 °C must not give off visible yellowish-brown nitrous fumes (nitrous gases). The ignition temperature must be above 180 °C. See paragraphs (3) to (8), (9) (a) and (10) below.

(2) 3 g of plasticized nitrocellulose, heated for one hour at 132 °C, must not give off visible yellowish-brown nitrous fumes (nitrous gases). The ignition temperature must be above 170 °C. See paragraphs (3) to (8), (9) (b) and (10) below.

(3) The test procedures set out below are to be applied when differences of opinion arise as to the acceptability of substances for carriage by road.

(4) If other methods or test procedures are used to verify the conditions of stability prescribed above in this appendix, those methods must lead to the same findings as could be reached by the methods specified below.

(5) In carrying out the stability tests by heating described below, the temperature of the oven containing the sample under test must not deviate by more than 2 °C from the prescribed temperature; the prescribed duration of a 30-minute or 60-minute test must be observed to within two minutes. The oven must be such that the required temperature is restored not more than five minutes after insertion of the sample.

(6) Before undergoing the tests in paragraphs (9) and (10), the samples must be dried for not less than 15 hours at the ambient temperature in a vacuum desiccator containing fused and granulated calcium chloride, the sample substance being spread in a thin layer; for this purpose, substances which are neither in powder form nor fibrous shall be ground, or grated, or cut into small pieces. The pressure in the desiccator must be brought below 6,5 kPa (0,065 bar).

(7) Before being dried as prescribed in paragraph (6) above, substances conforming to paragraph (2) shall undergo preliminary drying in a well-ventilated oven, with its temperature set at 70 °C, until the loss of mass per quarter-hour is less than 0,3 % of the original mass.

(8) Weakly nitrated nitrocellulose conforming to paragraph (1) shall first undergo preliminary drying as prescribed in paragraph (7) above; drying shall then be completed by keeping the nitrocellulose for at least 15 hours over concentrated sulphuric acid in a desiccator.

(9) Test of chemical stability under heat

(a) Test of the substance listed in paragraph (1) above.

(i) In each of two glass test tubes having the following dimensions:

length	350	mm
internal diameter	16	mm
thickness of wall	1,5	mm

is placed 1 g of substance dried over calcium chloride (if necessary the drying must be carried out after reducing the substance to pieces weighing not more than 0,05 g each). Both test tubes, completely covered with loose-fitting closures, are then so placed in an oven that at least four-fifths of their length is visible, and are kept at a constant temperature of 132 °C for 30 minutes. It is observed whether nitrous gases in the form of yellowish-brown fumes clearly visible against a white background are given off during this time.

(ii) In the absence of such fumes the substance is deemed to be stable.

3102 (cont'd)

(b) *Test of plasticized nitrocellulose* (paragraph (2) above).

(i) 3 g of plasticized nitrocellulose are placed in glass test tubes, similar to those referred to in (a), which are then placed in an oven kept at a constant temperature of 132 °C.

(ii) The test tubes containing the plasticized nitrocellulose are kept in the oven for one hour. During this time no yellowish-brown nitrous gases fumes (nitrous gases) must be visible. Observation and appraisal as in (a).

(10) *Ignition temperature* (see paragraphs (1) and (2) above)

(i) The ignition temperature is determined by heating 0,2 g of substance enclosed in a glass test tube immersed in a Wood's alloy bath. The test tube is placed in the bath when the latter has reached 100 °C. The temperature of the bath is then progressively increased by 5 °C per minute.

(ii) The test tubes must have the following dimensions:

length	125	mm
internal diameter	15	mm
thickness of wall	0,5	mm

and must be immersed to a depth of 20 mm.

(iii) The test must be repeated three times, the temperature at which ignition of the substance occurs, i.e., slow or rapid combustion, deflagration or detonation, being noted each time.

(iv) The lowest temperature recorded in the three tests is the ignition temperature.

Conditions relating to self-reactive substances of Class 4.1

Testings for assignment under section E of marginal 2401

3103 Self-reactive substances of items 31° to 50° can only be accepted for carriage and when the relevant criteria in Parts II and III of the 'Recommendations on the Transport of Dangerous Goods: Tests and Criteria' (second edition published by the United Nations Organization under the reference (ST/SG/AC.10/11/Rev.1) are met. The principles for classification of self-reactive substances are given in marginal 3104. The test selected for determining the self-accelerating decomposition temperature (SADT) shall be conducted in a manner which is representative, both in size and material, of the package to be carried.

Principles for classification of self-reactive substances of Class 4.1

3104 (1) A self-reactive substance or self-reactive substance formulation shall be regarded as possessing explosive properties when in laboratory testing it is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

(2) The following principles shall be applied to the classification of a self-reactive substance and self-reactive substance formulation not listed in marginal 2401:

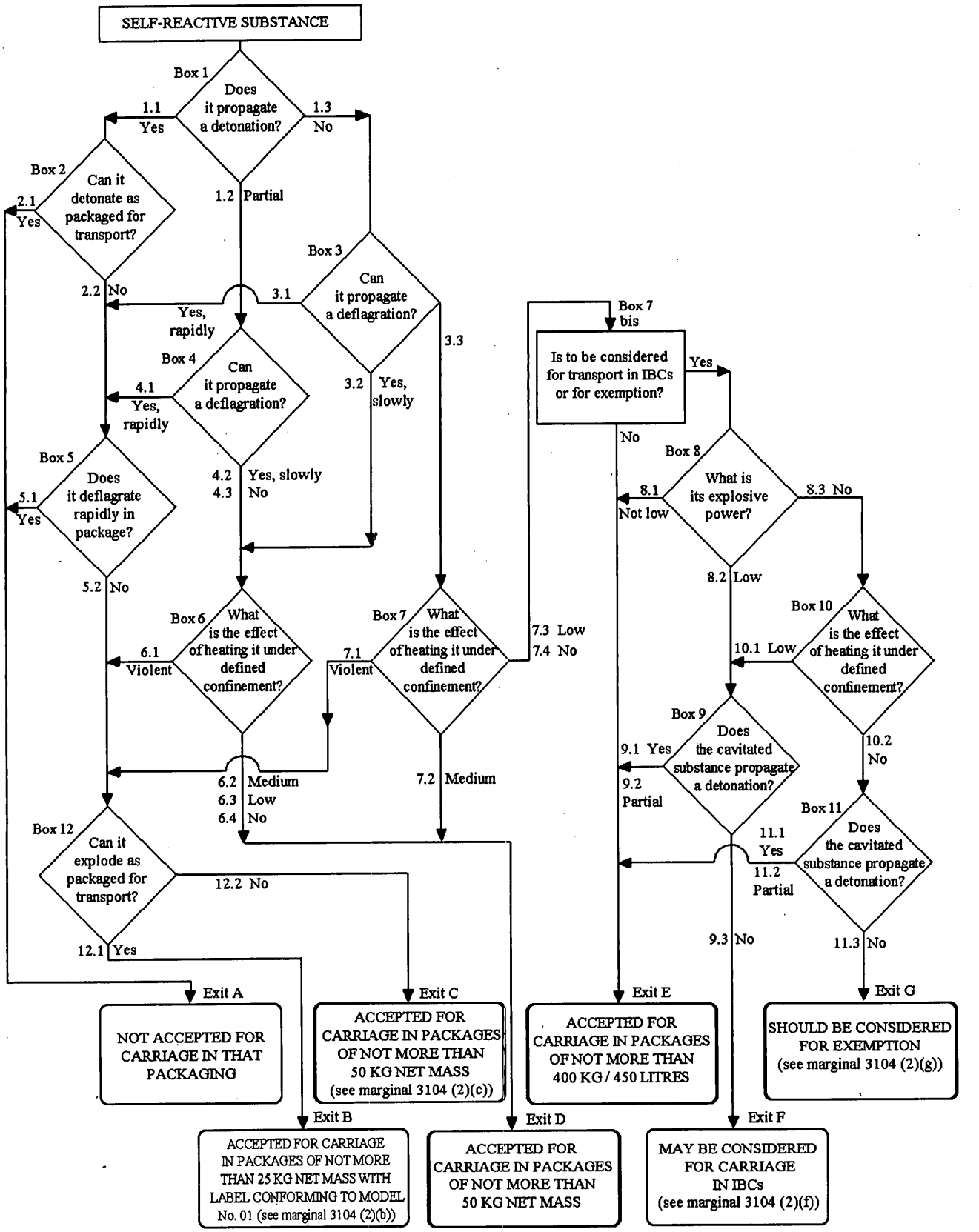
(a) any self-reactive substance or self-reactive substance formulation which can detonate or deflagrate rapidly, as packaged for carriage, shall be prohibited from carriage in that packaging under Class 4.1 (defined as self-reactive substance type A, exit box A of figure 4);

(b) any self-reactive substance or self-reactive substance formulation possessing explosive properties and which, as packaged for carriage, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that packaging, shall also bear a label conforming to model No 01. Such a self-reactive substance may be packaged in amounts of up to 25 kg unless the maximum quantity has to be limited to a lower amount to preclude detonation or rapid deflagration in the package (defined as selfreactive substance type B, exit box B of figure 4);

FIGURE 4

3104
(cont'd)

Classification and flow chart scheme for self-reactive substances



3104 *(cont'd)*

(c) any self-reactive substance or self-reactive substance formulation possessing explosive properties may be carried without a label conforming to model No 01 when the substance as packaged (maximum 50 kg) for carriage cannot detonate or deflagrate rapidly or undergo a thermal explosion (defined as self-reactive substance type C, exit box C of figure 4);

(d) any self-reactive substance or self-reactive substance formulation which in laboratory testing:

— detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or

— does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

— does not detonate or deflagrate at all and shows a medium effect when heated under confinement

may be accepted for carriage in packages containing not more than 50 kg (defined as self-reactive substance type D, exit box D of figure 4).

(e) any self-reactive substance or self-reactive substance formulation which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement may be accepted for carriage in packages containing not more than 400 kg/450 litres (defined as self-reactive substance type E, exit box E of figure 4);

(f) any self-reactive substance or self-reactive substance formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power may be accepted for carriage in IBCs (defined as self-reactive substance type F, exit box F of figure 4);

(g) any self-reactive substance or self-reactive substance formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement, nor any explosive power shall not be considered as a self-reactive substance of Class 4.1, provided that the formulation is thermally stable (self-accelerating decomposition temperature is 60 °C to 75 °C for a 50 kg package) and any compatible diluent meets the requirements of marginal 2400 (19) (defined as self-reactive substance type G, exit box G of figure 4). If the formulation is not thermally stable or a diluent having a boiling point less that 15 °C is used for desensitization, the formulation shall be defined as a self-reactive type F.

(3) Paragraph (2) refers only to those properties of self-reactive substances which are decisive for classification. A flow chart, presenting the classification principles in the form of a graphically arranged scheme of questions concerning the decisive properties together with the possible answers, is given in figure 4). These properties shall be determined experimentally in accordance with marginal 3103.

Conditions relating to organic peroxides

Testings for assignment to Class 5.2

3105 Substances and articles of Class 5.2 can only be accepted for carriage when the relevant criteria in Parts II and III of the 'Recommendations on the Transport of Dangerous Goods: Tests and Criteria' (published by the United Nations Organization under the reference ST/SG/AC.10/11/Rev. 1, second edition) are met. The test selected for determining the self-accelerating decomposition temperature (SADT) shall be conducted in a manner which is representative, both in size and material, of the package to be carried.

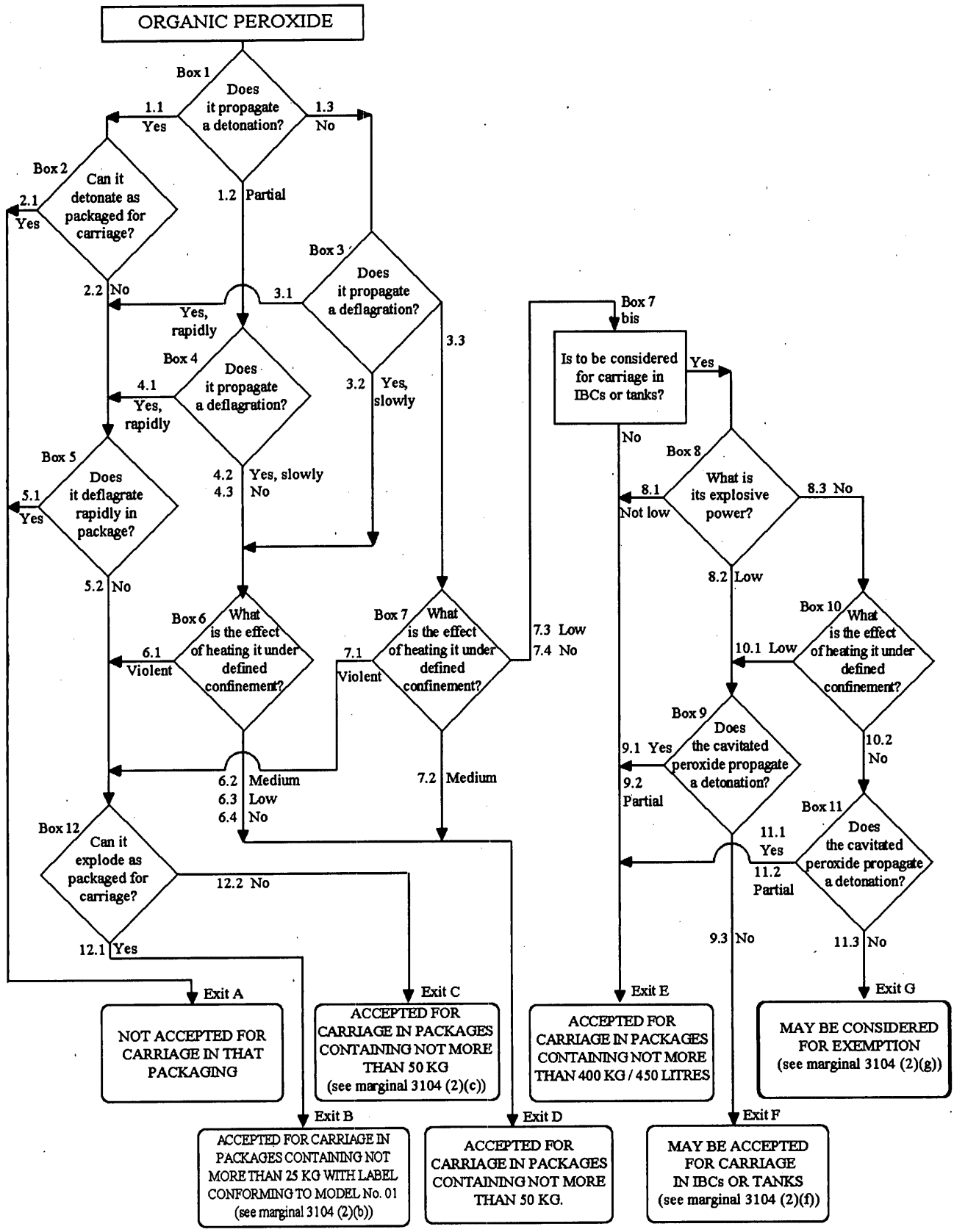
Principles for classification

3106 (1) An organic peroxide or organic peroxide formulation shall be regarded as possessing explosive properties when in laboratory testing it is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.

FIGURE 5

3106
(cont'd)

Classification and flow chart scheme for organic peroxides



3106 *(cont'd)*

(2) The following principles shall be applied to the classification of an organic peroxide or organic peroxide formulation not listed in marginal 2551:

(a) any organic peroxide or organic peroxide formulation which can detonate or deflagrate rapidly, as packaged for carriage, shall be prohibited from carriage in that packaging under Class 5.2 (defined as organic peroxide type A, exit box A of Figure 5).

(b) any organic peroxide or organic peroxide formulation possessing explosive properties and which, as packaged for carriage, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that packaging, shall also bear a label conforming to model No 01. Such an organic peroxide may be packaged in amounts of up to 25 kg unless the maximum quantity has to be limited to a lower amount to preclude detonation or rapid deflagration in the package (defined as organic peroxide type B, exit box B of Figure 5).

(c) any organic peroxide or organic peroxide formulation possessing explosive properties may be carried without a label conforming to model No 01 when the substance as packaged (maximum 50 kg) for carriage cannot detonate or deflagrate rapidly or undergo a thermal explosion (defined as organic peroxide type C, exit box C of Figure 5).

(d) any organic peroxide or organic peroxide formulation which in laboratory testing:

— detonates partially, does not deflagrate rapidly and shows no effect when heated under confinement; or

— does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or

— does not detonate or deflagrate at all and shows a medium effect when heated under confinement may be accepted for carriage in packages containing not more than 50 kg (defined as organic peroxide type D, exit box D of Figure 5).

(e) any organic peroxide or organic peroxide formulation which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement may be accepted for carriage in packages containing not more than 400 kg/450 litres (defined as organic peroxide type E, exit box E of Figure 5).

(f) any organic peroxide or organic peroxide formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power may be accepted for carriage in intermediate bulk containers (IBCs) or tanks (defined as organic peroxide type F, exit box F of Figure 5).

(g) any organic peroxide or organic peroxide formulation which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement, nor any explosive power shall be exempted from Class 5.2, provided that the formulation is thermally stable (self-accelerating decomposition temperature is 60 °C or higher for a 50 kg package) and for liquid formulations, a diluent type A is used for desensitization (defined as organic peroxide type G, exit box G of Figure 5).

(3) Paragraph (2) refers only to those properties of organic peroxides which are decisive for classification. A flow chart, presenting the classification principles in the form of a graphically arranged scheme of questions concerning the decisive properties together with the possible answers, is given in Figure 5. These properties shall be determined experimentally in accordance with marginal 3105.

3107-
3169

B. GLOSSARY OF NAMES IN MARGINAL 2101
[see also marginal 3101 (3)]

3170 *Notes:* 1. The descriptions in the glossary are not intended to replace the test procedures, nor to determine the hazard classification of a substance or article of Class 1. Assignment to the correct division and a decision on whether Compatibility Group S is appropriate must be based on testing of the product in accordance with the Test Manual mentioned in marginal 3101 (1) or by analogy with similar products which have already been tested and assigned in accordance with the procedures of the Test Manual.

3170 (cont'd)

2. The figures given after the names refer to the relevant item numbers (column 1) and identification numbers (column 2) of Table 1 in accordance with marginal 2101, separated by an oblique (e.g. 21°/0171).

For the classification code, see marginal 2100 (4).

Ammunition, illuminating, with or without burster, expelling charge or propelling charge 21°/0171; 30°/0254; 43°/0297

Ammunition designed to produce a single source of intense light for lighting up an area. The term includes illuminating cartridges, grenades and projectiles; and illuminating and target identification bombs.

Note: The following articles: *cartridges, signal; signal devices hand; signals, distress; flares, aerial; flares, surface* are not included in this definition. They are listed separately.

Ammunition, incendiary, liquid or gel, with burster, expelling charge or propelling charge 32°/0247

Ammunition containing liquid or gelatinous incendiary substance. Except when the incendiary substance is an explosive *per se,* it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Ammunition, incendiary, white phosphorus with burster, expelling charge or propelling charge 22°/0243; 31°/0244

Ammunition containing white phosphorus as incendiary substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Ammunition, incendiary with or without burster, expelling charge or propelling charge 21°/0009; 30°/0010; 43°/0300

Ammunition containing incendiary composition. Except when the composition is an explosive *per se,* it also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Ammunition, practice 30°/0488; 43°/0362

Ammunition without a main bursting charge, containing a burster or expelling charge. Normally it also contains a fuze and a propelling charge.

Note: Grenades, practice are not included in this definition. They are listed separately.

Ammunition, proof 43°/0363

Ammunition containing pyrotechnic substances, used to test the performance or strength of new ammunition, weapon components or assemblies.

Ammunition, smoke, white phosphorus, with burster, expelling charge or propelling charge 22°/0245; 31°/0246

Ammunition containing white phosphorus as a smoke-producing substance. It also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

Ammunition, smoke with or without burster, expelling charge or propelling charge 21°/0015; 30°/0016; 43°/0303

Ammunition containing a smoke-producing substance such as chlorosulphonic acid mixture or titanium tetrachloride; or a smoke-producing pyrotechnic composition based on hexachloroethane or red phosphorus. Except when the substance is an explosive *per se,* the ammunition also contains one or more of the following: a propelling charge with primer and igniter charge; a fuze with burster or expelling charge. The term includes grenades, smoke.

Note: Signals, smoke are not included in this definition. They are listed separately.

3170 (cont'd) *Ammunition, tear-producing,* with burster, expelling charge or propelling charge 21°/0018; 30°/0019; 43°/0301

Ammunition containing a tear-producing substance. It also contains one or more of the following: a pyrotechnic substance; a propelling charge with primer and igniter charge; a fuze with burster or expelling charge.

Articles, explosive, extremely insensitive (Articles EEI) 50°/0486

Articles containing only extremely insensitive detonating substances (EIDS) which demonstrate a negligible probability of accidental initiation or propagation under normal conditions of transport, and which have passed Test Series 7.

Articles, pyrophoric 25°/0380

Articles which contain a pyrophoric substance (capable of spontaneous ignition when exposed to air) and an explosive substance or component. The term excludes articles containing white phosphorus.

Articles, pyrotechnic, for technical purposes 9°/0428; 21°/0429; 30°/0430; 43°/0431; 47°/0432

Articles which contain pyrotechnic substances and are used for technical purposes such as heat generation, gas generation, theatrical effects, etc.

Note: The following articles: all ammunition; *cartridges, signal; cutters, cable, explosive; fireworks; flares, aerial; flares, surface; release devices, explosive; rivets, explosive; signal devices, hand; signals, distress; signals, railway track, explosives; signals, smoke* are not included in this definition. They are listed separately.

Black powder (gunpowder), compressed or *Black powder (gunpowder), in pellets* 4°/0028

Substance consisting of a pelletized form of black powder.

Black powder (gunpowder), granular or as meal 4°/0027

Substance consisting of an intimate mixture of charcoal or other carbon and either potassium nitrate or sodium nitrate, with or without sulphur.

Bombs, with inflammable liquid, with bursting charge 10°/0399; 23°/0400

Articles which are dropped from aircraft, consisting of a tank filled with inflammable liquid and bursting charge.

Bombs, photo-flash 5°/0038

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive without means of initiation or with means of initiation containing two or more effective protective features.

Bombs, photo-flash 7°/0037

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a charge of detonating explosive with means of initiation not containing two or more effective protective features.

Bombs, photo-flash 21°/0039; 30°/0299

Explosive articles which are dropped from aircraft to provide brief, intense illumination for photography. They contain a photo-flash composition.

Bombs, with bursting charge 5°/0034; 17°/0035

Explosive articles which are dropped from aircraft, without means of initiation or with means of initiation containing two or more effective protective features.

Bombs with bursting charge 7°/0033; 19°/0291

Explosive articles which are dropped from aircraft, with means of initiation not containing two or more effective protective features.

3170 (cont'd)

Boosters, with detonator 1°/0225; 13°/0268

Articles consisting of a charge of detonating explosive with means of initiation. They are used to increase the initiating power of detonators or detonating cord.

Boosters, without detonator 5°/0042; 17°/0283

Articles consisting of a charge of detonating explosive without means of initation. They are used to increase the initiating power of detonators or detonating cord.

Bursters, explosive 5°/0043

Articles consisting of a small charge of explosive used to open projectiles or other ammunition in order to disperse their contents.

Cartridges, flash 9°/0049; 30°/0050

Articles consisting of a casing, a primer and flash powder, all assembled in one piece ready for firing.

Cartridges for weapons, blank 3°/0326; 15°/0413; 27°/0327; 37°/0338; 47°/0014

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder but no projectile. It produces a loud noise and is used for training, saluting, propelling charge, starter pistols, etc. The term includes ammunition, blank.

Cartridges for weapons, inert projectile 15°/0328; 27°/0417; 37°/0339; 47°/0012

Ammunition consisting of a projectile without bursting charge but with a propelling charge with or without a primer. The articles may include a tracer, provided that the predominant hazard is that of the propelling charge.

Cartridges for weapons, with bursting charge 6°/0006; 18°/0321; 40°/0412

Ammunition consisting of a projectile with a bursting charge without means of initiation or with means of initiation containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

Cartridges for weapons, with bursting charge 7°/0005; 19°/0007; 41°/0348

Ammunition consisting of a projectile with a bursting charge with means of initiation not containing two or more effective protective features; and a propelling charge with or without a primer. The term includes fixed (assembled) ammunition, semi-fixed (partially assembled) ammunition and separate loading ammunition when the components are packed together.

Cartridges, oil well 27°/0277; 37°/0278

Articles consisting of a thin casing of fibreboard, metal or other material containing only propellant powder which projects a hardened projectile to perforate an oil well casing.

Note: Charges, shaped, commercial are not included in this definition. They are listed separately.

Cartridges, power device 15°/0381; 27°/0275; 37°/0276; 47°/0323

Articles designed to accomplish mechanical actions. They consist of a casing with a charge of deflagrating explosive and a means of ignition. The gaseous products of the deflagration produce inflation, linear or rotary motion or activate diaphragms, valves or switches or project fastening devices or extinguishing agents.

Cartridges, signal 30°/0054; 43°/0312; 47°/0405

Articles designed to fire coloured flares or other signals from signal pistols, etc.

Cartridges small arms 27°/0417; 37°/0339; 47°/0012

Ammunition consisting of a cartridge case fitted with a centre or rim fire primer and containing both a propelling charge and solid projectile. They are designed to be fired in weapons of calibre not larger than 19,1 mm. Shot-gun cartridges of any calibre are included in this description.

Note: Cartridges, small arms, blank, are not included in this definition. They are listed separately. Some military small arms cartridges are not included in this definition. They are listed under *cartridges for weapons, inert projectile.*

3170 (cont'd)

Cartridges, for weapons, blank, 27°/0338; 47°/0014

Ammunition consisting of a closed cartridge case with a centre or rim fire primer and a charge of smokeless or black powder. The cartridge cases contain no projectiles. The cartridges are designed to be fired from weapons with a calibre of at most 19,1 mm and serve to produce a loud noise and are used for training, saluting, propelling charge, starter pistols, etc.

Cases, cartridge, empty, with primer 37°/0379; 47°/0055

Articles consisting of a cartridge case made from metal, plastics or other non-inflammable material, in which the only explosive component is the primer.

Cases, combustible, empty, without primer 27°/0447; 37°/0446

Articles consisting of a cartridge case made partly or entirely from nitrocellulose.

Charges, bursting, plastics bonded 5°/0457; 17°/0458; 39°/0459; 47°/0460

Articles consisting of a charge of detonating explosive, plastics bonded, manufactured in a specific form without a casing and without means of initiation. They are designed as components of ammunition such as warheads.

Charges, demolition 5°/0048

Articles containing a charge of a detonating explosive in a casing of fibreboard, plastics, metal or other material. The articles are without means of initiation or with means of initiation containing two or more effective protective features.

Note: The following articles: *bombs; mines; projectiles* are not included in this definition. They are listed separately.

Charges, depth 5°/0056

Articles consisting of a charge of detonating explosive contained in a drum or projectile without means of initiation or with means of initiation containing two or more effective protective features. They are designed to detonate under water.

Charges, explosive, commercial, without detonator 5°/0442; 17°/0443; 39°/0444; 47°/0445

Articles consisting of a charge of detonating explosive without means of initiation, used for explosive welding, jointing, forming and other metallurgical processes.

Charges, propelling, for cannon 3°/0279; 15°/0414; 27°/0242

Charges of propellant in any physical form for separate-loading ammunition for cannon.

Charges, propelling 3°/0271; 15°/0415; 27°/0272; 37°/0491

Articles consisting of a charge of a propellant charge in any physical form, with or without a casing, as a component of rocket motors or for reducing the drag of projectiles.

Charges, shaped, commercial, without detonator 5°/0059; 17°/0439; 39°/0440; 47°/0441

Articles consisting of a casing containing a charge of detonating explosive with a cavity lined with rigid material, without means of initiation. They are designed to produce a powerful, penetrating jet effect.

Charges, shaped, flexible, linear, 5°/0288, 39°/0237

Articles consisting of a V-shaped core of a detonating explosive clad by a flexible sheath.

Charges, supplementary, explosive 5°/0060

Articles consisting of a small removable booster placed in the cavity of a projectile between the fuze and the bursting charge.

3170 (cont'd)

Components, explosive train, n.o.s. 1°/0461; 13°/0382; 35°/0383; 47°/0384

Articles containing an explosive designed to transmit detonation or deflagration within an explosive train.

Contrivances, water-activated with burster, expelling charge or propelling charge 25°/0248; 34°/0249

Articles whose functioning depends upon physico-chemical reaction of their contents with water.

Cord, detonating, flexible 5°/0065; 39°/0289

Article consisting of a core of detonating explosive enclosed in spun fabric and a plastics or other covering. The covering is not necessary if the spun fabric is sift-proof.

Cord (fuse) detonating, metal clad 5°/0290; 17°/0102

Article consisting of a core of detonating explosive clad by a soft metal tube with or without protective covering.

Cord (fuse) detonating, mild effect, metal clad 39°/0104

Article consisting of a core of detonating explosive clad by a soft metal tube with or without a protective covering. The quantity of explosive substance is so small that only a mild effect is manifested outside the cord.

Cord, igniter 43°/0066

Article consisting of textile yarns covered with black powder or another fast burning pyrotechnic composition and of a flexible protective covering; or it consists of a core of black powder surrounded by a flexible woven fabric. It burns progressively along its length with an external flame and is used to transmit ignition from a device to a charge or primer.

Cutters, cable, explosive 47°/0070

Articles consisting of a knife-edged device which is driven by a small charge of deflagrating explosive into an anvil.

Detonator assemblies, non-electric, for blasting 1°/0360; 35°/0361

Non-electric detonators assembled with and activated by such means as safety fuse, shock tube, flash tube or detonating cord. They may be of instantaneous design or incorporate delay elements. Detonating relays incorporating detonating cord are included.

Detonators, electric, for blasting 1°/0030; 35°/0255; 47°/0456

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Electric detonators are activated by an electric current.

Detonators for ammunition 1°/0073; 13°/0364; 35°/0365, 47°/0366

Articles consisting of a small metal or plastics tube containing explosives such as lead azide, PETN or combinations of explosives. They are designed to start a detonation train.

Detonators, non-electric, for blasting 1°/0029; 35°/0267; 47°/0455

Articles specially designed for the initiation of blasting explosives. These detonators may be constructed to detonate instantaneously or may contain a delay element. Non-electric detonators are activated by such means as shock tube, flash tube, safety fuse, other igniferous device or flexible detonating cord. Detonating relays without detonating cord are included.

Explosive, blasting, type A 4°/0081

Substances consisting of liquid organic nitrates such as nitroglycerine or a mixture of such ingredients with one or more of the following: nitrocellulose; ammonium nitrate or other inorganic nitrates; aromatic nitro-derivatives, or combustible materials, such as wood-meal and aluminium powder. They may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers. Such explosives shall be in powdery, gelatinous or elastic form. The term includes dynamite; gelatine, blasting and gelatine dynamites.

3170 (cont'd)

Explosive, blasting, type B 4°/0082; 48°/0331

Substances consisting of

(a) a mixture of ammonium nitrate or other inorganic nitrates with an explosive such as trinitrotoluene, with or without other substances such as wood-meal and aluminium powder; or

(b) a mixture of ammonium nitrate or other inorganic nitrates with other combustible substances which are not explosive ingredients. In both cases they may contain inert components such as kieselguhr, and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine, similar liquid organic nitrates or chlorates.

Explosive, blasting, type C 4°/0083

Substances consisting of a mixture of either potassium or sodium chlorate or potassium, sodium or ammonium perchlorate with organic nitro-derivatives or combustible materials such as wood-meal or aluminium powder or a hydrocarbon. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine or similar liquid organic nitrates.

Explosive, blasting, type D 4°/0084

Substances consisting of a mixture of organic nitrated compounds and combustible materials such as hydrocarbons and aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. Such explosives must not contain nitroglycerine, similar liquid organic nitrates, chlorates and ammonium nitrate. The term generally includes plastic explosives.

Explosives, blasting, type E 4°/0241; 48°/0332

Substances consisting of water as an essential ingredient and high proportions of ammonium nitrate or other oxidizers, some or all of which are in solution. The other constituents may include nitro-derivatives such as trinitrotoluene, hydrocarbons or aluminium powder. They may contain inert components such as kieselguhr and additives such as colouring agents and stabilizers. The term includes explosives, emulsion, explosives, slurry and explosives, watergel.

Fireworks 9°/0333; 21°/0334; 30°/0335; 43°/0336; 47°/0337

Pyrotechnic articles designed for entertainment.

Flares, aerial 9°/0420; 21°/0421; 30°/0093; 43°/0403; 47°/0404

Articles containing pyrotechnic substances which are designed to be dropped from an aircraft to illuminate, identify, signal or warn.

Flares, surface 9°/0418; 21°/0419; 30°/0092

Articles containing pyrotechnic substances which are designed for use on the surface to illuminate, identify, signal or warn.

Flash powder 8°/0094; 29°/0305

Pyrotechnic substance which, when ignited, produces an intense light.

Fracturing devices, explosive, without detonator, for oil wells, 5°/0099

Articles consisting of a charge of detonating explosive contained in a casing without means of initiation. They are used to fracture the rock around a drill shaft to assist the flow of crude oil from the rock.

Fuse, igniter, tubular, metal clad 43°/0103

Article consisting of a metal tube with a core of deflagrating explosive.

Fuse, instantaneous, non-detonating (quickmatch) 30°/0101

Article consisting of cotton yarns impregnated with fine black powder. It burns with an external flame and is used in ignition trains for fireworks, etc.

3170 (cont'd)

Fuse, safety 47°/0105

Article consisting of a core of fine grained black powder surrounded by a flexible woven fabric with one or more protective outer coverings. When ignited, it burns at a predetermined rate without any external explosive effect.

Fuzes, detonating 1°/0106; 13°/0107; 35°/0257; 47°/0367

Articles with explosive components designed to produce a detonation in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to initiate the detonation. They generally incorporate protective features.

Fuzes, detonating, with protective features 5°/0408; 17°/0409; 39°/0410

Articles with explosive components designed to produce a detonation in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to initiate the detonation. The detonating fuze must incorporate two or more effective protective features.

Fuzes, igniting 30°/0316; 43°/0317; 47°/0368

Articles with primary explosive components designed to produce a deflagration in ammunition. They incorporate mechanical, electrical, chemical or hydrostatic components to start the deflagration. They generally incorporate protective features.

Grenades, hand or rifle, with bursting charge 5°/0284; 17°/0285

Articles which are designed to be thrown by hand or to be projected by a rifle. They are without means of initiation or with means of initiation containing two or more effective protective features.

Grenades, hand or rifle, with bursting charge 7°/0292; 19°/0293

Articles which are designed to be thrown by hand or to be projected by a rifle. They are with means of initiation not containing two or more effective protective features.

Grenades, practice, hand or rifle 21°/0372; 30°/0318; 43°/0452; 47°/0110

Articles without a main bursting charge which are designed to be thrown by hand or to be projected by a rifle. They contain the priming device and may contain a spotting charge.

Hexotonal 4°/0393

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX), trinitrotoluene (TNT) and aluminium.

Hexolite (hexotol), dry or wetted with less than 15 % water, by mass 4°/0118

Substance consisting of an intimate mixture of cyclotrimethylene-trinitramine (RDX) and trinitrotoluene (TNT). The term includes 'Composition B'.

Igniters 9°/0121; 21°/0314; 30°/0315; 43°/0325; 47°/0454

Articles containing one or more explosive substances designed to produce a deflagration in an explosive train. They may be actuated chemically, electrically or mechanically.

Note: The following articles: *cord, igniter; fuse, igniter; fuse, instantaneous, non-detonating; fuzes, igniting; lighters, fuse; primers, cap type; primers, tubular* are not included in this definition. They are listed separately.

Jet perforating guns, charged, oil well, without detonator 5°/0124; 39°/0494

Articles consisting of a steel tube or metallic strip, into which are inserted shaped charges connected by detonating cord, without means of initiation.

3170 (cont'd)

Lighters, fuse 47°/0131

Articles of various design actuated by friction, percussion or electricity and used to ignite safety fuse.

Mines, with bursting charge 5°/0137; 17°/0138

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes 'Bangalore torpedoes'.

Mines, with bursting charge 7°/0136; 19°/0294

Articles consisting normally of metal or composition receptacles filled with a detonating explosive, with means of initiation not containing two or more effective protective features. They are designed to be operated by the passage of ships, vehicles or personnel. The term includes 'Bangalore torpedoes'.

Octolite (Octol), dry or wetted with less than 15 % water, by mass 4°/0266

Substance consisting of an intimate mixture of cyclotetramethylene-tetranitramine (HMX) and trinitrotoluene (TNT).

Octonal 4°/0496

Substance consisting of an intimat mixture of cyclotetramethylenetetranitramine (HMX), trinitrotoluene (TNT) and aluminium.

Pentolite, dry or wetted with less than 15 % water, by mass 4°/0151

Substance consisting of an intimate mixture of pentaerythrite tetranitrate (PETN) and trinitrotoluene (TNT).

Powder cake (powder paste), wetted with not less than 17 % alcohol, by mass. *Powder cake (powder paste), wetted* with not less than 25 % water, by mass 2°/0433; 26°/0159

Substance consisting of nitrocellulose impregnated with not more than 60 % of nitroglycerine or other liquid organic nitrates or a mixture of these.

Powder, smokeless 2°/0160; 26°/0161

Substance based on nitrocellulose used as propellant. The term includes propellants with a single base (nitrocellulose (NC) alone), those with a double base (such as NC and nitroglycerine/(NG)) and those with a triple base (such as NC/NG/nitroguanidine).

Note: Cast, pressed or bag-charges of smokeless powder are listed under *charges, propelling.*

Primers, cap type 1°/0377; 35°/0378; 47°/0044

Articles consisting of a metal or plastics cap containing a small amount of primary explosive mixture that is readily ignited by impact. They serve as igniting elements in small arms cartridges and in percussion primers for propelling charges.

Primers, tubular 30°/0319; 43°/0320; 47°/0376

Articles consisting of a primer for ignition and an auxiliary charge of deflagrating explosive such as black powder used to ignite the propelling charge in a cartridge case for cannon, etc.

3170 (cont'd)

Projectiles, inert with tracer 30°/0424; 43°/0425; 47°/0345

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm.

Projectiles, with burster or expelling charge 17°/0346; 39°/0347

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

Projectiles, with burster or expelling charge 19°/0426; 41°/0427

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features. They are used to scatter dyes for spotting or other inert materials.

Projectiles, with burster or expelling charge 21°/0434; 43°/0435

Articles such as a shell or bullet, which are projected from a cannon or other gun, rifle or other small arm. They are used to scatter dyes for spotting or other inert materials.

Projectiles, with bursting charge 5°/0168; 17°/0169; 39°/0344

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are without means of initiation or with means of initiation containing two or more effective protective features.

Projectiles, with bursting charge 7°/0167; 19°/0324

Articles such as a shell or bullet, which are projected from a cannon or other gun. They are with means of initiation not containing two or more effective protective features.

Propellant, liquid 2°/0497; 26°/0495

Substance consisting of a deflagrating liquid explosive, used for propulsion.

Propellant, solid 2°/0498; 26°/0499

Substance consisting of a deflagrating solid explosive, used for propulsion.

Release devices, explosive 47°/0173

Articles consisting of a small charge of explosive with means of initiation and rods or links. They sever the rods or links to release equipment quickly.

Rivets, explosive 47°/0174

Articles consisting of a small charge of explosive inside a metallic rivet.

Rocket motors 3°/0280; 15°/0281; 27°/0186

Articles consisting of a charge of explosive, generally a solid propellant, contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

3170 (cont'd)

Rocket motors, liquid fuelled 23°/0395; 32°/0396

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

Rocket motors with hypergolic liquids with or without expelling charge 25°/0322; 34°/0250

Articles consisting of a hypergolic fuel contained in a cylinder fitted with one or more nozzles. They are designed to propel a rocket or a guided missile.

Rockets, line throwing 21°/0238; 30°/0240; 43°/0453

Articles consisting of a rocket motor which is designed to extend a line.

Rockets, liquid fuelled, with bursting charge 10°/0397; 23°/0398

Articles consisting of a liquid fuel within a cylinder fitted with one or more nozzles and fitted with a warhead. The term includes guided missiles.

Rockets with bursting charge 6°/0181; 18°/0182

Articles consisting of a rocket motor and a warhead without means of initiation or with means of initiation containing two or more effective protective features. The term includes guided missiles.

Rockets, with bursting charge 7°/0180; 19°/0295

Articles consisting of a rocket motor and a warhead with means of initiation not containing two or more effective protective features. The term includes guided missiles.

Rockets, with expelling charge 15°/0436; 27°/0437; 37°/0438

Articles consisting of a rocket motor and a charge to expel the payload from a rocket head. The term includes guided missiles.

Rockets, with inert head 27°/0183

Articles consisting of a rocket motor and an inert head. The term includes guided missiles.

Signal devices, hand 43°/0191; 47°/0373

Portable articles containing pyrotechnic substances which produce visual signals or warnings. The term includes small surface flares such as highway or railway flares and small distress flares.

Signals, distress, ship 9°/0194; 30°/0195

Articles containing pyrotechnic substances designed to produce signals by means of sound, flame or smoke or any combination thereof.

Signals, railway track, explosive 9°/0192; 30°/0492; 43°/0493; 47°/0193

Articles containing a pyrotechnic substance which explodes with a loud report when the article is crushed. They are designed to be placed on a rail.

Signals, smoke, 9°/0196; 19°/0313; 30°/0487; 43°/0197

Articles containing pyrotechnic substances which emit smoke. In addition they may contain devices for emitting audible signals.

Sounding devices, explosive 5°/0374; 17°/0375

Articles consisting of a charge of detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

3170 (cont'd)

Sounding devices, explosive 7°/0296; 19°/0204

Articles consisting of a charge of detonating explosive with means of initiation not containing two or more effective protective features. They are dropped from ships and function when they reach a predetermined depth or the sea bed.

Substances, explosive, very insensitive (Substances, EVI 48°/0482)

Substances presenting a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport, and which have passed Test Series 5.

Torpedoes, liquid fuelled, with inert head 32°/0450

Articles consisting of a liquid explosive system to propel the torpedo through the water, with an inert head.

Torpedoes, liquid fuelled, with or without bursting charge 10°/0449

Articles consisting of either a liquid explosive system to propel the torpedo through the water, with or without a warhead; or a liquid non-explosive system to propel the torpedo through the water, with a warhead.

Torpedoes, with bursting charge 5°/0451

Articles consisting of a non-explosive system to propel the torpedo through the water, and a warhead without means of initiation or with means of initiation containing two or more effective protective features.

Torpedoes, with bursting charge 6°/0329

Articles consisting of an explosive system to propel the torpedo through the water, and a warhead without means of initiation or with means of initiation containing two or more effective protective features.

Torpedoes, with bursting charge 7°/0330

Articles consisting of an explosive or non-explosive system to propel the torpedo through the water, and a warhead with means of initiation not containing two or more effective protective features.

Tracers for ammunition 30°/0212; 43°/0306

Sealed articles containing pyrotechnic substances, designed to reveal the trajectory of a projectile.

Tritonal 4°/0390

Substance consisting of trinitrotoluene (TNT) mixed with aluminium.

3170 (cont'd)

Warheads, rocket, with burster or expelling charge 39°/0370

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

Warheads, rocket, with burster or expelling charge 41°/0371

Articles consisting of an inert payload and a small charge of detonating or deflagrating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket motor to scatter inert material. The term includes warheads for guided missiles.

Warheads, rocket, with bursting charge 5°/0286; 17°/0287

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

Warheads, rocket, with bursting charge 7°/0369

Articles consisting of a detonating explosive, with means of initiation not containing two or more effective protective features. They are designed to be fitted to a rocket. The term includes warheads for guided missiles.

Warheads, torpedo, with bursting charge 5°/0221

Articles consisting of a detonating explosive, without means of initiation or with means of initiation containing two or more effective protective features. They are designed to be fitted to a torpedo.

3171-3199

APPENDIX A.2

A. PROVISIONS RELATING TO THE NATURE OF ALUMINIUM-ALLOY RECEPTACLES FOR CERTAIN GASES OF CLASS 2

I. Quality of the material

3200 (1) The materials of aluminium-alloy receptacles which are to be accepted for the gases referred to in marginal 2203 (2) (b) shall satisfy the following requirements:

3200
(cont'd)

	A	B	C	D
Tensile strength Rm, in MPa (=N/mm²)	49 to 186	196 to 372	196 to 372	343 to 490
Yield stress, Re, in MPa (=N/mm²) permanent set λ = 0,2 %)	10 to 167	59 to 314	137 to 334	206 to 412
Permanent elongation at fracture (l = 5d) in per cent	12 to 40	12 to 30	12 to 30	11 to 16
Bend test (diameter of former d = n × e, where e is the thickness of the test piece)	n=5 (Rm ≤ 98) n=6 (Rm ≥ 98)	n=6 (Rm ≤ 325) n=7 (Rm ≥ 325)	n=6 (Rm ≤ 325) n=7 (Rm ≥ 325)	n=7 (Rm ≤ 392) n=8 (Rm ≥ 392)
Aluminium Association Series Number (1)	1 000	5 000	6 000	2 000

(1) See 'Aluminium Standards and Data', Fifth edition, January 1976, published by the 'Aluminium Association', 750 Third Avenue, New York.

The actual properties will depend on the composition of the alloy concerned and on the final treatment of the receptacle, but whatever alloy is used the thickness of the receptacle shall be calculated by the following formulae:

$$e = \frac{P_{MPa} \times D}{\frac{2 \times Re}{1{,}30} + P_{MPa}} \quad \text{or} \quad e = \left(\frac{P_{bar} \times D}{\frac{20 \times Re}{1{,}30} + P_{bar}} \right)$$

where

e = minimum thickness of receptacle wall, in mm;

P_{MPa} = test pressure, in MPa;

P_{bar} = test pressure, in bar;

D = nominal external diameter of the receptable, in mm; and

Re = guaranteed minimum 0,2 % proof stress, in MPa (=N/mm²).

In addition, the value of the minimum guaranteed proof stress (Re) introduced into the formula is no case to be greater than 0,85 times the guaranteed minimum tensile strength (Rm), whatever the type of alloy used.

Notes: 1. The above characteristics are based on previous experience with the following materials used for receptacles:

Column A: Aluminium, unalloyed, 99,5 % pure;

Column B: Alloys of aluminium and magnesium;

Column C: Alloys of aluminium, silicon and magnesium, such as ISO/R209-A1-Si-Mg (Aluminium Association 6351);

Column D: Alloys of aluminium, copper and magnesium.

2. The permanent elongation at fracture (1 = 5d) is measured by means of test-pieces of circular section in which the gauge length 1 is equal to five times the diameter d; if test-pieces of rectangular section are used the gauge length must be calculated by the formula: $l = 5{,}65 \sqrt{F_0}$, where F_0 is the initial cross-sectional area of the test-piece.

3. (a) The bend test (see diagram) shall be carried out on specimens obtained by cutting into two equal parts of width 3e, but in no case less than 25 mm, an annular section of a cylinder. The specimens shall not be machined elsewhere than on the edges.

(b) The bend test shall be carried out between a mandrel of diameter (d) and two circular supports separated by a distance of (d + 3e). During the test the inner faces shall be separated by a distance not greater than the diameter of the mandrel.

3200 *(cont'd)*

(c) The specimen shall not exhibit cracks when it has been bent inwards around the mandrel until the inner faces are separated by a distance not greater than the diameter of the mandrel.

(d) The ratio (n) between the diameter of the mandrel and the thickness of the specimen shall conform to the values given in the table.

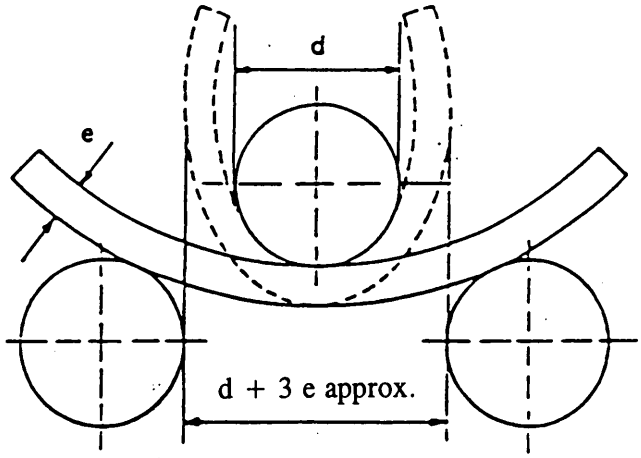


Diagram of bend test

(2) A lower minimum elongation value is acceptable on condition that an additional test approved by the competent authority of the country in which the receptacles are made proves that safety of carriage is ensured to the same extent as in the case of receptacles constructed to comply with the characteristics given in the table in paragraph (1).

(3) The wall thickness of the receptacles at the thinnest point shall be the following:

where the diameter of the receptacle is less than 50 mm: not less than 1,5 mm;

where the diameter of the receptacle is from 50 to 150 mm: not less than 2 mm; and

where the diameter of the receptacle is more than 150 mm: not less than 3 mm.

(4) The ends of the receptacles shall have a semicircular, elliptical or 'basket-handle' section; they shall afford the same degree of safety as the body of the receptacle.

II. Additional official test for aluminium alloys

3201 (1) In addition to the tests required by marginals 2215, 2216 and 2217, it is necessary to test for possible intercrystalline corrosion of the inside wall of the receptacle where use is made of an aluminium alloy containing copper, or where use is made of an aluminium alloy containing magnesium and manganese and the magnesium content is greater than 3,5 % or the manganese content lower than 0,5 %.

(2) In the case of an aluminium/copper alloy the test shall be carried out by the manufacturer at the time of approval of a new alloy by the competent authority; it shall thereafter be repeated, in the course of production, for each pour of the alloy.

(3) In the case of an aluminium/magnesium alloy the test shall be carried out by the manufacturer at the time of approval of a new alloy and of the manufacturing process by the competent authority. The test shall be repeated whenever a change is made in the composition of the alloy or in the manufacturing process.

(4) (a) *Preparation of aluminium/copper alloys*

Before the aluminium/copper alloy is subjected to the corrosion test, the samples shall be cleansed of grease by means of a suitable solvent, and dried.

(b) *Preparation of aluminium/magnesium alloys*

Before the aluminium/magnesium alloy is subjected to the corrosion test, the samples shall be heated for seven days at 100 °C; they shall then be cleansed of grease by means of a suitable solvent, and dried.

3201 *(cont'd)*

(c) *Performance of test*

The inner side of a specimen measuring 1 000 mm² (33,3 × 30 mm) of the material containing copper shall be treated at ambient temperature, for 24 hours, with 1 000 ml of an aqueous solution containing 3 % NaCl and 0,5 % HCl.

(d) *Examination*

After being washed and dried, a section of the specimen 20 mm long shall be examined micrographically at a magnification of 100 to 500 X, preferably after electropolishing.

The depth of attack shall not go beyond the second layer of grains from the surface subjected to the corrosion test; in principle, if the entire first layer of grains is attacked, only part of the second row should be.

In the case of sections, examination shall be performed at right angles to the surface.

Where after electropolishing it is found necessary to render the grain boundaries particularly visible for subsequent examination, this shall be done by a method acceptable to the competent authority.

III. Protection of the inner surface

3202 The inner surface of aluminium-alloy receptacles shall be provided with a suitable anti-corrosion coating if the competent testing stations so consider necessary.

3203-3249

B. REQUIREMENTS CONCERNING THE MATERIALS AND CONSTRUCTION OF RECEPTACLES INTENDED FOR THE CARRIAGE OF DEEPLY-REFRIGERATED LIQUEFIED GASES OF CLASS 2

3250 (1) Receptacles shall be made of steel, aluminium, aluminium alloy, copper, or copper alloy, e.g. brass. However, receptacles, made of copper or copper alloy shall be accepted only for gases containing no acetylene.

(2) Only materials appropriate to the lowest working temperature of the receptacles, and of their fittings and accessories, may be used.

3251 The following materials shall be accepted for the manufacture of receptacles:

(a) steels not subject to brittle fracture at the lowest working temperature (see marginal 3265);

1. fine-grained unalloyed steels, down to a temperature of – 60 °C;
2. nickel steels (with a nickel content of 0,5 to 9 %) down to a temperature of – 196 °C, depending on the nickel content;
3. austenitic chrome-nickel steels, down to a temperature of – 270 °C;

(b) aluminium not less than 99,5 % pure, or aluminium alloys (see marginal 3266);

(c) deoxidized copper not less than 99,9 % pure, or copper alloys having a copper content of over 56 % (see marginal 3267).

3252 (1) Receptacles shall be either seamless or welded.

(2) Receptacles under marginal 2207 made of austenitic steel, of copper or of copper alloy may alternatively be hard-soldered.

3253 The fittings and accessories may either be screwed to the receptacles, or be affixed thereto as follows:

(a) receptacles made of steel, aluminium or aluminium alloy: by welding;

(b) receptacles made of austenitic steel, of copper or of copper alloy: by welding or hard-soldering.

3254 The construction of receptacles and their mode of affixing to the vehicle, to the underframe or in the container frame shall be such as to preclude with certainty any such reduction in the temperature of the load-bearing components as would be likely to render them brittle. The fastenings of the receptacles shall themselves be so designed that even when the receptacle is at its lowest working temperature they still possess the necessary mechanical properties.

3255-
3264

1. Materials, receptacles

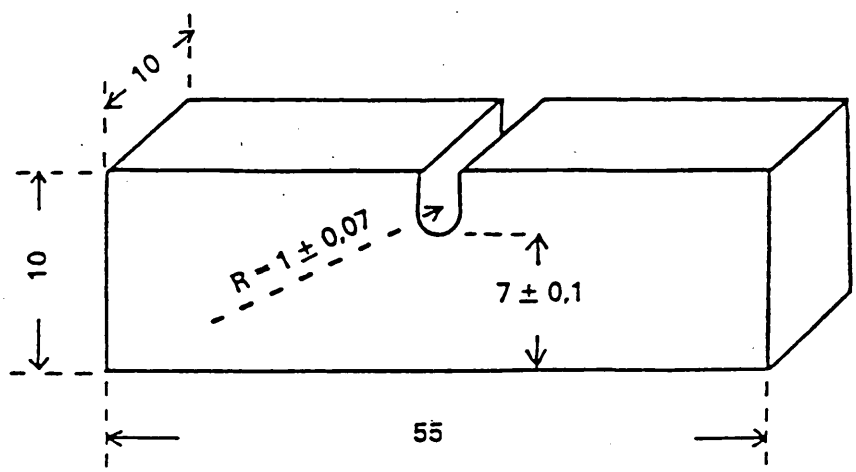
(a) *Steel receptacles*

3265 The materials used for the manufacture of receptacles, and the weld beads, shall at their lowest working temperatures meet at least the following requirements as to impact strength.

The tests may be conducted with test-pieces having either a U-shaped or a V-shaped notch.

Material	Impact strength [a] of sheet metal and weld beads at lowest working temperatures	
	J/cm² [b]	J/cm² [c]
Unalloyed killed steel	34,3	27,4
Ferritic alloy steel Ni < 5 %	34,3	21,6
Ferritic alloy steel 5 % ≤ Ni ≤ 9 %	44,1	34,3
Austenitic Cr Ni steel	39,2	31,4

[a] Impact strengths determined with different test-pieces are not mutually comparable. See also marginal 3275 to 3277.
[b] The values relate to test-pieces with a U-shaped notch as illustrated below.
[c] The values relate to test-pieces with a V-shaped notch conforming to ISO R 148.



In the case of austenitic steels, only the weld bead need be subjected to an impact-strength test.

For working temperatures below – 196 °C, the impact-strength test is not performed at the lowest working temperature, but at – 196 °C.

(b) *Receptacles made of aluminium or aluminium alloy*

3266 The seams of receptacles shall at ambient temperature meet the following requirements as to bending coefficient:

Thickness of sheet e in mm	Bending coefficient k [a] for the seam	
	Root in compression zone	Root in tension zone
≤ 12	≥ 15	≥ 12
> 12 to 20	≥ 12	≥ 10
> 20	≥ 9	≥ 8

[a] See marginal 3285.

(c) *Receptacles made of copper or copper alloy*

3267 It is not necessary to carry out tests to determine whether the impact strength is adequate.

3268-
3274

2. Tests

(a) *Impact-strength tests*

3275 The impact strength shown in marginal 3265 relate to test-pieces measuring 10 x 10 mm and having a U-shaped or a V-shaped notch.

Notes: 1. With regard to the shape of the test piece, see marginal 3265 [table, notes [b] and [c]].

2. For sheets less than 10 mm but not less than 5 mm thick, test-pieces having a cross-section of 10 × e mm, where 'e' represents the thickness of the sheet, shall be used. Such impact-strength tests generally yield higher values than do such tests on standard test-pieces.

3. No impact-strength test shall be carried out on sheets less than 5 mm thick, or on their seams.

3276 (1) For testing sheet metal the impact strength shall be determined on three test-pieces. The test-pieces shall be removed at right angles to the direction of rolling in the case of test-pieces with a U-shaped notch and in the direction of rolling in the case of test-pieces with a V-shaped notch.

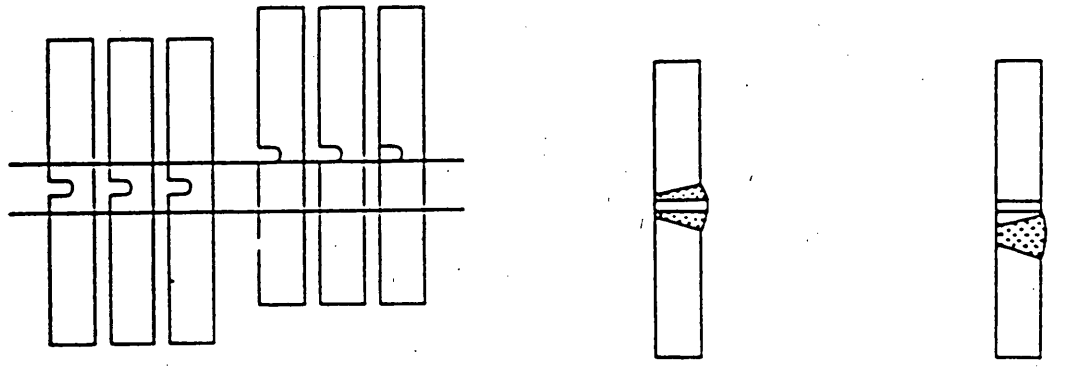
(2) For testing seams the test-pieces shall be taken as follows:

e ≤ 10 mm

— three test-pieces from the centre of the weld;

— three test-pieces from the zone of deformation created by the weld (the notch shall be completely outside the melted area but as near to it as possible);

3276
(cont'd)



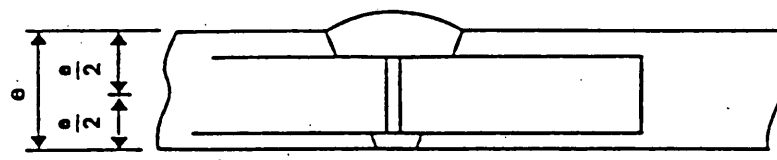
i.e. six test-pieces in all.

The test-pieces shall be so machined as to have the maximum possible thickness.

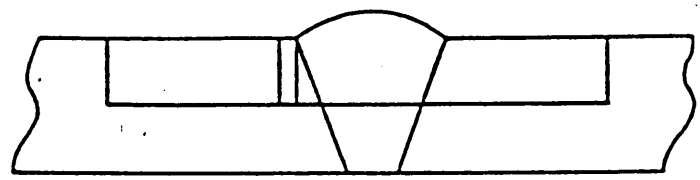
$10 < e \leq 20$

— three test-pieces from the centre of the weld;

— three test-pieces from the zone of deformation;



Centre of weld

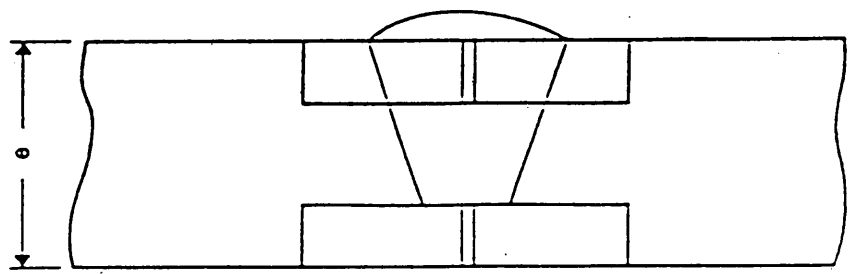


Zone of deformation

i.e. six test-pieces in all.

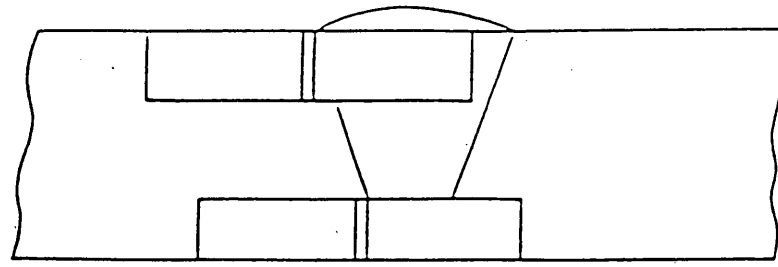
$e > 20$

two sets of three test-pieces (one set on the upper face, one set on the lower face) at each of the points indicated below;



Centre of weld

3276
(cont'd)



Zone of deformation

i.e. twelve test-pieces in all.

3277 (1) For sheet metal the average of three tests shall meet the minimum values given in marginal 3265; none of the values may be more than 30 % below the minimum specified.

(2) For welds the average values obtained from three of the test-pieces taken at the different points, centre of weld and zone of deformation, shall correspond to the minimum values shown. None of the values may be more than 30 % below the minimum specified.

3278-
3284

(b) Determination of bending coefficient

3285 (1) The bending coefficient k referred to in marginal 3266 is defined as follows:

$$k = 50 \frac{e}{r}$$

where e = thickness of sheet in mm; and

r = mean radius of curvature in mm of the test-piece when the first crack appears in the tension zone.

(2) The bending coefficient k shall be determined for the seam. The width of the test piece shall be equal to 3e.

(3) Four tests shall be performed on the seam, two with the root in the compression zone (fig. 1) and two with the root in the tension zone (fig. 2); all values obtained shall meet the minimum value requirements of marginal 3266.

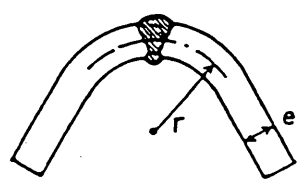


Fig. 1

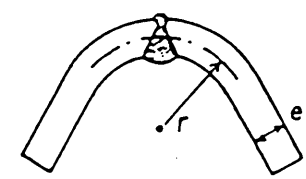


Fig. 2

3286-
3290

C. PROVISIONS RELATING TO TESTS ON AEROSOL DISPENSERS AND NON-REFILLABLE CONTAINERS FOR GASES UNDER PRESSURE OF CLASS 2, 10° AND 11°

1. Pressure and bursting tests on receptacle model

3291 Hydraulic pressure tests shall be carried out on at least five empty receptacles of each model;

(a) until the prescribed test pressure is reached, by which time no leakage or visible permanent deformation shall have occurred; and

(b) until leakage or bursting occurs; the dished end, if any, should yield first and the receptacle should not leak or burst until a pressure 1.2 times the test pressure has been reached or passed.

2. Tightness (leakproofness) tests on all receptacles

3292 (1) For the test on aerosol dispensers (10°) and non-refillable containers for gas under pressure (11°) in a hot-water bath, the temperature of the bath and the duration of the test shall be such that the internal pressure of each receptacle reaches at least 90 % of the internal pressure that would be reached at 55 °C.

However, if the contents are sensitive to heat or if the receptacles are made of a plastics material which softens at this test temperature, the temperature of the bath shall be from 20 °C to 30 °C; in addition, one dispenser out of every 2 000 shall be tested at the temperature prescribed in the foregoing paragraph.

(2) No leakage or permanent deformation of receptacles shall occur. The provision concerning permanent deformation is not applicable to receptacles which, being made of a plastics material, soften.

3293-
3299

APPENDIX A.3

A. TESTS RELATING TO FLAMMABLE LIQUIDS OF CLASSES 3, 6.1 AND 8

Test for determining flash-point

3300 (1) The flash-point shall be determined by means of one of the following types of apparatus:

(a) for use at temperatures not exceeding 50 °C: Abel, Abel-Pensky, Luchaire-Finances, Tag;

(b) for use at temperatures above 50 °C: Pensky-Martens, Luchaire-Finances;

(c) failing these, any other closed-cup apparatus capable of giving results within 2 °C of those which an apparatus listed above would give at the same place.

(2) To determine the flash-point of paints, gums and similar viscous products containing solvents, only apparatus and test methods suitable for determining the flash-point of viscous liquids shall be used, such as method A of IP standard 170/94 or more recent IP (1) standards or German standard DIN 53 213.

3301 The test procedure shall be:

(a) for the Abel apparatus, that of IP (1) standard 170/94; this standard may also be used with the Abel-Pensky apparatus;

(b) for the Pensky-Martens apparatus, that of IP (1) standard 34/88, or that of ASTM (2) standard D.93/80;

(1) The institute of Petroleum, 61 New Cavendish Street, London, W1M 8AR.
(2) American Society for Testing and Materials, 1916 Race Street, Philadelphia 3, (Pa.).

3301 *(cont'd)*

(c) for the Tag apparatus, that of ASTM (1) standard D.56/87;

(d) for the Luchaire apparatus, that of the French standard NFT 60.103.

If any other apparatus is used, the following precautions shall be taken:

1. The test shall be performed in a place free from draughts.

2. The rate of temperature increase of the liquid being tested shall never exceed 5 °C per minute.

3. The pilot-flame shall be 5 mm (± 0,5 mm) long.

4. The pilot-flame shall be applied to the opening of the receptacle at each rise of 1 °C in the temperature of the liquid.

3302 In the event of a dispute as to the classification of a flammable liquid, the item number proposed by the consignor shall be accepted if a check-test of the flash-point, yields a result not differing by more than 2 °C from the limits (23 °C, and 61 °C respectively) stated in marginal 2301. If the difference is more than 2 °C a second check-test shall be carried out, and the highest figure obtained shall be adopted.

Test for determining peroxide content

3303 To determine the peroxide content of a liquid, the procedure is as follows:

A quantity p (about 5 g, weighed to the nearest 0,01 g) of the liquid to be titrated is placed in an Erlenmeyer flask; 20 cm^3 of acetic anhydride and about 1 g of powdered solid potassium iodide are added; the flask is shaken and, after 10 minutes, heated for 3 minutes to about 60 °C. When it has been left to cool for 5 minutes, 25 cm^3 of water are added. After this, it is left standing for half an hour, then the liberated iodine is titrated with a decinormal solution of sodium thiosulphate, no indicator being added; complete discoloration indicates the end of the the reaction. If n is the number of cm^3 of thiosulphate solution required, the percentage of peroxide (calculated as H_2O_2) present in the sample is obtained by the formula

$$\frac{7\,n,}{100\,P}$$

Method of testing for combustibility

3304 (1) The method describes a procedure for determining whether the substance, when heated under the test conditions and exposed to an external source of flame applied in a standard manner, sustains combustion.

(2) *Principle of the method*: a metal block with a concave depression (test portion well) is heated to a specified temperature. A specified volume of the substance under test is transferred to the well and its ability to sustain combustion is noted after application and subsequent removal of a standard flame under specified conditions.

(3) *Apparatus*: a combustibility tester consisting of a block of aluminium alloy or other corrosion-resistant metal of high thermal conductivity is used. The block has a concave well and a pocket drilled to take a thermometer. A small gas jet assembly on a swivel is attached to the block. The handle and gas inlet for the gas jet may be fitted at any convenient angle to the gas jet. A suitable apparatus is shown in figure 1 and the essential dimensions are given in figures 1 and 2.

The following equipment is needed:

(a) *Gauge*, for checking that the height of the centre of the gas jet above the top of the test portion well is 2,2 mm (see figure 1);

(b) *Thermometer*, mercury in glass, for horizontal operation, with a sensitivity not less than 1mm/°C, or other measuring device of equivalent sensitivity permitting reading at 0,5 °C intervals. When in position in the block, the thermometer bulb should be surrounded with thermally conducting thermoplastic compound;

(1) American Society for Testing and Materials, 1916 Race Street, Philadelphia 3, (Pa.).

3304 *(cont'd)*

c) *Hotplate*, fitted with a temperature-control device. (Other types of apparatus with suitable temperature-control facilities may be employed to heat the metal block);

(d) *Stopwatch*, or other suitable timing device;

(e) *Syringe*, capable of delivering 2 ml to an accuracy of ± 0,1 ml; and

(f) *Fuel source*, butane test fuel.

(4) *Sampling*: The sample shall be representative of the substance to be tested and shall be supplied and kept in a tightly closed container prior to test. Because of the possibility of loss of volatile constituents, the sample shall receive only the minimum treatment to ensure its homogeneity. After removing each test portion, the sample container shall be immediately closed tightly to ensure that no volatile components escape from the container; if this closure is incomplete, an entirely new sample shall be taken.

(5) *Procedure*: Carry out the determination in triplicate.

WARNING — Do not carry out the test in a small confined area (for example a glove box), because of the hazard of explosions.

(a) It is essential that the apparatus is set up in a completely draught-free area (see warning) and in the absence of strong light, to facilitate observation of flash, flame, etc.

(b) Place the metal block on the hotplate or heat the metal block by other suitable means so that its temperature, as indicated by the thermometer placed in the metal block, is maintained at the specified temperature with a tolerance of ± 1 °C. The test temperature is 60,5/75 °C [see (h)]. Correct this temperature for the difference in barometric pressure from the standard atmospheric pressure pressure (101,3 kPa) by raising the test temperature for a high pressure or lowering the test temperature for a lower pressure by 1,0 °C for each 4 kPa difference. Ensure that the top of the metal block is exactly horizontal. Use the gauge to check that the jet is 2,2 mm above the top of the well when in the test position.

(c) Light the butane test fuel with the jet away from the test position (i.e. in the 'off' position, away from the well). Adjust the size of the flame so that it is 8 mm to 9 mm high and approximately 5 mm wide.

(d) Using the syringe, take from the sample container at least 2 ml of the sample and rapidly transfer a test portion of 2 ml ± 0,1 ml to the well of the combustibility tester and immediately start the timing device.

(e) After a heating time of 60 s, by which time the test portion is deemed to have reached its equilibrium temperature, and if the test fluid has not ignited, swing the test flame into the test position over the edge of the pool of liquid. Maintain it in this position for 15 s and then return it to the 'off' position while observing the behaviour of the test portion. The test flame should remain alight throughout the test.

(f) For each test observe and record:

(i) whether there is ignition and sustained combustion or flashing, or neither, of the test portion before the test flame is moved into the test position;

(ii) whether the test portion ignites while the test flame is in the test position, and, if so, how long combustion is sustained after the test flame is returned to the 'off' position.

(g) If sustained combustion interpreted in accordance with paragraph (6) is not found, repeat the complete procedure with new test portions, but with a heating time of 30 s.

(h) If sustained combustion interpreted in accordance with paragraph (6) is not found at a test temperature of 60,5 °C, repeat the complete procedure with new test portions, but at a test temperature of 75 °C.

(6) *Interpretation of observations:* The substance shall be assessed as sustaining combustions if, for either of the heating times, one of the following occurs with either of the test portions:

(a) When the test flame is in the 'off' position, the test portion ignites and sustains combustion;

3304 *(cont'd)*

(b) The test portion ignites while the test flame is in the test position, maintained for 15 s, and sustains combustion for more than 15 s after the test flame has been returned to the 'off' position;

Intermittent flashing shall not be interpreted as sustained combustion. Normally, at the end of 15 s, the combustion has either clearly ceased or continues. In cases of doubt, the substance shall be deemed to sustain combustion;

(c) Substances are considered not to sustain combustion if their fire point according to ISO 2592:1973 is greater than 100 C° or if they are water miscible solutions with a water content of more than 90 % by mass.

Design and dimensions of the test apparatus for determining the combustibility of flammable liquids

Dimensions in millimeters

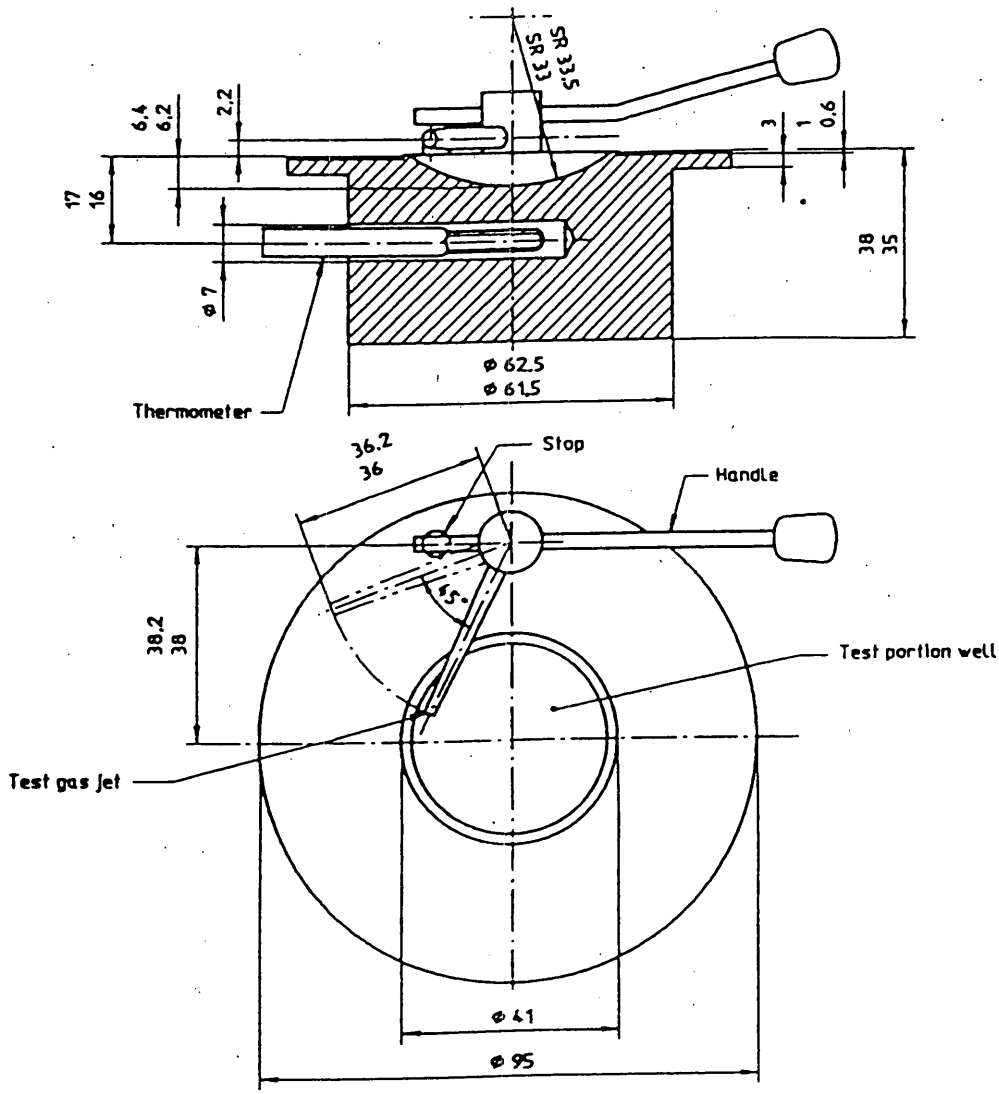


Figure 1 — Combustibility tester

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(cont'd)

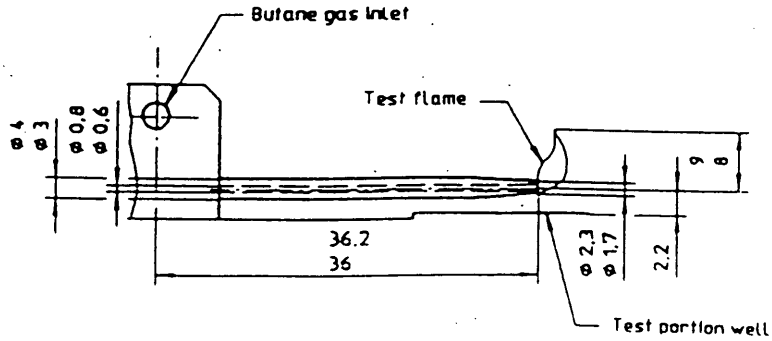


Figure 2 — Test gas jet and flame

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3309

B. TEST FOR DETERMINING FLUIDITY

3310 To determine the fluidity of liquid or viscous substances and mixtures of Class 3 and pasty substances of Class 4.1, the following test method shall be used.

(a) *Test apparatus*

Commercial penetrometer conforming to ISO Standard 2137-1985, with a guide rod of 47,5 g ± 0,05 g; sieve disc of duralumin with conical bores and a mass of 102,5 g ± 0,05 g (see Figure 1); penetration vessel with an inside diameter of 72 mm to 80 mm for reception of the sample.

(b) *Test procedure*

The sample is poured into the penetration vessel not less than half an hour before the measurement. The vessel is then hermetically closed and left standing until the measurement. The sample in the hermetically closed penetration vessel is heated to 35 °C ± 0,5 °C and is placed on the penetrometer table immediately prior to measurement (not more than two minutes). The point S of the sieve disc is then brought into contact with the surface of the liquid and the rate of penetration is measured.

(c) *Evaluation of test results*

A substance is not subject to the provisions of Class 3 but to those of Class 4.1 of ADR if, after the centre S has been brought into contact with the surface of the sample, the penetration indicated by the dial gauge:

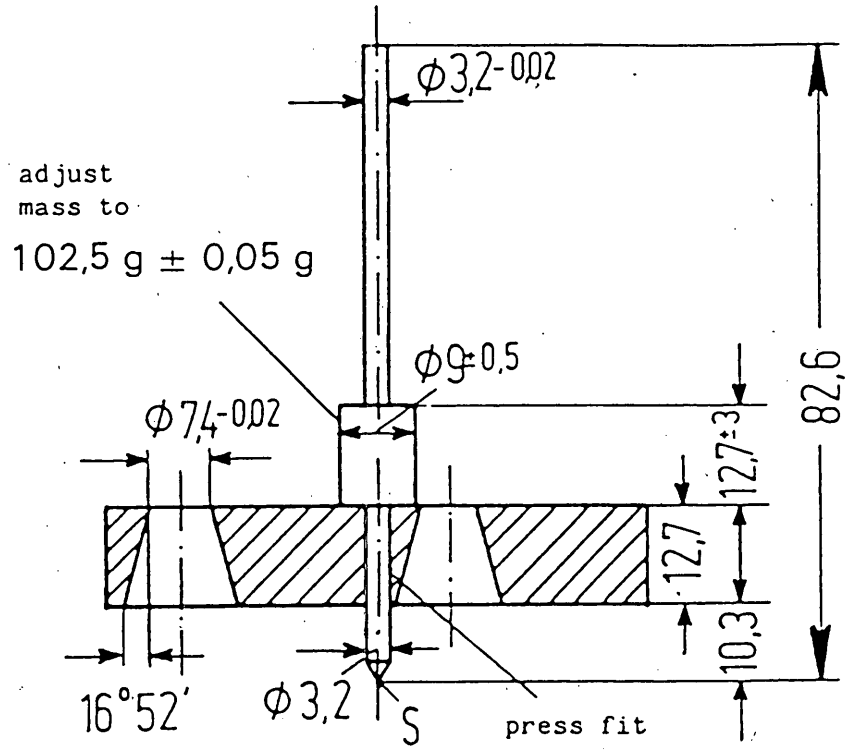
(i) after a loading time of 5 s ± 0,1 s, is less than 15,0 mm ± 0,3 mm; or

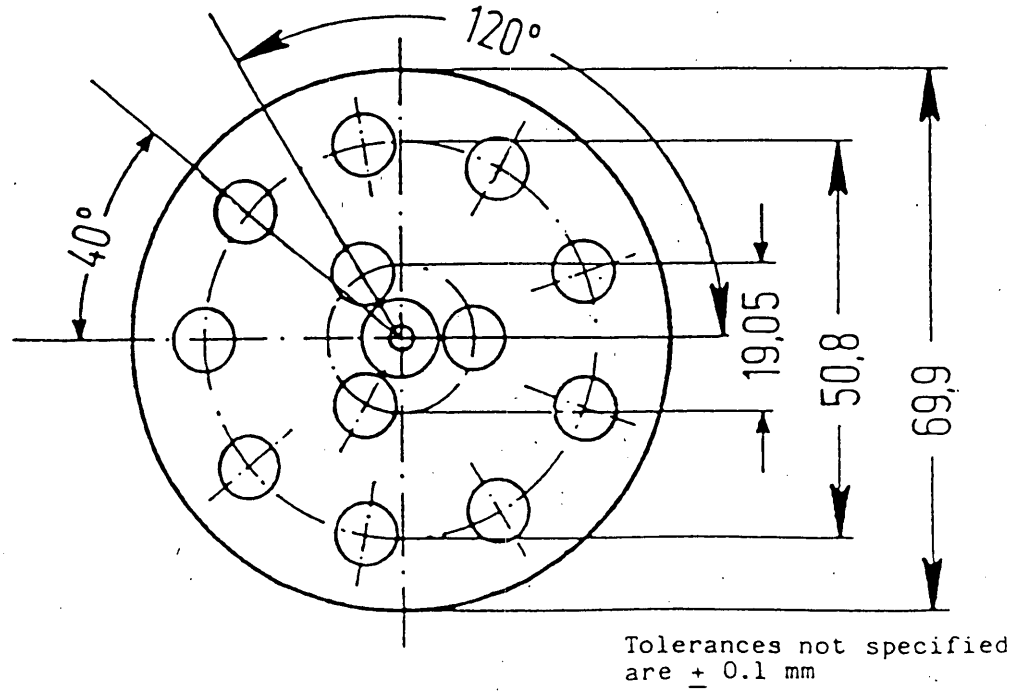
(ii) after a loading time of 5 s ± 0,1 s, is greater than 15,0 mm ± 0,3 mm, but the additional penetration after another 55 s ± 0,5 s is less than 5,0 mm ± 0,5 mm.

Note: In the case of samples having a flow point, it is often impossible to produce a steady level surface in the penetration vessel and, hence, to establish satisfactory initial measuring conditions for the contact of the point S. Furthermore, with some samples, the impact of the sieve disc can cause an elastic deformation of the surface and, in the first few seconds, simulate a deeper penetration. In all these cases, it may be appropriate to make the evaluation in (b) above.

3310
(cont'd)

Figure 3 — Penetrometer





3311-
3319

C. TESTS RELATING TO FLAMMABLE SOLIDS OF CLASS 4.1

Test methods for readily combustible solids

3320 (1) *Preliminary screening test*

(a) The substance in its commercial form shall be formed into an unbroken strip or powder train about 250 mm long by 20 mm wide by 10 mm high on a cool, impervious, low heat-conducting base plate.

(b) A hot flame (minimum temperature 1 000 °C) from a gas burner (minimum diameter 5 mm) is applied to one end of the powder train until the powder ignites or for a maximum of 2 minutes (5 minutes for powders of metals or metal alloys). It shall be noted whether combustion propagates along 200 mm of the train within the two-minute test period (or 20 minutes for metal powders).

(c) If the substance does not ignite and propagate combustion either by burning with flame or smouldering along 200 mm of the powder train within the two-minute (or 20 minute) test period, the substance shall not be classified as a flammable solid and no further testing is required.

(d) If the substance propagates burning over a 200 mm length of the powder train in less than two minutes, or less than 20 minutes for metal powders, the full test programme below shall be carried out.

(2) *Burning rate test*

In order to differentiate between any substance that can be ignited and those which burn rapidly or whose burning behaviour is particularly dangerous, only substances whose burning rate exceeds a certain limit shall be classified in Class 4.1. A burning time of less than 45 s measured over a length of 100 mm according to the procedure in marginal 3320 (3) is taken as the criterion. An attempt is made to ignite the substance under the conditions defined below and the burning time is measured. The pile is wetted beyond the zone over which the burning rate is measured and the effect on flame propagation is noted.

(3) *Test procedure*

(a) The powdered or granular substance, in its commercial form, is loosely filled into a mould 250 mm in length with triangular cross-section of inner height 10 mm and width 20 mm. On both sides of the mould, in the longitudinal direction, two metal sheets are mounted as lateral limitations which extend 2 mm beyond the upper edge of the triangular cross-section (see Figure 2). Mould and accessories for the preparation of the pile). The mould is then dropped three times from a height of 2 cm onto a solid surface. The lateral limitations are then removed and an impervious, non-combustible, low heat-conducting plate is placed on top of the mould, the apparatus inverted and the mould removed. Pasty substances are spread on a non-combustible surface in the form of a rope 250 mm in length with a cross-section of about 1 cm^2. Any suitable ignition source such as a small flame or a hot wire of minimum temperature 1 000 °C is used to ignite the pile at one end. In the case of a moisture-sensitive substance, the test shall be carried out as quickly as possible, after removal of the substance from the container.

3320 *(cont'd)*

(b) The pile shall be arranged across the draught in a fume cupboard. The air speed shall be sufficient to prevent fumes escaping into the laboratory and shall not be varied during the test. A draught screen may be erected around the apparatus.

(c) 1 ml of a wetting solution shall be added to the pile 30-40 mm beyond the 100 mm timing zone. Apply the wetting solution to the ridge drop by drop, ensuring the whole cross-section of the pile is wetted without loss of liquid from the sides [1]. The liquid shall be applied over the shortest possible length of the pile consistent with avoiding loss from the sides. This part of the test is not applicable to metal powders.

(d) One end of the pile shall be ignited. When the pile has burned over a length of 80 mm, measure the rate of burning over the next 100 mm. Note whether or not the wetted zone stops propagation of the flame. The test shall be performed six times using a clean cool plate each time, unless a positive result is observed earlier.

Criteria for classification

3321 (1) Powdered, granular or pasty substances shall be classified in Class 4.1 when the burning time of one or more of the tests, in accordance with the test method described in marginal 3320 (2), is less than 45 s or the rate of burning is more than 2,2 mm s. Powders of metals or metal alloys shall be classified in this class when they can be ignited and the reaction spreads over the whole length of the sample in 10 minutes or less.

(2) Assignment to a letter in the various items

(a) Any solid, normally wetted, which if in a dry state would be classified as an explosive shall be assigned to letter (a).

(b) The following shall be assigned to letter (b):

any self-reactive substance, any combustible solid (other than metal powders) tested in accordance with marginal 3320 if the burning time is less than 45 s and the flame passes the wetted zone, and powders of metal or metal alloys if the reaction spreads over the whole length of the sample in 5 minutes or less.

(c) The following shall be assigned to letter (c):

any combustible solid (other than metal powders) tested in accordance with marginal 3320 if the burning time is less than 45 s and the wetted zone stops the flame propagation for at least 4 minutes, and metal powders if the reaction spreads over the whole length of the sample in more than 5 minutes.

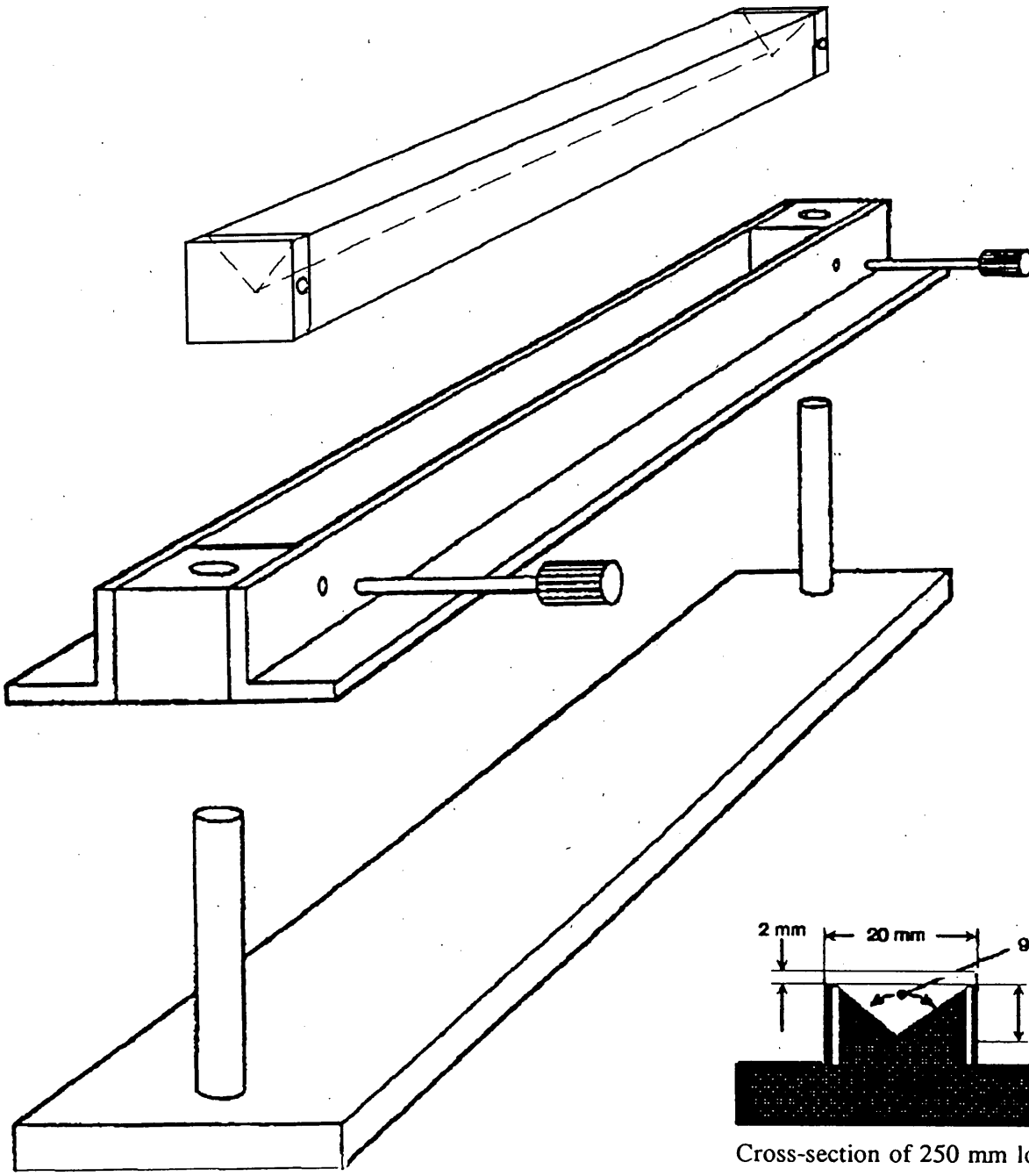
(d) For solids which may cause or contribute to a fire through friction, a letter in the various items shall be assigned by analogy with existing classifications or in accordance with any appropriate special conditions.

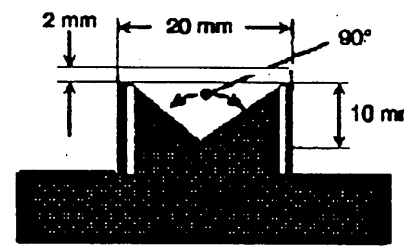
3322-3329

[1] If water rolls off the sides of the pile, the addition of wetting agents is necessary. Wetting agents used shall be free from combustible diluents and the total active matter in the wetting solution shall not exceed 1 %. This liquid may be added to a hollow up to 3mm deep and 5mm in diameter in the top of the pile.

Figure 4

Mould and accessories for the preparation of the pile
(All dimensions in millimetres)





Cross-section of 250 mm long mould
Material: Aluminum

D. TESTS RELATING TO SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION OF CLASS 4.2

3330 (1) *Test method and procedure for solid pyrophoric substances*

1 to 2 cm^3 of the powdery substance to be tested shall be poured from a height of about 1 m onto a non-combustible surface and it shall be observed whether the substance ignites during dropping or within 5 minutes of settling. This procedure shall be repeated six times unless a positive result is obtained earlier.

(2) *Test method for liquid pyrophoric substances*

The test for liquid substances shall be in two parts; the first to determine whether the substance ignites when added to an inert carrier and exposed to air, the second if a negative result is obtained in the first. The second part determines whether the substance chars or ignites a filter paper.

(3) *Test procedure for liquid pyrophoric substances*

(a) Part 1 — A porcelain cup of about 10 cm diameter shall be filled with diatomaceous earth or silica gel at room temperature to a height of about 5 mm. Approximately 5 ml of the liquid to be tested shall be poured into the prepared porcelain cup and it shall be observed whether the substance ignites within five minutes. This procedure shall be repeated six times unless a positive result is obtained earlier.

(b) Part 2 — A 0,5 ml test sample shall be delivered from a syringe to an indented dry No 3 Whatman filter paper. The test is conducted at 25 °C ± 2 °C and at a relative humidity of 50 % ± 5 %. Observations shall be made to see whether ignition or charring occurs on the filter paper within five minutes after the liquid to be tested is introduced. This procedure shall be repeated three times, using a new filter paper each time, unless a positive result is obtained earlier.

Criteria for classification

3331 (1) A solid substance shall be classified in Class 4.2 and considered to be pyrophoric if the sample ignites in one of the tests. A liquid shall be classified in Class 4.2 and considered to be pyrophoric if it ignites in Part 1 of the test, or if the filter paper is ignited or charred in Part 2 of the test.

(2) Assignment to a letter in the various items

All pyrophoric solids and liquids shall be assigned to letter (a).

3332 (1) *Test method for self-heating substances*

Samples in 2,5 cm and 10 cm cubes shall be kept at a constant temperature for 24 hours and observations shall be made whether the temperature of the sample exceeds 200 °C. (The test method is a modified version of the Bowes-Cameron cage test which is a self-heating test method for carbon.)

(2) *Test procedure*

(a) A hot-air circulating type of oven with an inner volume of more than 9 litres and capable of controlling the internal temperature at 140 °C ± 2 °C shall be used.

(b) Cubic sample containers of 2,5 cm and 10 cm side, made of stainless steel net with a mesh size of 0,053 mm (1), with their top surface open, shall be used. Each container is housed in a cubic container cover made from stainless steel net with a mesh size of 0,595 mm (1) and slightly larger than the sample container, so that the container fits in this cover. In order to avoid the effect of air circulation, this cover is installed in a second stainless steel cage, made from a net with a mesh size of 0,595 mm (1) and 15 cm x 15 cm x 25 cm in size, shall be further installed to house the cover.

(c) Chromel-Alumel thermocouples of 0,3 mm diameter shall be used for temperature measurement. One is placed in the centre of the sample and another between the sample container and the oven wall. The temperatures shall be measured continuously.

(1) This mesh size is based on Tyler sieves, where the mesh size varies in proportion to the square of the linear distance between the wires.

3332 *(cont'd)*

(d) The sample, powdered or granular, shall be prepared in its commercial form and filled to the brim of the sample container and the container tapped several times. If the sample settles, more shall be added. If the sample is heaped it shall be levelled to the brim. The container shall be housed in the cover and hung at the centre of the oven.

(e) The oven temperature shall be raised to 140 °C test temperature and maintained for 24 hours. The temperature of the sample shall be recorded. The first test shall be conducted with a 10 cm cube sample. Observations shall be made to determine whether spontaneous ignition occurs or whether the temperature of the sample exceeds 200 °C. If negative results are obtained, no further test is necessary. If positive results are obtained, a second test shall be conducted with a 2,5 cm cube sample to determine the packing group assignment.

Criteria for classification

3333 (1) A substance shall be classified in Class 4.2 if, in the first test using a 10 cm cube sample, spontaneous ignition occurs or the temperature of the sample exceeds 200 °C during the 24 hours test period. This criterion is based on the self-ignition temperature of charcoal, which is 50 °C for a cubic volume of 27 m^3 and 140 °C for a one litre sample. Substances with self-ignition temperatures higher than 50 °C for 27 m^3 shall not be classified in Class 4.2.

(2) Assignment to a letter in the various items

(a) Any substance which gives a positive result when tested with the 2,5 cm cube sample shall be assigned to letter (b).

(b) Any substance which gives a positive result when tested with the 10 cm cube sample but which gives a negative result with a 2,5 cm cube sample shall be assigned to letter (c).

3334-
3339

E. TEST RELATING TO SUBSTANCES OF CLASS 4.3 WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

3340 (1) *Test method*

This test method is used to determine whether the reaction of a substance with water leads to the development of a dangerous amount of flammable gases. The test method can be applied to solid and liquid substances. It is not applicable to pyrophoric substances. The substance shall be tested in its commercial form at ambient temperature (20 °C) by bringing it into contact with water. If spontaneous ignition of the gas occurs at any stage, no further testing is necessary.

(2) *Test procedure*

(a) A small quantity (approximately 2 mm diameter) of the test substance shall be placed in a trough of distilled water at 20 °C. It shall be noted (i) whether any gas is emitted and (ii) if spontaneous ignition of the gas occurs.

(b) A small quantity of the test substance (approximately 2 mm diameter) shall be placed at the centre of a filter paper which is floated flat on the surface of distilled water at 20 °C in a suitable vessel, e.g. a 100 mm diameter evaporating dish. The filter paper is to keep the substance in one place, under which condition the likelihood of spontaneous ignition of any gas is greatest. It shall be noted (i) whether any gas is emitted and (ii) whether spontaneous ignition of the gas occurs.

(c) The test substance shall be made into a pile approximately 2 cm high and 3 cm diameter with a hollow in the top. A few drops of water shall be added to the hollow. It shall be noted whether (i) any gas is emitted and (ii) whether spontaneous ignition occurs.

3340 (cont'd) d) For solid substances, the package shall be inspected for any powder of < 500 µm. If that powder constitutes more than 1 % (mass) of the total, or if the substance is friable, then the whole of the sample shall be ground to a powder before testing to allow for a reduction in particle size during handling and carriage. Otherwise, as for liquids, the substance shall be tested in its commercial state. The test shall be performed at ambient temperature (20 °C) and atmospheric pressure, and repeated three times.

e) Water is put into the dropping funnel and enough of the substance (up to a maximum weight of 25 g) to produce between 100 cm^3 and 250 cm^3 of gas is weighed and placed in a conical flask. The tap of the dropping funnel is opened to let the water into the conical flask and a stop-watch is started. The volume of gas emitted is measured by any suitable means. The time taken for all the gas to be emitted is noted and, where possible, intermediate readings are taken. The rate of emission of gas is calculated over seven hours at one hour intervals. If the rate of emission is erratic or is increasing after seven hours, the measuring time shall be extended to a maximum of five days. The five-day test may be stopped if the rate of emission becomes steady or continually decreases and sufficient data have been established to be able to assign the substance to a group or to decide that the substance is not to be classified in Class 4.3. If the chemical identity of the gas is unknown, the gas shall be tested for flammability.

Criteria for classification

3341 (1) A substance shall be classified in Class 4.3 if spontaneous ignition occurs at any stage of the test procedure, or if flammable gas is emitted at a rate greater than 1 litre per kilogramme of the substance per hour.

(2) Assignment to a letter in the various items

(a) The following shall be assigned to letter (a):

any substance which reacts vigorously with water at ambient temperature and emits gas liable to ignite spontaneously, or which reacts readily with water at ambient temperature such that the rate of emission of flammable gas in one minute is equal to or greater than 10 litres per kilogramme of substance.

(b) The following shall be assigned to letter (b):

any substance which reacts readily with water at ambient temperature such that the maximum rate of emission of flammable gas is equal to or greater than 20 litres per kilogramme of substance per hour, and which does not meet the criteria for letter (a).

(c) The following shall be assigned to letter (c):

any substance which reacts slowly with water at ambient temperature such that the maximum rate of emission of flammable gas is equal to or greater than 1 litre per kilogramme of substance per hour, and which does not meet the criteria for letters (a) and (b).

3342-3349

F. TEST RELATING TO SOLID OXIDIZING SUBSTANCES OF CLASS 5.1

3350 (1) *Test method*

This test method is designed to measure the potential for a solid substance to increase the burning rate or burning intensity of a combustible substance when the two are thoroughly mixed. Two tests shall be run for each substance to be evaluated, one at a 1 to 1 ratio (mass), of sample to sawdust and one at a 4 to 1 ratio (mass), of sample to sawdust. The burning characteristics of each mixture are compared with the standard 1 to 1 ratio (mass), of ammonium persulphate.

(2) *Test procedure*

(a) Ammonium persulphate, potassium perchlorate and potassium bromate are the reference substances. These substances shall pass through a sieve mesh size smaller than 0,3 mm and shall not be ground. The reference substances are dried at 65 °C for 12 hours and kept in a desiccator until required.

3350 *(cont'd)*

(b) Softwood sawdust is the combustible material in this test. It shall pass through a sieve mesh size smaller than 1,6 mm and contain less than 5 % of water (mass). If necessary, it is made into a layer less than 25 mm thick, dried at 105 °C for 4 hours and kept in a desiccator until required.

(c) A 30,0 g ± 0,1 g mixture of the reference substance and wood sawdust is prepared in a 1 to 1 ratio (mass). Two 30,0 g ± 0,1 g mixtures of the substance to be tested, in the particle size in which it will be carried, and the wood sawdust are prepared in ratios of 1 to 1 (mass), and 4 to 1 (mass). Each mixture shall be mixed mechanically without excessive stress as thoroughly as possible.

(d) The test shall be conducted in a draught or a place equipped with a ventilator.

(e) The conditions at normal atmospheric pressure are: temperature 20 °C ± 5 °C, humidity 50 % ± 110 %.

(f) Each of the mixtures shall be formed into a conical pile with dimensions of approximately 70 mm base diameter and 60 mm height on a cool, impervious, low heat-conducting surface. Ignition shall be provided by means of a wire of inert metal in the form of a circular loop 40 mm in diameter positioned inside the pile 1 mm above the test surface. The wire shall be heated electrically to 1 000 °C until the first signs of combustion are observed or it is clear that the pile cannot be ignited. The electrical power is turned off as soon as there is combustion.

(g) The time shall be recorded from the first observable signs of combustion to the end of all reaction: smoke, flame, incandescence.

(h) The test shall be repeated three times for each of the mixing ratios.

Criteria for classification

3351 (1) A solid substance shall be classified in Class 5.1 if, in either concentration tested, the mean burning time of the sawdust, established from three tests, is equal to or less than that of the average of the three tests with ammonium persulphate mixture.

(2) Assignment to a letter in the various items

(a) Any substance which, in either concentration tested, exhibits a burning time less than that with potassium bromate shall be assigned to letter (a).

(b) Any substance which, in either concentration tested, exhibits a burning time equal to or less than that with potassium perchlorate and does not meet the criteria for group (a) shall be assigned to letter (b).

c) Any substance which, in either concentration tested, exhibits a burning time equal to or less than that with ammonium persulphate and does not meet the criteria for letters (a) and (b) shall be assigned to letter (c).

3352-3389

G. TEST FOR DETERMINING THE ECOTOXICITY, PERSISTENCE AND BIOACCUMULATION OF SUBSTANCES IN THE ACQUATIC ENVIRONMENT FOR ASSIGNMENT TO CLASS 9

Note: The test methods used shall be those adopted by the Organization for Economic Cooperation and Development (OECD) and the European Economic Commission (EEC). If other methods are used, they shall be internationally recognized, be equivalent to the OECD/EEC tests and be referenced in test reports.

3390 *Acute toxicity for fish*

The object is to determine the concentration which causes 50 % mortality in the test species; this is the (LC_{50}), value, namely, the concentration of the substance in water which will cause the death of 50 % of a test group of fish during a continuous period of testing of at least 96 hours. Appropriate types of fish include: striped brill *(Brachydanio rerio)*, fathead minnow *(Pimephales promelas)* and rainbow trout *(Oncorhynchus mykiss)*.

The fish are exposed to the test substance added to the water in varying concentrations (+ 1 control). Observations are recorded at least every 24 hours. At the end of the 96-hour activity and, if possible, at each observation, the concentration causing the death of 50 % of the fish is calculated. The no observed effect concentration (NOEC) at 96 hours is also determined.

3391 *Acute toxicity for daphnia*

The object is to determine the effective concentration of the substance in water which renders 50 % of the daphnia unable to swim (EC_{50}). The appropriate test organisms are *daphnia magna* and *daphnia pulex*. The daphnia are exposed for 48 hours to the test substance added to the water in varying concentrations. The no observed effect concentration (NOEC) at 48 hours is also determined.

3392 *Algal growth inhibition*

The object is to determine the effect of a chemical on the growth of algae under standard conditions. The change in biomass and the rate of growth with algae under the same conditions, but without the presence of the test chemical, are compared over 72 hours. The results are expressed as the effective concentration which reduces the rate of algal growth by 50 %, IC_{50r}, and also the formation of the biomass, IC_{50b}.

3393 *Tests for ready biodegradability*

The object is to determine the degree of biodegradation under standard aerobic conditions. The test substance is added in low concentrations to a nutrient solution containing aerobic bacteria. The progress of degradation is followed for 28 days by determining the parameter specified in the test method used. Several equivalent test methods are available. The parameters include reduction of dissolved organic carbon (DOC), carbon dioxide (CO_2) generation of oxygen (O_2) depletion.

A substance is considered to be readily biodegradable if within not more that 28 days the following criteria are satisfied — within 10 days from when degradation first reaches 10 %:

Reduction of DOC:	70 %
Generation of CO_2:	60 % of theoretical CO_2 production
Depletion of O_2:	60 % of theoretical O_2 requirement

The test may be continued beyond 28 days if the above criteria are not satisfied, but the result will represent the inherent biodegradability of the test substance. For assignment purposes, the 'ready' result is normally required.

Where only COD and BOD5 data are available, a substance is considered to be readily biodegradable if:

$$\frac{BOD_5}{COD} \geqslant 0{,}5$$

BOD (Biochemical Oxygen Demand) is defined as the mass of dissolved oxygen required by a specific volume of solution of the substance for the process of biochemical oxidation under prescribed conditions. The result is expressed as grams of BOD per gram of test substance. The normal test period is five days using a national standard test procedure.

3393 *(cont'd)* COD (Chemical Oxygen Demand) is a measure of the oxidizability of a substance, expressed as the equivalent amount in oxygen of an oxidizing reagent consumed by the substance under fixed laboratory conditions. The results are expressed in grams of COD per gram of substance. A national standard procedure may be used.

3394 *Tests for bioaccumulation potential*

(1) The object is to determine the potential for bioaccumulation either by the ratio at equilibrium of the concentration (c) of a substance in a solvent to that in water or by the bioconcentration factor (BCF).

(2) The ratio at equilibrium of the concentration (c) of a substance in a solvent to that in water is normally expressed as a $\log_{10}$. The solvent and water shall have negligible miscibility and the substance shall not ionize in water. The solvent normally used is n-octanol.

In the case of n-octanol and water, the result is:

$$\log P_{ow} = \log_{10} [c_o/c_w]$$

where P_{ow} is the partition coefficient obtained by dividing the concentration of the substance in noctanol (c_o) by the concentration of the substance in water (C_w). If $\log P_{ow} \geq 3,0$ then the substance has a potential bioaccumulate.

(3) The bioconcentration factor (BCF) is defined as the ratio of the concentration of the test substance in the test fish (c_f) to the concentration in the test water (c_w) at steady state:

$$BCF = (c_f)/(c_w)$$

The principle of the test involves exposing fish to a solution or dispersion at known concentrations of the test substance in water. Continuous flow, static or semi-static procedures may be used according to the test procedure selected, based on the properties of the test substances. Fish are exposed to the test substances over a given period of time, followed by a period of no further exposure. During the second period, measurements are made of the rate of increase in the water of the test substance (i.e. the rate of excretion of depuration).

(Full details of the various test procedures and the calculation method for the BCF are given in the OECD Guidelines for Testing of Chemicals, methods 305A to 305E, 12 May 1981.)

(4) A substance may have a log P_{ow} greater than 3 and a BCF less than 100 which would indicate little or no potential to bioaccumulate. In cases of doubt, the BCF value takes precedence over log P_{ow}, as indicated in the flow chart shown in marginal 3396.

Criteria

3395 A substance may be regarded as a pollutant to the aquatic environment if it satisfies one of the following criteria:

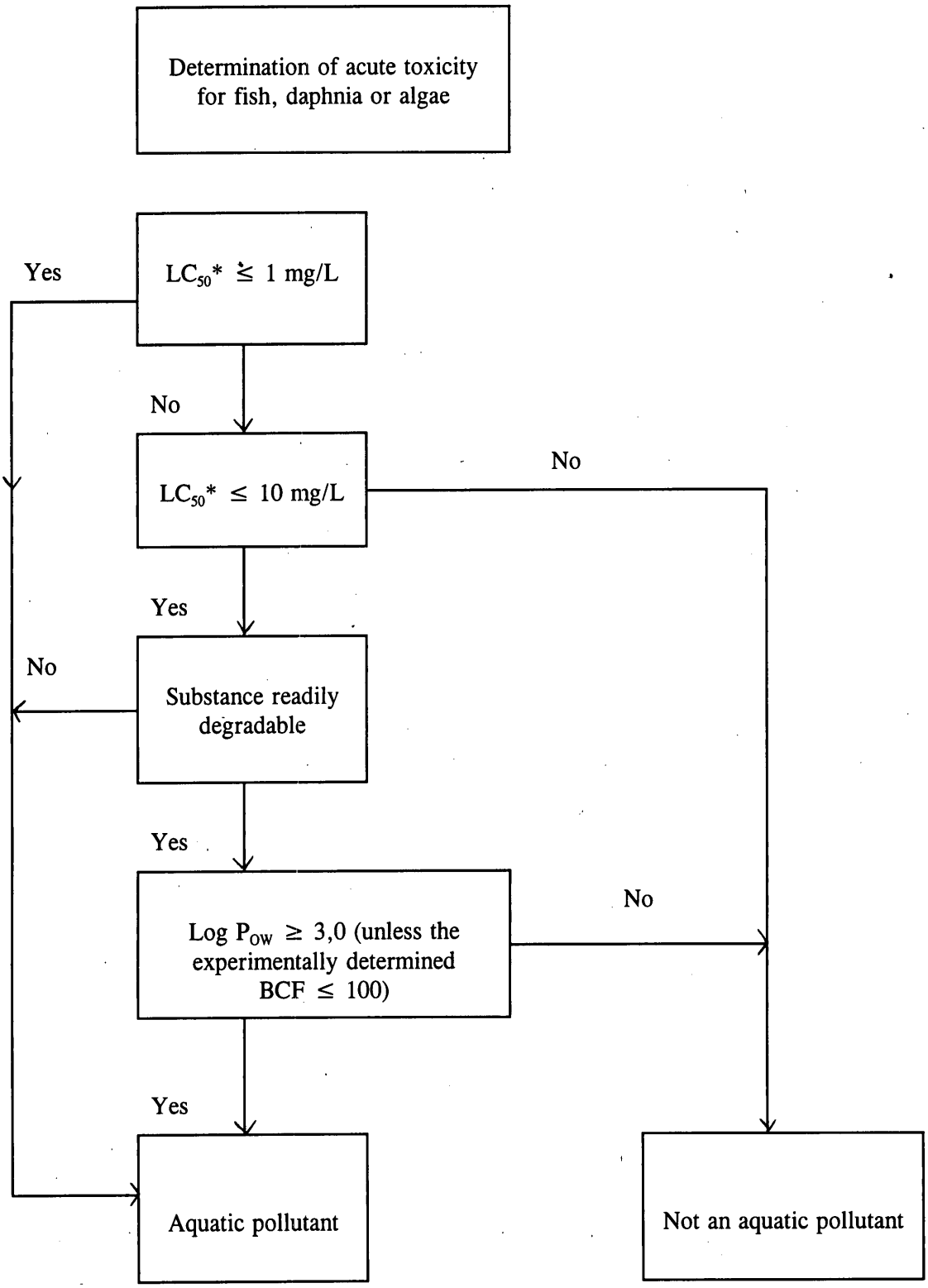
The lowest of the values of the 96-hour LC_{50} for fish, the 48-hour EC_{50} for daphnia or the 72-hour IC_{50} for algae

— is less than or equal to 1 mg/L;

— is greater than 1 mg/L but less than or equal to 10 mg/L, and the substance is not biodegradable;

— is greater than 1 mg/L but less than or equal to 10 mg/L, and the log Pow is greater than or equal to 3,0 (unless the experimentally determined BCF is less than or equal to 100).

3396 Procedure to be followed



* Lowest value of 96-hour LC_{50}, 48-hour EC_{50} or 72-hour IC_{50} as appropriate.
BCF = bioconcentration factor.

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3399

APPENDIX A.4

3400- Reserved
3499

APPENDIX A.5

GENERAL PACKING CONDITIONS, TYPES OF PACKAGING, REQUIREMENTS APPLICABLE TO PACKAGINGS AND TEST REQUIREMENTS FOR PACKAGINGS

Note: These requirements apply to packagings containing substances and articles of Classes 1, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6,2, 8 and 9.

Section I

General packing conditions

3500 (1) Packagings shall be so manufactured and closed as to prevent any leakage of contents from a package prepared for dispatch such as might be caused in normal conditions of carriage particularly by vibration or changes in temperature, humidity or pressure. No dangerous substance shall adhere to the outside of packages. These provisions apply both to new and to reused packagings.

(2) Parts of packagings which are in direct contact with dangerous substances shall not be affected by chemical or other action of those substances; where necessary, they shall be provided with a suitable inner coating or treatment. Such parts of packagings shall not incorporate constituents liable to react dangerously with the contents, to form hazardous products, or significantly to weaken them.

(3) Each packaging except inner packagings of combination packagings shall conform to a design type tested and approved in accordance with the requirements laid down in section IV. Mass-produced packagings shall conform to the approved design type.

(4) Where packagings are filled with liquid substances, sufficient ullage shall be left to ensure that no leakage of liquid substance and no permanent distortion of the packaging occurs as a result of expansion of the liquid substance, due to temperatures which may be attained during carriage. For a filling temperature of 15 °C, the degree of filling shall be determined as follows, unless otherwise provided under a particular class, either:

(a)

Boiling point (initial boiling point) of the substance in °C	< 60	≥ 60 < 100	≥ 100 < 200	≥ 200 < 300	≥ 300
Degree of filling as a percentage of the capacity of the packaging	90	92	94	96	98

or

(b) Degree of filling = $\frac{98}{1 + \alpha\ (50\text{-}t_F)}$ % of the capacity of the packaging.

In this formula α represents the mean coefficient of cubic expansion of the liquid substance between 15 °C and 50 °C; that is to say, for a maximum rise in temperature of 35 °C, α is calculated according to the formula:

$$\alpha = \frac{d_{15} - d_{50}}{35 \times d_{50}}$$

d_{15} and d_{50} being the relative densities (1) of the liquid at 15 °C and 50 °C and t_F the mean temperature of the liquid at the time of filling.

(1) Relative density (d) is considered to be synonymous with specific gravity (SG) and will be used throughout this appendix.

3500 *(cont'd)*

(5) Inner packagings shall be packed in an outer packaging in such a way that, under normal conditions of carriage, they cannot break, be punctured or leak their contents into the outer packaging. Inner packagings which are liable to break or be punctured easily, such as those made of glass, porcelain or stoneware or of certain plastics materials, etc., shall be secured in outer packagings with suitable cushioning material. Any leakage of the contents shall not substantially impair the protective properties of the cushioning material or of the outer packaging.

(6) Inner packagings containing different substances which may react dangerously with one another and cause:

(a) combustion and/or evolution of considerable heat;

(b) emission of flammable and/or toxic gases;

(c) the formation of corrosive substances; or

(d) the formation of unstable substances,

shall not be placed in the same outer packaging (see also the mixed packing provisions under the various classes).

(7) The closure of packagings containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during carriage.

(8) Where overpressure may develop in a package through the emission of gas from the contents (as a result of temperature increase or other causes), the packaging may be fitted with a vent provided that the gas emitted will not cause any danger on account of its toxicity, its inflammability, the quantity released, etc. The vent shall be so designed that, when the packaging is in the attitude in which it is intended to be transported, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of carriage. However, a substance may be carried in such a packaging only where a vent is expressly prescribed for that substance in the conditions of carriage of the relevant class.

(9) New, remanufactured, reused or reconditioned packagings shall be capable of passing the tests prescribed in section IV. Before being filled and handed over for carriage, every packaging shall be inspected and its freedom from corrosion, contamination or other damage, verified. Any packaging which shows signs of reduced strength in comparison with the approved design type shall no longer be used or shall be so reconditioned that it is able to withstand the design-type tests.

(10) Packagings used for liquids shall undergo a leakproofness test if so required by and under the conditions prescribed in marginal 3560.

(11) Liquids shall be filled only into packagings which have an appropriate resistance to the internal pressure that may be developed under normal conditions of carriage. Packagings marked with the hydraulic test pressure as prescribed in marginal 3512 (1) (d) shall be filled only with a liquid having a vapour pressure:

(a) such that the total gauge pressure in the packaging (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55 °C determined on the basis of a maximum degree of filling in accordance with (4) above and a filling temperature of 15 °C, will not exceed two-thirds of the marked test pressure; or

(b) at 50 °C less than four-sevenths of the sum of the marked test pressure plus 100 kPa; or

(c) at 55 °C less than two-thirds of the sum of the marked test pressure plus 100 kPa.

(12) Packagings used for solids which may become liquid at temperatures likely to be encountered during carriage shall also be capable of containing the substance in the liquid state.

(13) The packagings shall be manufactured and tested under a quality assurance programme which satisfies the competent authority in order to ensure that each manufactured packaging meets the requirements of this appendix.

3500 (cont'd) (14) The requirements for packagings in section III are based on packagings currently used. In order to take into account progress in science and technology, packagings having specifications different from those in section III may be used, provided that they are equally effective, are acceptable to the competent authority and are able successfully to withstand the tests described in paragraph (10) and section IV.

3501-3509

Examples of required marked test pressures calculated as in 3500 (11) (c)

UN No	Liquid		Packing group	V_{p55} (kPa)	$(V_{p55} \times 1,5)$ (kPa)	$(V_{p55} \times 1,5)$ minus 100 (kPa)	Required minimum test gauge, pressure under marginal 3554 (4) (c) (kPa)	Minimum test pressure (gauge) to be marked on the packaging (kPa)
	Name	Class						
2056	Tetrahydrofuran	3	II	70	105	5	100	100
2247	n-Decane	3	III	1,4	2,1	– 97,9	100	100
1593	Dichloromethane	6.1	III	164	246	146	146	150
1155	Diethyl ether	3	I	199	299	199	199	250

Notes: 1. For pure liquids the vapour pressure at 55 °C (V_{p55}) can often be obtained from scientific tables.

2. The maximum vapour pressures in paragraphs (b) and (c) refer to the basis of the formula.

3. The table refers to the use of paragraph (c) only, which means that the marked test pressure should exceed 1.5 times the vapour pressure at 55 °C less 100 kPa. When, for example, the test pressure for n-Decane is determined according to marginal 3554 (4) (a) the minimum marked test pressure may be lower.

4. For diethyl ether (1155) (Packing group I), the required minimum test pressure under marginal 3554 (4) is 250 kPa.

Section II

Types of packaging

Definitions

3510 (1) Subject to the special provisions for each class, the packagings listed below may be used:

Drums: flat-ended or convex-ended cylindrical packagings made of metal, fibre, plastics, plywood or other suitable materials. This definition also includes packagings of other shapes, e.g. round taper-necked packagings, or pail-shaped packagings. Wooden barrels and jerricans are not covered by this definition.

Wooden barrels: packagings made of natural wood, of round cross-section, having convex walls, consisting of staves and heads and fitted with hoops.

Jerricans: metal or plastics packagings of rectangular or polygonal cross-section with one or more orifices.

3510 (cont'd)

Boxes: packagings with complete rectangular or polygonal faces, made of metal, wood, plywood, reconstituted wood, fibreboard, plastics or other suitable material. Small holes for purposes such as ease of handling or opening, or to meet classification requirements, are permitted as long as they do not compromise the integrity of the packaging during carriage;

Bags: flexible packagings made of paper, plastics film, textiles, woven material or other suitable materials.

Composite packagings (plastics material): packagings consisting of an inner plastics receptacle and an outer packaging (made of metal, fibreboard, plywood, etc.). Once assembled, such a packaging remains thereafter an inseparable unit; it is filled, stored, despatched and emptied as such.

Composite packagings (glass, porcelain or stoneware): packagings consisting of an inner glass, porcelain or stoneware receptacle and an outer packaging (made of metal, wood, fibreboard, plastics material, expanded plastics material, etc.). Once assembled, such a packaging remains thereafter an inseparable unit; it is filled, stored, despatched and emptied as such. It shall be tested in accordance with marginals 3552 (1) (a) or (b), 3553 and 3554.

Combination packagings: a combination of packagings for transport purposes, consisting of one or more inner packagings secured in an outer packaging in accordance with marginal 3500 (5).

Reconditioned packagings include metal drums that are:

(i) cleaned to original materials of construction, with all former contents, internal and external corrosion, and external coatings and labels removed;

(ii) restored to original shape and contour, with chimes (if any) straightened and sealed, and all non-integral gaskets replaced; and

iii) inspected after cleaning but before painting, with rejection of packagings with visible pitting, significant reduction in material thickness, metal fatigue, damaged threads or closures, or other significant defects.

Remanufactured packaging include metal drums that:

(i) are produced as a UN type from a non-UN type;

ii) are converted from one UN type to another UN type; or

iii) undergo the replacement of integral structural components (such as non-removable heads).

Remanufactured packagings are subject to the same requirements of this Appendix that apply to a new packaging of the same type.

Reused packagings: packagings which have been examined and found free of defects affecting the ability to withstand the performance test; the term includes those which are refilled with the same or similar compatible contents and are carried within distribution chains controlled by the consignor of the product;

3510 (cont'd)

(2) Subject to the special provisions for each class, the following packagings may also be used:

Composite packagings: (glass, porcelain or stoneware): if tested in accordance with marginal 3552 (1) (e).

Light gauge metal packagings: packagings of circular, elliptical, rectangular or polygonal cross-section, (also conical) and taper-necked and pail-shaped packagings made of tinplate or light metal, having a wall thickness of less than 0,5 mm, flat or convex bottomed and with one or more orifices, which are not covered in marginal 3510 (1) as drums or jerricans.

(3) The following definitions are applicable to packagings in (1) and (2) above:

Closures: devices which close an opening in a receptacle;

Inner packagings: packagings for which an outer packaging is required for carriage.

Inner receptacles: receptacles which require an outer packaging in order to perform their containment function.

Maximum capacity (as used in Section III): the maximum inner volume of receptacles or packagings expressed in litres.

Maximum net mass: the maximum net mass of contents in a single packaging or maximum combined mass of inner packagings and the contents thereof expressed in kilogrammes.

Outer packaging: the outer protection of a composite or combination packaging together with any absorbent materials, cushioning and any other components necessary to contain and protect inner receptacles or inner packagings.

Packages: the complete product of the packing operation, consisting of the packaging and its contents prepared for dispatch.

Packagings: receptacles and any other components or materials necessary for the receptacle to perform its containment function.

Receptacles: containment vessels for receiving and holding substances or articles, including any means of closing.

Sift-proof packagings packagings impermeable to dry contents including fine solid material produced during carriage.

Note: The 'inners' of 'combination packagings' are always termed 'inner packagings' not 'inner receptacles'. A glass bottle is an example of such an 'inner packaging'. The 'inners' of 'composite packagings' are normally termed 'inner receptacles'. For example, the 'inner' of a 6HA1 composite packaging (plastics material) is such an 'inner receptacle' since it is normally not designed to perform a containment function without its 'outer packaging' and is not therefore an 'inner packaging'.

Coding of design types for packagings conforming to marginal 3510 (1) and (2)

3511 (1) The code number consists of:

an Arabic numeral indicating the kind of packaging, e.g. drum, jerrican, etc.;

a capital letter or letters (Latin characters) indicating the nature of the material, e.g. steel, wood, etc.;

where necessary, an Arabic numeral indicating the category of packaging within the type to which the packaging belongs.

In the case of composite packagings, two capital letters (Latin characters) shall be used. The first shall indicate the material of the inner receptacle and the second that of the outer packaging.

In the case of combination packagings, only the code number for the outer packaging shall be used.

The following numerals shall be used for the kind of packaging:

1. Drum

2. Wooden barrel

3. Jerrican

4. Box

5. Bag

6. Composite packaging

0. Light gauge metal packagings

The following capital letters shall be used for the types of material:

A. Steel (all types and surface treatments)

B. Aluminium

C. Natural wood

D. Plywood

F. Reconstituted wood

G. Fibreboard

H. Plastics material, including expanded plastics material

L. Textile

M. Paper, multiwall

N. Metal (other than steel or aluminium)

P. Glass, porcelain or stoneware

(2) Three packing groups are provided for in the special requirements for each class, according to the degree of danger presented by the substances to be carried:

Packing Group I: for substances of group (a);

Packing Group II: for substances of group (b);

Packing Group III: for substances of group (c) of the items in the list of substances.

3511 *(cont'd)* The code number of the packaging shall be followed in the marking by a letter indicating the groups of substances for which the design type is approved as follows:

X for packagings for substances in packing groups I to III;

Y for packagings for substances in packing groups II and III; and

Z for packagings for substances in packing group III.

Marking

Note: The marking indicates that the packaging which bears it corresponds to a successfully tested design type and that it complies with the provisions of this Appendix which are related to the manufacture, but not to the use, of the packaging. In itself, therefore, the mark does not necessarily confirm that the packaging may be used for any substance: generally the type of packaging (e.g. steel drum), its maximum capacity and/or mass, and any special requirements are specified for each substance in the appropriate packaging marginals in the classes.

3512 (1) Each packaging shall bear markings which are durable, legible and placed in a location and of such a size relative to the packaging as to be readily visible. For packages with a gross mass of more than 30 kg, the markings or a duplicate thereof shall appear on the top or on a side of the packaging. Letters, numerals and symbols shall be at least 12 mm high, except for packagings of 30 litres or 30 kg capacity or less, when they shall be at least 6 mm in height and for packagings of 5 litres or 5 kg or less when they shall be of an appropriate size. The marking for new packagings manufactured in conformity with the approved design type consists of:

(a) (i) the symbol Ⓤ for packagings conforming to marginal 3510 (1).

For metal packagings on which the marking is stamped, the letters UN may be applied instead of the symbol Ⓤ ;

(ii) the symbol 'ADR' (or 'RID/ADR' for packagings approved for rail transport as well as road transport) instead of the symbol Ⓤ ;

for packagings conforming to marginal 3510 (2);

(b) the packaging code number in accordance with marginal 3511 (1);

(c) a code in two parts:

(i) a letter (X, Y or Z) designating the packing group(s) for which the design type has been approved;

(ii) for packagings without inner packagings, intended to contain liquids having a viscosity at 23 °C of 200 mm^2/s or less, the relative density (rounded off to the first decimal), to which the design type has been tested if more than 1,2;

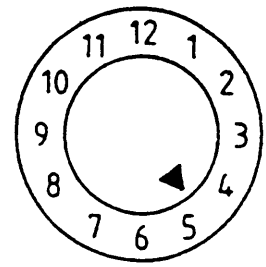
For packagings intended to contain liquids having a viscosity at 23 °C of more than 200 mm^2/s, solids or inner packagings, and for light gauge metal packagings, removable head, intended for substances of Class 3, 5°(c), the maximum gross mass in kilogrammes;

(iii) for packagings intended to contain substances of Class 6.2, 1° and 2°, 'Class 6.2' shall be used instead of the information required in (i) or (ii);

(d) either a letter 'S' denoting that the packaging is intended to contain liquids having a viscosity at 23 °C of more than 200 mm^2/s, solids or inner packagings, and for light gauge metal packagings, removable head, intended for substances of Class 3, 5°(c), or, where a hydraulic pressure test has been successfully passed, the test pressure in kPa rounded off to the nearest 10 kPa.;

(e) the year of manufacture (last two digits); in addition for packagings of types 1H and 3H, the month of manufacture; this part of the marking may be affixed in a different place from the other particulars. A suitable method is:

3512
(cont'd)



(f) the mark (1) of the State in which the approval was issued;

(g) either a registration number and the name or mark of the manufacturer or some other packaging identification mark specified by the competent authorities.

(2) Every reusable packaging liable to undergo a reconditioning process which might obliterate the packaging markings shall bear the marks indicated in (1) (a) to (e) in a permanent form. Marks are permanent if they are able to withstand the reconditioning process (e.g. embossed). For packagings other than metal drums of a capacity greater than 100 litres, these permanent marks may replace the corresponding durable markings prescribed in (1). In addition to the durable markings prescribed in (1), every new metal drum of a capacity greater than 100 litres shall, bear the marks described in (1) (a) to (e) on the base, with an indication of the nominal thickness of at least the metal used in the body (in mm, to 0,1 mm), in permanent form (e.g. embossed). When the nominal thickness of either head of a metal drum is thinner than that of a body, the nominal thicknesses of the top head, body, and bottom head shall be marked on the bottom in a permanent form (e.g. embossed), for example '1,0 — 1,2 — 1,0' or 0,9 — 1,0 — 1.0'. Nominal thicknesses of metal shall be determined according to the appropriate ISO standard, e.g. ISO 3574: 1986 steel drums. The marks indicated in (1) (f) and (g) shall not be applied in a permanent form (e.g. embossed) except as provided for below.

For manufactured metal drums, if there is no change to the packaging type and no replacement or removal of integral structural components, the required markings need not be permanent (e.g. embossed). Every other remanufactured metal drum shall bear the markings in (1) (a) to (e) in a permanent form (e.g. embossed) on the top head or side.

Metal drums made from materials (e.g. stainless steel) designed to be reused repeatedly may bear the markings indicated in 1 (f) and (g) in a permanent form (e.g. embossed).

(3) The registration number is valid for only one design type or series of design types. Different surface treatments may fall within the same design type.

A 'series of design types' means packagings of the same structural design, wall thickness, material and cross-section, which differ only in their lesser design heights from the design type approved.

The closures of receptacles shall be identifiable as those referred to in the test report.

(4) After reconditioning a packaging the reconditioner shall affix to it, near the durable marks required by (a) to (e) the following sequence of marks:

(h) the mark (1) of the State in whose territory the reconditioning was carried out;

(i) the name or authorized symbol of the reconditioner;

(j) the year of reconditioning, the letter 'R' and for every packaging which has successfully undergone the leakproofness test in accordance with marginal 3500 (10), the additional letter 'L'.

(1) Distinguishing sign for motor vehicles in international traffic prescribed in the Vienna Convention on Road Traffic (1968).

3512 *(cont'd)* (l) When, after reconditioning, the markings required by (1) (a) to (d) no longer appear on the top head or the side of a metal drum, the reconditioner shall apply them in a durable form followed by the markings required in (h), (i) and (j). These markings shall not identify a greater performance capability than that for which the original design type has been tested and marked.

(5) The letters 'V' or 'W' may follow the packaging code. The letter 'V' signifies a special packaging [see 3550 (8)]. The letter 'W' signifies that the packaging, although of the same type indicated by the code, is manufactured to a specification different to that in section III and is considered equivalent under the provisions of marginal 3500 (14).

(6) Packagings marked in accordance with this marginal but which were approved in a State which is not a Member State may nevertheless be used for carriage under this Directive.

(7) Examples of the markings

For a new steel drum:

1A1/Y1.4/150/83 NL/VL123	(a) (i), (b), (c), (d) and (e) (f) and (g)

For a reconditioned steel drum:

1A1/Y1.4/150/83 NL/RB/84/RL	(a) (i), (b), (c), (d) and (e) (h), (i) and (j)

For a steel box of equivalent specification:

4AW/Y136/S/90 GB/MC123	(a), (b), (c), (d), (e), (f) and (g)

For new light gauge metal packagings:

RID/ADR/0A2/Y20/S/83 NL/VL 123	(a) (ii), (b), (c), (d) and (e) (f) and (g)	Non-removable head
RID/ADR/0A2/Y/83 NL/VL 124	(a) (ii), (b), (c) and (e) (f) and (g)	Removable head, intended for liquids with a viscosity at 23 °C exceeding 200 mm^2/s, and for substances of Class 3, 5°(c).

For a remanufactured steel drum intended to transport liquids:

1A2/Y/100/91 USA/MM5	(a) (b), (c), (d) and (e) (f) and (g)

For a new fibreboard box intended to contain substances of 1° and 2° of Class 6.2:

4G/Class 6.2/S/92 SP/9989-ERIKSSON	(a) (i), (b), (c) (iii), (d) and (e) (f) and (g)

For fibreboard box intended to contain inner packagings or solids:

4G/Y145/S/83 NL/VL823	(a), (b), (c), (d), (e) (f) and (g)

Certification

3513 The manufacturer certifies, by affixing marking in accordance with marginal 3512 (1) that mass-produced packagings correspond to the approved design type and that the requirements referred to in the approval have been met.

Index of packagings

3514 The following types and codes of packaging are assigned:

A. Conforming to marginal 3510 (1) and marked 'UN'

Kind	Material	Category	Code	Marginal
1. Drums	A. Steel	non-removable head	1A1	3520
		removable head	1A2	3520 (1)
	B. Aluminium	non-removable head	1B1	3521
		removable head	1B2	3521 (1)
	D. Plywood	—	1D	3523 (1)
	G. Fibre	—	1G	3525 (1)
	H. Plastics	non-removable head	1H1	3526
		removable head	1H2	3526 (1)
2. Barrels	C. Wood	bung type	2C1	3524
		removable type	2C2	
3. Jerrycan	A. Steel	non-removable head	3A1	3522
		removable head	3A2	3522 (1)
	H. Plastics	non-removable head	3H1	3526
		removable head	3H2	3526 (1)
4. Boxes	A. Steel	—	4A	3532 (1)
		with liner	4A	
	B. Aluminium	—	4B	3532 (1)
		with liner	4B	
	C. Natural wood	ordinary	4C1	3527 (1)
		with sift-proof walls	4C2	
	D. Plywood	—	4D	3528 (1)
	F. Reconstituted wood	—	4F	3529 (1)
	G. Fibreboard	—	4G	3530 (1)
	H. Plastics	expanded	4H1	3531 (1)
		solid	4H2	
5. Bags	H. Woven plastics	without inner lining or coating	5H1	3534
		sift-proof	5H2	
		water resistant	5H3	
	H. Plastics film	—	5H4	3535
	L. Textile	without inner lining or coating	5L1	3533
		sift-proof	5L2	
		water resistant	5L3	
	M. Paper	multiwall	5M1	3536
		multiwall, water resistant	5M2	

(1) According to marginal 3538 these packagings can be used as outer packagings for combination packagings.

3514 *(cont'd)*

Kind	Material	Categorie	Code	Marginal
6. Composite packagings	H. Plastics receptacles	in steel drum	6HA1	
		in steel crate (1) or box	6HA2	
		in aluminium drum	6HB1	
		in aluminium crate or box	6HB2	
		in wooden box	6HC	
		in plywood drum	6HD	3537
		in plywood box	6HD2	
		in fibre drum	6HG1	
		in fibreboard box	6HG2	
		in plastics drum	6HH1	
		in solid plastics box	6HH2	

B. Packagings which may conform to marginal 3510 (1) or (2)

Kind	Material	Categorie	Code	Marginal
6. Composite packagings	P. Glass, porcelain or stoneware receptacle	in steel drum	6PA1	
		in steel crate or box	6PA2	
		in aluminium drum	6PB1	
		in aluminium crate or box	6PB2	
		in wooden box	6PC	
		in plywood drum	6PD1	3539
		in wickerwork hamper	6PD2	
		in fibre drum	6PG1	
		in fibreboard box	6PG2	
		in expanded plastics packaging	6PH1	
		in solid plastics packaging	6PH2	

(1) Crates are outer packagings with incomplete surfaces.

3514 (cont'd)

C. Conforming only to marginal 3510 (2) and marked 'ADR' [or ('RID/ADR')]

Kind	Material	Categorie	Code	Marginal
O. Light gauge metal packagings	A. Steel	non-removable head	0A1	3540
		removable head	0A2	

3515-3519

Section III

Requirements for packagings

A. Packagings conforming to marginal 3510 (1)

3520 Steel drums

1A1 non-removable head

1A2 removable head

(a) The sheet metal for the body and ends shall be of suitable steel and of a gauge appropriate to the drum's capacity and intended use.

(b) Body seams shall be welded on drums intended to contain more than 40 litres of liquid. Body seams shall be mechanically seamed or welded on drums intended to contain solids or 40 litres or less of liquids.

(c) Head and chime seams shall be mechanically seamed or welded.

(d) If there are built-on rolling hoops they shall be fitted tightly on the body and so secured that they cannot shift. Rolling hoops shall not be spot-welded.

(e) Internal coatings of lead, zinc, tin, lacquer and the like shall be tough and resilient and shall adhere to the steel at every point, including the closures.

(f) Openings for filling, emptying and venting in the bodies or heads of non-removable head (1A1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1A2).

(g) Closures shall incorporate a leakproof gasket except where a taper thread ensures comparable leakproofness.

(h) Closures of non-removable-head drums shall either be of the screw-threaded type or be capable of being secured by a screw-threaded device or a device at least equally effective.

(i) Closure devices for removable head drums shall be so designed and applied that they will remain secure and drums will remain leakproof under normal conditions of carriage. Gaskets or other sealing elements shall be used with all removable heads.

(j) Maximum capacity of drum: 450 litres.

(k) Maximum net mass: 400 kg.

3521 Aluminium drums

1B1 non-removable head

1B2 removable head

(a) The body and heads shall be of aluminium at least 99 % pure, or of an aluminium-base alloy having corrosion resistance and mechanical properties appropriate to the capacity of the drum and its intended use.

3521 *(cont'd)*

(b) Openings for filling, emptying and venting in the bodies or heads of non-removable head (1B1) drums shall not exceed 7 cm in diameter. Drums with larger openings are considered to be of the removable head type (1B2).

(c) Aluminium drums 1B1.

End seams, if any, shall be adequately reinforced for their protection. If there are any body and end seams they shall be welded. The closure shall either be of the screw-threaded type or be capable of being secured by a screw-threaded device or a device at least equally effective. Closures shall incorporate a leakproof gasket except where a taper thread ensures comparable leakproofness.

(d) Aluminium drums 1B2.

The body of the drum shall either be seamless or have a welded seam. The closures shall be so designed and fitted that they will remain secure and the drums will remain leakproof under normal conditions of carriage. Gaskets or other sealing elements shall be used with all removable heads.

(e) Maximum capacity of drum: 450 litres.

(f) Maximum net mass: 400 kg.

3522 Steel jerricans

3A1 non-removable head

3A2 removable head

(a) Body and heads shall be constructed of steel sheet of a suitable type and of adequate thickness in relation to the capacity of the jerrican and its intended use.

(b) Chimes of all jerricans shall be mechanically seamed or welded. Body seams of jerricans intended to contain more than 40 litres of liquid shall be welded. Body seams of jerricans intended to carry 40 litres or less shall be mechanically seamed or welded.

(c) Openings in jerricans (3A1) shall not exceed 7 cm in diameter. Jerricans with larger openings are considered to be of the removable head type (3A2).

(d) Closures of non-removable-head jerricans (3A1) shall either be of the screw-threaded type or be capable of being secured by a screw-threaded device or a device at least equally effective.

Closure devices of removable-head jerricans (3A2) shall be so designed and fitted that they will remain secure and that the jerricans will remain leakproof under normal conditions of carriage.

(e) Maximum capacity of jerrican: 60 litres.

(f) Maximum net mass: 120 kg.

3523 Plywood drums

1D

(a) The wood used shall be well seasoned, commercially dry and free from any defect likely to lessen the effectiveness of the drum for the purpose intended. If a material other than plywood is used for the manufacture of the ends, it shall be of a quality equivalent to the plywood.

(b) At least two-ply plywood shall be used for the body and at least three-ply plywood for the ends; the plies shall be firmly glued together, with their grain crosswise, by a water-resistant adhesive.

(c) The body and ends shall be of a design appropriate to the capacity of the drum and its intended use.

(d) In order to prevent sifting of the contents, lids shall be lined with kraft paper or some other equivalent material which shall be securely fastened to the lid and extend to the outside along its full circumference.

3523 *(cont'd)*

(e) Maximum capacity of drum: 250 litres.

(f) Maximum net mass: 400 kg.

3524 Wooden barrels

2C1 bung type

2C2 removable head

(a) The wood used shall be of good quality, straight-grained, well-seasoned and free from knots, bark, rotten wood, sapwood or other defects likely to lessen the effectiveness of the barrel for the purpose intended.

(b) The body and ends shall be of a design appropriate to the capacity of the barrel and its intended use.

(c) Staves and ends shall be sawn or cleft with the grain so that no annual ring shall extend over more than half the thickness of a stave or head.

(d) Barrel hoops shall be of steel or iron and of good quality. The hoops of 2C2 barrels with removable heads may be of a suitable hardwood.

(e) Wooden barrels 2C1:

The diameter of the bung-hole shall not exceed half the width of the stave in which it is placed.

(f) Wooden barrels 2C2:

Heads shall fit tightly into the crozes.

(g) Maximum capacity of barrel: 250 litres.

(h) Maximum net mass: 400 kg.

3525 Fibre drums

1G

(a) The body of the drum shall consist of multiple plies of heavy paper or fibreboard (without corrugations) firmly glued or laminated together and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

(b) Heads shall be of natural wood, fibreboard, metal, plywood, plastics or other suitable material and may include one or more protective layers of bitumen, waxed kraft paper, metal foil, plastics material, etc.

(c) The body and heads of the drum and their joins shall be of a design appropriate to the capacity of the drum and its intended use.

(d) The assembled packaging shall be sufficiently water-resistant so as not to delaminate under normal conditions of carriage.

(e) Maximum capacity of drum: 450 litres.

(f) Maximum net mass: 400 kg.

3526 Plastics drums and jerricans

1H1 drums, non-removable head

1H2 drums, removable head

3H1 jerricans, non-removable head

3H2 jerricans, removable head

(a) The packagings shall be capable of withstanding the physical (in particular mechanical and thermal) and chemical stresses to be expected in carriage and of remaining leakproof. They shall be capable of withstanding dangerous substances and their vapours. They shall also have the necessary degree of resistance to ageing and ultra-violet radiation. Packagings shall be safe to handle.

3526 *(cont'd)*

(b) Unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous substances shall not exceed five years, from the date of the manufacture of the packaging, except where a shorter period of use is prescribed because of the nature of the substance to be transported.

(c) If protection against ultra-violet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the packaging. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2 % by mass or if the pigment content does not exceed 3 % by mass; the content of inhibitors of ultra-violet radiation is not limited.

(d) Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastics material provided that they do not adversely affect the chemical and physical properties of the material of the packaging. In such circumstances, retesting may be waived.

(e) Appropriate steps shall be taken to ensure that the plastics material to be used in the manufacture of the packaging is chemically compatible with the goods which the packaging is intended to contain, [see marginal 3551 (5)].

(f) Packagings shall be manufactured from suitable plastics material of known origin and specifications; their construction shall be fully appropriate to plastics materials and in accordance with technological developments. For new packagings, no used material other than production residues or regrind from the same manufacturing process may be used.

(g) The wall thickness at every point of the packaging shall be appropriate to its capacity and intended use, taking into account however the stresses to which each point is liable to be exposed.

(h) Openings for filling, emptying and venting in the bodies or heads of non-removable head drums (1H1) and jerricans (3H1) shall not exceed 7 cm in diameter. Drums and jerricans with larger openings are considered to be of the removable head type (1H2, 3H2).

(i) Removable head drums (1H2) and jerricans (3H2) used for solid substances shall remain leakproof at every point with respect to the filling substance.

Closures of non-removable-head drums and jerricans (1H1, 3H1) shall either be of the screw-threaded type or be capable of being secured by a screw-threaded device or a device at least equally effective. Closure devices of removable-head drums and jerricans (1H2, 3H2) shall be so designed and fitted that they will remain secure and the drums or jerricans will remain leakproof under normal conditions of carriage.

Gaskets shall be used with all removable heads unless the drum or jerrican design is such that, where the removable head is properly secured, the drum or jerrican is inherently leakproof.

(j) The maximum permissible permeation for inflammable liquids shall be 0,008g/l.h at 23 °C (see marginal 3556).

(k) Maximum capacity of drumsand jerricans:

1H1, 1H2: 450 litres
3H1, 3H2: 60 litres

(l) Maximum net mass:

1H1, 1H2: 400 kg
3H1, 3H2: 120 kg.

3527 Boxes of natural wood

4C1 ordinary

4C2 with sift-proof walls

Note: For plywood boxes, see marginal 3528: for reconstituted wood boxes, see marginal 3529.

3527 *(cont'd)*

(a) The wood used shall be well seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the box. The strength of the material used and the method of construction shall be appropriate to the capacity of the box and its intended use. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

Fastenings shall be resistant to vibration experienced under normal conditions of carriage. End grain nailing shall be avoided whenever practicable. Joins which are likely to be highly stressed shall be made using clenched or annular ring nails or equivalent fastenings.

(b) Boxes with sift-proof walls 4C2:

Each part of the box shall be in one piece or equivalent thereto. A part shall be deemed equivalent to a part in one piece if it is glued together by one of the following methods: Lindermann (dovetail) jointing, tongue-and-groove jointing, ship-lap or rabbet jointing, or butt-jointing with at least two corrugated metal fasteners at each joint.

(c) Maximum net mass: 400 kg.

3528 Plywood boxes

4D

(a) The plywood used shall have at least three plies. It shall be made of well-seasoned rotary-cut, sliced or sawn veneer commercially dry and free from defects likely to lessen the strength of the box. All plies shall be glued by means of a water-resistant adhesive. Other suitable materials may be used together with plywood in the manufacture of boxes. Boxes shall be firmly nailed or secured to corner posts or ends or be assembled by other equally suitable devices.

(b) Maximum net mass: 400 kg.

3529 Reconstituted wood boxes

4F

(a) The walls of boxes shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type. The strength of the material used and the method of construction shall be appropriate to the capacity of the box and its intended use.

(b) Other parts of the boxes may be made of other suitable material.

(c) Boxes shall be securely assembled by means of suitable devices.

(d) Maximum net mass: 400 kg.

3530 Fibreboard boxes

4G

(a) Good quality solid or double-faced (single-wall or multiwall) corrugated fibreboard appropriate to the capacity and intended use of the boxes shall be used. The water-resistance of the outer surface shall be such that the increase in mass, as measured in a test carried out over a period of 30 minutes by the Cobb method of water-absorption determination, is not greater than 155 g/m^2 (in accordance with the International Standard ISO 535:1991). The fibreboard shall be capable of bending sufficiently without breaking. It shall be cut, creased without scoring and slotted so as to permit assembly without cracking and without its surfaces tearing or bulging unduly. The fluting of corrugated fibreboard shall be firmly glued to the facings.

(b) Ends of boxes may have a wooden frame or be entirely of wood or other suitable material. Reinforcements of wooden battens or other suitable material may be used.

3530 *(cont'd)*

(c) Joins of boxes shall be taped with adhesive tape, be lapped and glued, or be lapped and metal-stapled. Lapped joins shall have a suitable overlap. Where closure is effected by gluing or by applying adhesive tape, the adhesive shall be water-resistant.

(d) The dimensions of the box shall be appropriate for the contents.

(e) Maximum net mass: 400 kg.

3531 Plastics boxes

4H1 expanded plastics boxes

4H2 solid plastics boxes

(a) The box shall be manufactured from suitable plastics material and be of adequate strength in relation to its capacity and intended use. The box shall be adequately resistant to ageing and to degradation caused either by the substance contained or by ultra-violet radiation.

(b) An expanded plastics box shall comprise two parts made of a moulded expanded plastics material, a bottom section containing cavities for the inner packagings and a top section covering and interlocking with the bottom section. The top and bottom sections shall be designed so that the inner packagings fit snugly. The closure cap for any inner packaging shall not be in contact with the inside of the top section of this box.

(c) For dispatch, an expanded plastics box shall be closed with a self-adhesive tape having sufficient tensile strength to prevent the box from opening. The adhesive tape shall be weather-resistant and its adhesive compatible with the expanded plastics material of the box. Other closing devices at least equally effective may be used.

(d) For solid plastics boxes, protection against ultra-violet radiation, if required, shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the box. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if the carbon black content does not exceed 2 % by mass or if the pigment content does not exceed 3 % by mass; the content of inhibitors of ultra-violet radiation is not limited.

(e) Solid plastics boxes shall have closure devices made of a suitable material of adequate strength and so designed as to prevent the box from unintentional opening.

(f) Additives serving purposes other than protection against ultra-violet radiation may be included in the composition of the plastics material of boxes 4H1 and 4H2 provided that they do not adversely affect the chemical and physical properties of the material. In such circumstances, retesting may be waived.

(g) Maximum net mass:

4H1: 60 kg.

4H2: 400 kg.

3532 Steel or aluminium boxes

4A steel

4B aluminium

(a) The strength of the metal and the construction of the box shall be appropriate to the capacity of the box and to its intended use.

(b) Boxes shall be lined with fibreboard or felt packing pieces as required or shall have an inner liner or coating of suitable material. If a double seamed metal liner is used, steps shall be taken to prevent the ingress of substances into the recesses of the seams.

(c) Closures may be of any suitable type; they shall remain secured under normal conditions of carriage.

(d) Maximum net mass: 400 kg.

3533 Textile bags

5L1 without inner lining or coating

5L2 sift-proof

5L3 water-resistant

(a) The textiles used shall be of good quality. The strength of the fabric and the construction of the bag shall be appropriate to the capacity of the bag and its intended use.

(b) Bags, sift-proof, 5L2.

The bag shall be made sift-proof, for example by the use of:

paper bonded to the inner surface of the bag by a water-resistant adhesive such as bitumen; or

plastics film bonded to the inner surface of the bag; or

one or more inner liners made of paper or plastics material.

(c) Bags, water-resistant, 5L3

To prevent any entry of moisture the bag shall be made waterproof, for example by the use of:

separate inner liners of water-resistant paper (e.g. waxed kraft paper, tarred paper or plastics-coated kraft paper); or

plastics film bonded to the inner surface of the bag;

or one or more inner liners made of plastics material.

(d) Maximum net mass: 50 kg.

3534 Woven plastics bags

5H1 without inner lining or coating

5H2 sift-proof

5H3 water-resistant

(a) Bags shall be made from stretched tapes or stretched monofilaments of a suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and its intended use.

(b) Bags may be fitted with an inner liner of plastics film or given a thin inner coating of plastics material.

(c) If the fabric is woven flat, the bags shall be formed by sewing or some other method ensuring closure of the bottom and one side. If the fabric is tubular, the bottom of the bag shall be closed by sewing, weaving or some other equally strong method of closure.

(d) Bags, sift-proof, 5H2:

The bag shall be made sift-proof, for example by means of:

paper or a plastics film bonded to the inner surface of the bag; or

one or more separate inner liners made of paper or plastics material.

(e) Bags, water-resistant, 5H3

To prevent any entry of moisture, the bag shall be made waterproof, e.g. by means of:

separate inner liners of water-resistant paper (e.g. waxed kraft paper, double-tarred kraft paper or plastics-coated kraft paper);

plastics film bonded to the inner or outer surface of the bag; or

one or more inner plastics liners.

(f) Maximum net mass: 50 kg.

3535 Plastics film bags

5H4

(a) Bags shall be made of suitable plastics material. The strength of the material used and the construction of the bag shall be appropriate to the capacity of the bag and its intended use. Seams shall withstand pressures and impacts liable to occur in normal conditions of carriage.

(b) Maximum net mass: 50 kg.

3536 Paper bags

5M1 multiwall

5M2 multiwall, water-resistant

(a) Bags shall be made of a suitable kraft paper or of an equivalent paper with at least three plies. The strength of the paper and the construction of the bags shall be appropriate to the capacity of the bag and its intended use. Joins and closures shall be sift-proof.

(b) Paper bags 5M2:

To prevent the entry of moisture, a bag of four plies or more shall be made waterproof by the use of either a water resistant ply as one of the two outermost plies or a water barrier made of a suitable protective material between the two outermost plies; a bag of three plies shall be made waterproof by the use of water resistant ply as the outermost ply. Where there is a danger of the substance contained reacting with moisture or where it is packed damp, a waterproof ply or barrier, such as doubletarred kraft paper, plastics-coated kraft paper, plastics film bonded to the inner surface of the bag, or one or more inner plastics liners, shall also be placed next to the substance. Joins and closures shall be waterproof.

(c) Maximum net mass: 50 kg.

3537 Composite packagings (plastics material)

6HA1 plastics receptacle with outer steel drum

6HA2 plastics receptacle with outer steel crate [1] or box

6HB1 plastics receptacle with outer aluminium drum

6HB2 plastics receptacle with outer aluminium crate [1] or box

6HC plastics receptacle with outer wooden box

6HD1 plastics receptacle with outer plywood drum

6HD2 plastics receptacle with outer plywood box

6HG1 plastics receptacle with outer fibre drum

6HG2 plastics receptacle with outer fibreboard box

6HH1 plastics receptacle with outer plastics drum

6HH2 plastics receptacle with outer solid plastics box

(a) *Inner receptacle*

(1) The provisions of marginal 3526 (a) and (c) to (h) shall apply to plastics inner receptacles.

(2) The plastics inner receptacle shall fit snugly inside the outer packaging, which shall be free of any projection that might abrade the plastics material.

(3) Maximum capacity of inner receptacle:

6HA1, 6HB1, 6HD1, 6HG1, 6HH1: 250 litres

6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: 60 litres.

(4) Maximum net mass:

6HA1, 6HB1, 6HD1, 6HG1, 6HH1: 400 kilogrammes

6HA2, 6HB2, 6HC, 6HD2, 6HG2, 6HH2: 75 kilogrammes.

[1] Crates are outer packagings with incomplete surfaces.

3537 (cont'd) (b) *Outer packaging*

(1) Plastics receptacle with outer steel or aluminium drum 6HA1 or 6HB1; the provisions of marginal 3520 (a) to (i) or 3521 (a) to (d), as appropriate, shall apply to the construction of the outer packaging.

(2) Plastics receptacle with outer steel or aluminium crate or box 6HA2 or 6HB2; the provisions of marginal 3532 shall apply to the construction of the outer packaging.

(3) Plastics receptacle with outer wooden box 6HC; the provisions of marginal 3527 shall apply to the construction of the outer packaging.

(4) Plastics receptacle with outer plywood drum 6HD1; the provisions of marginal 3523 shall apply to the construction of the outer packaging.

(5) Plastics receptacle with outer plywood box 6HD2; the provisions of marginal 3528 shall apply to the construction of the outer packaging.

(6) Plastics receptacle with outer fibre drum 6HG1; the provisions of marginal 3525 (a) to (d) shall apply to the construction of the outer packaging.

(7) Plastics receptacle with outer fibreboard box 6HG2; the provisions of marginal 3530 (a) to (c) shall apply to the construction of the outer packaging.

(8) Plastics receptacle with outer plastics drum 6HH1; the provisions of marginal 3526 (a) and (c) to (h) shall apply to the construction of the outer packaging.

(9) Plastics receptacle with outer solid plastics box 6HH2; the relevant provisions of marginal 3531 (a), (d), (e) and (f) shall apply to the construction of the outer packaging.

3538 Combination packagings

(a) *Inner packagings*

The following may be used:

glass, porcelain or stoneware packagings with a maximum permissible capacity of 5 litres for liquids or 5 kg for solids;

plastics packagings with a maximum permissible capacity of 30 litres for liquids or 30 kg for solids;

metal packagings with a maximum permissible capacity of 40 litres for liquids or 40 kg for solids;

paper, textile, woven plastics or plastics-film sachets and bags with a maximum permissible capacity of 5 kg for solids in sachets and 50 kg in bags;

cans, folding cartons and boxes made of fibreboard or plastics with a maximum permissible capacity of 10 kg for solids;

other types of small packagings such as tubes with a maximum permissible capacity of 1 litre for liquids or 1 kg for solids.

(b) *Outer packaging*

The following may be used:

steel drums, removable head (marginal 3520);

aluminium drums, removable head (marginal 3521);

steel jerricans, removable head (marginal 3522);

plywood drums (marginal 3523);

fibre drums (marginal 3525);

plastics drums, removable head (marginal 3526);

3538 *(cont'd)*

plastics jerricans, removable head (marginal 3526);
natural wood boxes (marginal 3527);
plywood boxes (marginal 3528);
reconstituted wood boxes (marginal 3529);
fibreboard boxes (marginal 3530);
plastics boxes (marginal 3531);
steel or aluminium boxes (marginal 3532).

B. Packagings which may conform to marginal 3510 (1) or (2)

3539 Composite packagings (glass, porcelain or stoneware)

6PA1 receptacle with outer steel drum

6PA2 receptacle with outer steel crate (1) or box

6PB1 receptacle with outer aluminium drum

6PB2 receptacle with outer aluminium crate (1) or box

6PC receptacle with outer wooden box

6PD1 receptacle with outer plywood drum

6PD2 receptacle with outer wickerwork hamper

6PG1 receptacle with outer fibre drum

6PG2 receptacle with outer fibreboard box

6PH1 receptacle with outer expanded plastics packaging

6PH2 receptacle with outer solid plastics packaging

(a) *Inner receptacle*

(1) The receptacle shall be suitably moulded (cylindrical or pear-shaped) and be made of good quality material free from any defect that could impair its strength. The walls shall be sufficiently thick at every point and free from internal stresses.

(2) Screw-threaded plastics closures, ground glass stoppers or closures at least equally effective shall be used as closures for receptacles. Any part of the closure likely to come into contact with the contents of the receptacle shall be resistant to those contents.

Care should be taken to ensure that the closures are so fitted as to be leakproof and are suitably secured to prevent any loosening during carriage.

If vented closures are necessary, they shall be leakproof.

(3) The receptacle shall be firmly secured in the outer packaging by means of cushioning and/or absorbent materials.

(4) Maximum capacity of receptacle: 60 litres

(5) Maximum net mass: 75 kg.

(b) *Outer packaging*

(1) Receptacle with outer steel drum 6PA1

The provisions of marginal 3520 (a) to (i) shall apply to the construction of the outer packaging. The removable lid required for this type of packaging may however be in the form of a cap.

(1) Crates are outer packagings with incomplete surfaces.

3539 (cont'd)

(2) Receptacle with outer steel crate or box 6PA2

The provisions of marginal 3532 (a) to (c) shall apply to the construction of the outer packaging. For cylindrical receptacles the outer packaging should, when upright, rise above the receptacle and its closure. If the protective crate surrounds a pear-shaped receptacle and is of matching shape, the outer packaging shall be fitted with a protective cover (cap).

(3) Receptacle with outer aluminium drum 6PB1

The provisions of marginal 3521 (a) to (d) shall apply to the construction of the outer packaging.

(4) Receptacle with outer aluminium crate or box 6PB2

The provisions of marginal 3532 shall apply to the construction of the outer packaging.

(5) Receptacle with outer wooden box 6PC

The provisions of marginal 3527 shall apply to the construction of the outer packaging.

(6) Receptacle with outer plywood drum 6PD1

The provisions of marginal 3523 shall apply to the construction of the outer packaging.

(7) Receptacle with outer wickerwork hamper 6PD2

The wickerwork hamper shall be properly made with material of good quality. It shall be fitted with a protective cover (cap) so as to prevent damage to the receptacle.

(8) Receptacle with outer fibre drum 6PG1

The provisions of marginal 3525 (a) to (d) shall apply to the construction of the outer packaging.

(9) Receptacle with outer fibreboard box 6PG2

The provisions of marginal 3530 (a) to (c) shall apply to the construction of the outer packaging.

(10) Receptacle with outer expanded plastics or solid plastics packaging 6PH1 or 6PH2.

The materials of both outer packagings shall meet the provisions of marginal 3531 (a) to (f). Solid plastics packaging shall be made of high density polyethylene or other comparable plastics material. The removable lid for this type of packaging may however be in the form of a cap.

C. Packagings conforming only to marginal 3510 (2)

3540 Light gauge metal packagings

0A1 non-removable-head

0A2 removable-head

(a) The sheet metal for the body and ends shall be of suitable steel, and of a gauge appropriate to the capacity and intended use of the packaging.

(b) The joints shall be welded, at least double-seamed by welting or produced by a method ensuring a similar degree of strength and leakproofness.

(c) Inner coatings of zinc, tin, lacquer, etc. shall be tough and shall adhere to the steel at every point, including the closures.

3540 (cont'd)

(d) Openings for filling, emptying and venting in the bodies or heads of non-removable head (0A1) packagings shall not exceed 7 cm in diameter. Packagings with larger openings shall be considered to be of the removable-head type (0A2).

(e) The closures of non-removable-head packagings (0A1) shall either be of the screw-threaded type or be capable of being secured by a screwable device or a device at least equally effective. The closures of removable-head packagings (0A2) shall be so designed and fitted that they stay firmly closed and the packagings remain leakproof in normal conditions of carriage.

(f) Maximum capacity of packagings: 40 litres

(g) Maximum net mass: 50 kg.

3541-3549

Section IV

Test requirements for packagings

A. Design-type tests

3550 Performance and frequency of tests

(1) The design type of each packaging shall be tested and approved by the competent authority or by a body designated by that authority.

(2) Tests in accordance with (1) shall be carried out again after any modification of the design type unless the authorized testing body has agreed to the modification of the design type. In the latter event a new approval of the design type is not required. A packaging design type is defined by the design, size, material and thickness, manner of construction and packing, but may include various surface treatments. It also includes packagings which differ from the design type only in their lesser design height.

(3) The competent authority may at any time require proof, through tests in accordance with this section, that mass-produced packagings meet the requirements of the design-type tests. For such tests on paper or fibreboard packagings, preparation at ambient conditions shall be considered equivalent to the requirements of marginal 3551 (3).

(4) For verification purposes the authorized testing body shall keep a record of the materials used, through materials testing or by retaining samples or pieces of the materials.

(5) If an inner coating is required for safety reasons, it shall retain its protective properties even after the tests.

(6) The competent authority may permit the selective testing of packagings that differ only in minor respects from a tested type, e.g. smaller sizes of inner packagings or inner packagings of lower net mass; and packagings such as drum, bags and boxes which are produced with small reductions in external dimension(s).

(7) Provided the validity of the test results is not affected and with the approval of the competent authority, several tests may be made on one sample.

3551 Preparation of packagings and packages for testing

(1) Tests shall be carried out on packagings prepared as for transport including, with respect to combination packagings, the inner packagings used. Inner or single receptacles or packagings shall be filled to not less than 98 % of their maximum capacity for liquids or 95 % for solids. For combination packagings where the inner packaging is designed to carry liquids and solids, separate testing is required for both liquid and solid contents.

3551 *(cont'd)* The substances or articles to be transported in the packagings may be replaced by other substances or articles except where this would invalidate the results of the tests. For solids, when another substance is used it shall have the same physical characteristics (mass, grain, size, etc.) as the substance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, so long as they are placed so that the test results are not affected. Suitable mixtures of powdery solids, such as polyethylene or PVC powder with sawdust, fine sand, etc., may be used as a substitute filling substance for substances having a viscosity in excess of 2 680 mm^2/s at 23 °C.

(2) In the drop tests for liquids, when another substance is used its relative density and viscosity shall be similar to those of the substance to be carried. Water may also be used for the liquid drop test under the conditions in marginal 3552 (4).

(3) Paper or fibreboard packagings shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen. The preferred atmosphere is 23 °C ± 2 °C and 50 % ± 2 % r.h. The two other options are 20 °C ± 2 °C and 65 % ± 2 % r.h. or 27 °C ± 2 °C and 65 % ± 2 % r.h.

Note: Average values shall fall within these limits. Short term fluctuations and measurement limitations may cause individual measurements to vary by up to ± 5 % relative humidity without significant impairment of test reproducibility.

(4) Bung-type barrels made of natural wood shall be left filled with water for at least 24 hours before the tests.

(5) To check that their chemical compatibility with the liquids is sufficient, plastics drums and jerricans in accordance with marginal 3526 and if necessary composite packagings (plastics material) in accordance with marginal 3537 shall be subjected to storage at ambient temperature for six months, during which time the test samples shall be kept filled with the goods they are intended to carry.

For the first and last 24 hours of storage, the test samples shall be placed with the closure downwards. However, packagings fitted with a vent shall be so placed on each occasion for five minutes only. After this storage the test samples shall undergo the tests prescribed in marginals 3552 to 3556.

When it is known that the strength properties of the plastics material of the inner receptacles of composite packagings (plastics material) are not significantly altered by the action of the filling substance, it shall not be necessary to check that the chemical compatibility is sufficient.

A significant alteration in strength properties means:

(a) distinct embrittlement; or

(b) a considerable decrease in elasticity, unless related to a not less than proportionate increase in the elongation under load.

Where the behaviour of the plastics material has been established by other means, the above compatibility test may be dispensed with. Such procedures shall be at least equivalent to the above compatibility test and be recognized by the competent authority.

Note: For plastics drums and jerricans and composite packagings (plastics material) made of high molecular mass polyethylene, see also (6) below.

(6) For high molecular mass polyethylene drums and jerricans in accordance with marginal 3526 and if necessary composite packagings of high molecular mass polyethylene in accordance with marginal 3537, conforming to the following specifications:

— relative density at 23 °C after thermal conditioning for one hour at 100 °C ≥ 0,940, in accordance with ISO Standard 1183,

— melt flow rate at 190 °C/21,6 kg load ≤ 12 g/10 min. in accordance with ISO Standard 1133,

chemical compatibility with the liquids listed in section II of the annex to this appendix may be verified as follows with standard liquids (see section I of the annex to this appendix).

3551 *(cont'd)* The sufficient chemical compatibility of these packagings may be verified by storage for three weeks at 40 °C with the appropriate standard liquid; where this standard liquid is water, proof of chemical compatibility is not required.

For the first and last 24 hours of storage, the test samples shall be placed with the closure downwards. However, packagings fitted with a vent shall be so placed on each occasion for five minutes only. After this storage, the test samples shall undergo the tests prescribed in marginals 3552 to 3556.

When a packaging design-type has satisfied the approval tests with a standard liquid, the comparable filling substances listed in section II of the annex to this appendix may be accepted for carriage without further testing, subject to the following conditions:

the relative densities of the filling substances shall not exceed that used to determine the height for the drop test and the mass for the stacking test;

the vapour pressures of the filling substances at 50 °C or 55 °C shall not exceed that used to determine the pressure for the internal pressure test.

(7) For drums and jerricans conforming to marginal 3526, and where necessary composite packagings conforming to marginal 3537, made of high molecular mass polyethylene, which have passed the test in paragraph (6) of this marginal, filling substances other than those listed in section II of the annex may also be approved. Such approval shall be based on laboratory tests proving that the effect of such filling substances on the test specimens is less than that of the standard liquids. The processes of deterioration to be taken into account shall be the following: softening through swelling, cracking under stress and molecular degradation. The same conditions as those set out in (6) above shall apply with respect to relative density and vapour pressure.

3552 Drop test [1]

(1) Number of test samples (per design type and manufacturer) and drop orientation.

For other than flat drops the centre of gravity shall be vertically over the point of impact.

Packaging	No of test samples	Drop orientation
(a) Steel drums Aluminium drums Steel jerricans Plywood drums Wooden barrels Fibre drums Plastics drums and jerricans Composite packagings (plastics material) which are in the shape of a drum Composite packagings (glass, stoneware, or porcelain) conforming to marginal 3510 (1) and which are in the shape of a drum Light gauge metal packagings	Six (three for each drop)	First drop (using three samples): the packaging shall strike the target diagonally on the chime or, if the packaging has no chime, on a circumferential seam or an edge. Second drop (using the other three samples): the packaging shall strike the target on the weakest part not tested by the first drop, for example a closure or, for some cylindrical drums, the welded longitudinal seam of the drum body.

[1] See ISO Standard 2248

3552 *(cont'd)*

Packaging	No of test samples	Drop orientation
(b) Boxes of natural wood Plywood boxes Reconstituted wood boxes Fibreboard boxes Plastics boxes Steel or aluminium boxes Composite packagings (plastics material) which are in the shape of a box Composite packagings (glass, stoneware, porcelain) conforming to marginal 3510 (1) and which are in the shape of a box	Five (one for each drop)	First drop: flat on the bottom Second drop: flat on the top Third drop: flat on the long side Fourth drop: flat on the short side Fifth drop: on a corner
(c) Textile bags Paper bags	Three (two drops per bag)	First drop: flat on a face of the bag Second drop: on the end of the bag
(d) Woven plastics bags Plastics film bags	Three (three per bag)	First drop: flat on a wide face Second drop: flat on narrow face Third drop: on the end of the bag
(e) Composite packagings (glass, stoneware or porcelain) conforming to marginal 3510 (2) and which are in the shape of a drum or box	Three (one for each drop)	Diagonally on the bottom chime, or, if there is no chime, on a circumferential seam or the bottom edge.

Where more than one orientation is possible for a given drop test, the orientation most likely to result in failure of the packaging shall be used.

(2) Special preparation of test samples for the drop test:

The temperature of the test sample and its contents shall be reduced to –18 °C or lower for the following packagings:

(a) plastics drums (see 3526)

(b) plastics jerricans (see 3526)

(c) plastics boxes other than expanded polystyrene boxes (see 3531)

(d) composite packagings (plastics material) (see 3537)

(e) combination packagings with plastics inner packagings (see 3538)

(f) textile bags with inner plastics liner (see 3533)

(g) woven plastics bags (see 3534), and

(h) plastics film bags (see 3535).

Where the test samples are prepared in this way, the conditioning in marginal 3551 (3) may be waived. Test liquids shall be kept in the liquid state by the addition of anti-freeze if necessary.

3552 (cont'd)

(3) Target

The target shall be a rigid, non-resilient, flat and horizontal surface.

(4) Drop height

For solids:

Packing group I	Packing group II	Packing group III
1,8 m	1,2 m	0,8 m

For liquids:

If the test is performed with water:

(a) where the substances to be carried have a relative density not exceeding 1,2:

Packing group I	Packing group II	Packing group III
1,8 m	1,2 m	0,8 m

(b) where the substances to be carried have a relative density exceeding 1,2, the drop height shall be calculated on the basis of the relative density of the substance to be carried, rounded up to the first decimal, as follows:

Packing group I	Packing group II	Packing group III
relative density x 1,5 m	relative density x 1,0 m	relative density x 0,67 m

(c) for light-gauge metal packagings intended for the carriage of substances having a viscosity at 23 °C greater than 200 mm^2/s (corresponding to a flow time of 30 seconds with an ISO flow cup having a jet orifice of 6 mm diameter in accordance with ISO Standard 2431-1980), and for substances of Class 3, 5°(c).

(i) if the relative density does not exceed 1,2:

Packing group II	Packing group III
0,6 m	0,4 m

(ii) where the substances to be carried have a relative density exceeding 1,2 the drop height shall be calculated on the basis of the relative density of the substance to be carried, rounded up to the first decimal place, as follows:

Packing group II	Packing group III
relative density x 0,5 m	relative density x 0,33 m

3552 *(cont'd)* If the test is performed with the substance to be carried or with a liquid of at least equal relative density:

Packing group I	Packing group II	Packing group III
1,8 m	1,2 m	0,8 m

(5) Criteria for passing the test:

(a) Every packaging containing liquid shall be leakproof when equilibrium has been reached between the internal and external pressures, except for inner packagings of combination packagings or composite packagings (glass, porcelain or stoneware) when it is not necessary that the pressures be equalized.

(b) Where removable-head drums for solids undergo a drop test and their upper faces strike the target, the test sample passes the test if the entire contents are retained by an inner packaging (e.g. a plastics bag) even if the closure on the top face of the drum is no longer sift-proof.

(c) The outermost ply of a bag shall not exhibit any damage liable to affect safety in carriage.

(d) The outer packaging of a composite or combination packaging shall not exhibit any damage liable to affect safety in carriage. There shall be no leakage of the filling substance from the inner packaging.

(e) A slight discharge from the closure(s) upon impact shall not be considered to be a failure of the packaging provided that no further leakage occurs.

(f) No rupture is permitted in packagings for goods of Class 1 which would cause the spillage of loose explosive substances or articles from the outer packaging.

Leakproofness test

3553 (1) The leakproofness test shall be performed on all types of packagings intended to contain liquids; however, this test is not required for:

— inner packagings of combination packagings;

— inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to marginal 3510 (2);

— removable head packagings intended for substance with a viscosity at 23 °C exceeding 200 mmq^2/s.

— light gauge metal packagings, removable head, intended for substances of Class 3, 5°(c).

(2) Number of test samples:

Three test samples per design type and manufacturer.

(3) Special preparation of test samples for the test:

Test samples shall be pierced for entry of the compressed air at a neutral point, so as also to test the tightness of the closure. Vented closures of packagings shall be replaced by non-vented closures.

(4) Test method:

The test samples including their closures shall be restrained under water for 5 minutes while an internal air pressure is applied, the method of restraint shall not affect the results of the test. Other methods at least equally effective may be used.

3553 *(cont'd)*

(5) Air pressure to be applied:

Packing group I	Packing group II	Packing group III
Not less than 30 kPa	Not less than 20 kPa	Not less than 20 kPa

(6) Criterion for passing the test:

There shall be no leakage.

Internal pressure (hydraulic) test

3554 (1) The hydraulic pressure test shall be carried out on all types of steel, aluminium and plastics packagings, and on all composite packagings intended to contain liquids. However, this test is not required for:

— inner packagings of combination packagings;

— inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to marginal 3510 (2);

— removable head packagings intended for substances with a viscosity at 23 °C exceeding 200 mm^2/s.

— light gauge metal packagings, removable head, intended for substances of Class 3, 5°(c).

(2) Number of test samples:

Three test samples per design type and manufacturer.

(3) Special preparation of packagings for the test:

Test samples shall be pierced for entry of the pressure at a neutral point, so as also to test the tightness of the closure. Vented closures of packagings shall be replaced by non-vented closures.

(4) Test method and pressure to be applied:

The packagings shall be subjected for five minutes (30 minutes in the case of plastics packagings) to a hydraulic gauge pressure not lower than:

(a) the total gauge pressure measured in the packaging (i.e. the vapour pressure of the filling substance and the partial pressure of the air or other inert gases, less 100 kPa) at 55 °C, multiplied by a safety factor of 1,5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with marginal 3500 (4) and a filling temperature of 15 °C; or

(b) 1,75 times the vapour pressure of the filling substance at 50 °C, less 100 kPa, but at a gauge pressure of not less than 100 kPa; or

(c) 1,5 times the vapour pressure of the filling substance at 55 °C, less 100 kPa, but at a gauge pressure of not less than 100 kPa.

The manner in which the packagings are maintained in place shall not distort the results of the test. Pressure shall be applied continuously and evenly. The test pressure shall be kept constant throughout the test period.

The minimum test pressure for packagings for Packing Group I shall be 250 kPa.

(5) Criterion for passing the test:

No packaging shall leak.

Stacking test

3555 (1) All packagings other than bags and non-stackable composite packagings (glass, porcelain or stoneware) conforming to marginal 3510 (2), shall be subjected to a stacking test.

(2) Number of test samples:

Three test samples per design type and manufacturer.

(3) Test method:

The test sample shall be subjected to a force applied to the top surface of the test sample equivalent to the total weight of identical packages which might be stacked on it during carriage.

The duration of the test shall be 24 hours, except that plastics drums and jerricans in accordance with marginal 3526 and composite packagings 6HH1 and 6HH2, intended for liquids, shall be subjected to the stacking test for a period of 28 days at a temperature of not less than 40 °C.

The minimum height of the stack including the test sample shall be 3 metres.

For the test in accordance with marginal 3551 (5), the original filling substance shall be used. For the test in accordance with marginal 3551 (6), a stacking test shall be carried out with a standard liquid.

Where the contents of the test samples are non-dangerous liquids with relative density different from that of the liquid to be carried, the force shall be calculated in relation to the latter.

(4) Criteria for passing the test:

No test sample shall leak. In composite packagings or combination packagings, there shall be no leakage of the filling substance from the inner receptacle or inner packaging.

No test sample shall show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages.

Stacking stability shall be considered sufficient when, after the stacking test, and in the case of plastics packagings, after cooling to ambient temperature, two filled packagings of the same type placed on the test sample maintain their position for one hour.

Supplementary permeability test for plastics drums and jerricans in accordance with marginal 3526 and for composite packagings (plastics material) in accordance with marginal 3537 intended for the carriage of liquids having a flash-point $\leq$ 61 °C, other than 6HA1 packagings

3556 (1) Polyethylene packagings need be subjected to this test only if they are to be approved for the carriage of benzene, toluene, xylene or mixtures and preparations containing those substances.

(2) Number of test samples:

Three packagings per design type and manufacturer.

(3) Special preparation of the test sample for the test:

The test samples are to be pre-stored with the original filling substance in accordance with marginal 3551 (5), or, for high molecular mass polyethylene packagings, with the standard liquid mixture of hydrocarbons (white spirit) in accordance with marginal 3551 (6).

(4) Test method:

The test samples filled with the substance for which the packaging is to be approved shall be weighed before and after storage for 28 days at 23 °C and 50 % relative atmospheric humidity. For high molecular mass polyethylene packagings, the test may be carried out with the standard liquid mixture of hydrocarbons (white spirit) in place of benzene, toluene or xylene.

(5) Criterion for passing the test:

Permeability shall not exceed 0,008 g/l.h

3557 Supplementary test for natural wood bung type barrels

(1) Number of test samples:

One barrel per design type and manufacturer.

(2) Test method:

Remove all hoops above the bilge of an empty barrel which has previously stood assembled for at least two days.

(3) Criterion for passing test:

The diameter of the upper part of the barrel shall not increase by more than 10 %.

Approval of combination packagings

Note: Combination packagings shall be tested in accordance with the provisions applicable to the outer packagings.

3558 (1) During design-type tests of combination packagings, approval may at the same time be given for packagings:

(a) containing inner packagings of less volume;

(b) having a lower net mass than that of the design type tested.

(2) Where several types of combination packaging having different types of inner packaging have been approved, the various inner packagings may also be assembled in a single outer packaging if the sender certifies that this package meets the test requirements.

(3) Provided that the strength properties of the plastics inner packagings of a combination packaging are not significantly altered by the action of the filling substance, proof of chemical compatibility is not necessary. A significant alteration in strength properties means:

(a) distinct embrittlement;

(b) a considerable decrease in elasticity, unless related to a not less than proportionate increase in elastic elongation.

(4) Where an outer packaging of a combination packaging has been successfully tested with different types of inner packagings, a variety of such different inner packagings shall also be assembled in this outer packaging. In addition, provided an equivalent level of performance is maintained, the following variations in inner packagings are allowed without further testing of the package:

(a) Inner packagings of equivalent smaller size shall be used provided:

(i) The inner packagings are of similar design to the tested inner packagings (e.g. shape — round, rectangular, etc.);

(ii) The material of construction of the inner packagings (glass, plastics, metal, etc.) offers resistance to impact and stacking forces equal to or greater than that of the originally tested packaging;

(iii) The inner packagings have the same or smaller openings and the closure is of similar design (e.g. screw cap, friction lid, etc.);

(iv) Sufficient additional cushioning material is used to take up void spaces and to prevent significant movement of inner packagings; and

(v) Inner packagings are oriented within the outer packaging in the same manner as in the tested package.

(b) A lesser number of the tested inner packagings, or of the alternative types of inner packagings identified in (a) above, shall be used provided sufficient cushioning is added to fill the void space(s) and to prevent significant movement of the inner packagings.

3558 *(cont'd)* (5) Articles or inner packagings of any type for solids or liquids shall be assembled and presented for carriage without testing in an outer packaging under the following conditions:

(a) The outer packaging shall have been successfully tested in accordance with marginal 3552 with fragile (e.g. glass) inner packagings containing liquids using the packing group I drop height.

(b) The total combined gross mass of inner packagings shall not exceed one half of the gross mass of inner packagings used for the drop test in (a) above.

(c) The thickness of the cushioning material between inner packagings and the outside of the packaging shall not be reduced below the corresponding thickness in the originally tested packaging; and if a single inner packaging was used in the original test, the thickness of the cushioning between inner packagings shall not be less than the thickness of cushioning between the outside of the packaging and the inner packaging in the original test. If either fewer or smaller inner packagings are used (as compared to the inner packagings used in the drop test) sufficient additional cushioning material shall be used to take up void spaces.

(d) The outer packaging shall have passed successfully the stacking test in marginal 3555 while empty. The total mass of identical packages shall be based on the combined mass of the inner packagings used for the drop test in (a) above.

(e) Inner packagings containing liquids shall be completely surrounded with a sufficient quantity of absorbent material to absorb the entire liquid contents of the inner packagings.

(f) If the outer packaging is intended to contain inner packagings for liquids and is not leakproof, or is intended to contain inner packagings for solids and is not sift-proof, a means of containing any liquid or solid contents in the event of leakage shall be provided in the form of a leakproof liner, plastics bag or other equally efficient means of containment. For packagings containing liquids, the absorbent material required in (e) shall be placed inside the means of containing liquid contents.

(g) Packagings shall be marked in accordance with marginal 3512 as having been tested to Packing Group I performance for combination packagings. The marked gross mass in kilograms shall be the sum of the mass of the outer packagings plus one half of the mass of the inner packaging(s) as used for the drop test referred to in (a) above. The mark shall contain a letter 'V' in accordance with marginal 3512 (5) as being a special packaging.

Test report

3559 A test report containing at least the following particulars shall be drawn up and shall be available to the users of the packaging:

1. Testing body;
2. Applicant;
3. Manufacturer of packaging;
4. Description of packaging (e.g. distinctive features such as material, inner lining, dimensions, wall thickness, mass, closures, colouring of plastics materials);
5. Design drawing of packaging and closures (if necessary, photographs);
6. Method of manufacture;
7. Maximum capacity;
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids;
9. Drop height;
10. Test pressure in leakproofness test in accordance with marginal 3553;

3559 (cont'd)

11. Test pressure in internal pressure test in accordance with marginal 3554;

12. Stacking height;

13. Test results;

14. A unique test report identification;

15. Date of the test report;

16. The test report shall be signed with the name and status of signatory.

The test report shall contain statements that the packaging prepared as for carriage was tested in accordance with the appropriate provisions of Appendix A.5 and that the use of other packaging methods may render it invalid. A copy of the test report shall be available to the competent authority.

B. Leakproofness test for all new, remanufactured or reconditioned packagings intended to contain liquids

3560 (1) Application of the test

Every packaging intended to contain liquids shall undergo the leakproofness test:

— before it is first used for carriage;

— after remanufacturing or reconditioning, before it is re-used for carriage.

For this test, packagings need not have their own closures fitted.

The inner receptacle of composite packagings may be tested without the outer packaging provided the test results are not affected.

This test is not required for:

— inner packagings of combination packagings;

— inner receptacles of composite packagings (glass, porcelain or stoneware) conforming to marginal 3510 (2);

— removable head packagings intended for substances with a viscosity at 23 °C exceeding 200 mm^2/s;

light gauge metal packagings conforming to marginal 3510 (2).

(2) Test method:

Compressed air shall be introduced through the filling orifice of each packaging. The packaging shall be immersed in water; it shall be kept under water in such a way as not to distort the result of the test. The packaging may also be covered with soap solution, heavy oil or other suitable liquid on its seams or at any other place where leakage might occur. Other methods at least equally effective may also be used. Packagings need not be equipped with their own closures.

(3) Air pressure to be applied:

Packing group I	Packing group II	Packing group III
Not less than 30 kPa	Not less than 20 kPa	Not less than 20 kPa

(4) Criterion for passing the test:

There shall be no leakage.

3561-3599

Annex to Appendix A.5

Section I Standard liquids for verifying the chemical compatibility of high molecular mass polyethylene packagings in accordance with marginal 3551 (6).

The following standard liquids shall be used for this plastics material.

(a) *Wetting Solution* for substances causing severe cracking in polyethylene under stress, in particular for all solutions and preparations containing wetting agents.

An aqueous solution of 1 to 10 % of a wetting agent shall be used. The surface tension of this solution shall be 31 to 35 mN/m at 23 °C.

The stacking test shall be carried out on the basis of a relative density of not less than 1,20.

A compatibility test with acetic acid is not required if adequate chemical compatibility is proved with a wetting solution.

(b) *Acetic acid* for substances and preparations causing cracking in polyethylene under stress, in particular for monocarboxylic acids and monovalent alcohols.

Acetic acid in 98 to 100 % concentration shall be used.

Relative density = 1,05.

The stacking test shall be carried out on the basis of a relative density not less than 1.1.

In the case of filling substances causing polyethylene to swell more than acetic acid and to such an extent that the polyethylene mass is increased by up to 4 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with marginal 3551 (6) but with the original filling matter.

(c) *Normal butyl acetate/normal butyl acetate-saturated wetting solution* for substances and preparations causing polyethylene to swell to such an extent that the polyethylene mass is increased by about 4 % and at the same time causing cracking under stress, in particular for phyto-sanitary products, liquid paints and esters. Normal butyl acetate in 98 to 100 % concentration shall be used for preliminary storage in accordance with marginal 3551 (6).

For the stacking test in accordance with marginal 3555, a test liquid consisting of a 1 to 10 % aqueous wetting solution mixed with 2 % normal butyl acetate conforming to (a) above shall be used.

The stacking test shall be carried out on the basis of a relative density not less than 1,0.

In the case of filling substances causing polyethylene to swell more than normal butyl acetate and to such an extent that the polyethylene mass is increased by up to 7,5 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with marginal 3551 (6) but with the original filling matter.

(d) *Mixture of hydrocarbons (white spirit)* for substances and preparations causing polyethylene to swell, in particular for hydrocarbons, esters and ketones.

A mixture of hydrocarbons having a boiling range 160 °C to 220 °C, relative density 0,78-0,80, flash-point > 50 °C and an aromatic content 16 % to 21 % shall be used.

The stacking test shall be carried out on the basis of a relative density not less than 1,0.

In the case of filling substances causing polyethylene to swell to such an extent that the polyethylene mass is increased by more than 7,5 %, adequate chemical compatibility may be proved after preliminary storing for three weeks at 40 °C, in accordance with marginal 3551 (6) but with the original filling matter.

(e) *Nitric acid* for all substances and preparations having an oxidizing effect on polyethylene and causing molecular degradation identical to or less than 55 % nitric acid.

Nitric acid in a concentration of not less than 55 % shall be used.

The stacking test shall be carried out on the basis of a relative density of not less than 1,4.

Annex *(cont'd)*

In the case of filling substances more strongly oxidizing than 55 % nitric acid or causing degradation of the molecular mass proceed in accordance with marginal 3551 (5).

(f) *Water* for substances which do not attack polyethylene in any of the cases referred to under (a) to (e), in particular for inorganic acids and lyes, aqueous saline solutions, polyvalent alcohols and organic substances in aqueous solution.

The stacking test shall be carried out on the basis of a relative density of not less than 1,2.

Section II List of substances to which the standard liquids may be regarded as equivalents in accordance with marginal 3551 (6).

CLASS 3

Item	Substance	Standard Liquid
	A. Substances having a flashpoint below 23°C, not toxic, not corrosive	
3°(b)	Substances having a vapour pressure at 50 °C of not more than 110 kPa (1,1 bar)	
	— Crude petroleum and other crude oils	Mixture of hydrocarbons
	— Hydrocarbons	Mixture of hydrocarbons
	— Halogenated substances	Mixture of hydrocarbons
	— Alcohols	Acetic acid
	— Ethers	Mixture of hydrocarbons
	— Aldehydes	Mixture of hydrocarbons
	— Ketones	Normal butyl acetate where the swelling effect is up to 4 % (mass): other cases, mixture of hydrocarbons
4°(b)	Mixtures of substances of 3° (b) having a boiling point or initial boiling point exceeding 35 °C, containing not more than 55 % nitrocellulose with a nitrogen content not exceeding 12,6 %.	Normal butyl acetate/normal butyl acetate-saturated wetting solution and mixture of hydrocarbons.
5°	Viscous substances	Mixture of hydrocarbons
	B. Substances having a flashpoint below 23 °C and toxic	
17°(b)	Methanol	Acetic acid
	E. Substances having a flashpoint between 23 °C and 61 °C inclusive which might be slightly toxic or slightly corrosive	
31°(c)	Substances having a flashpoint between 21 °C and 61 °C inclusive:	
	— Petroleum, solvent naphta	Mixture of hydrocarbons
	— White spirit (turpentine substitute)	Mixture of hydrocarbons
	— Hydrocarbons	Mixture of hydrocarbons
	— Halogenated substances	Mixture of hydrocarbons
	— Alcohols	Acetic acid
	— Ethers	Mixture of hydrocarbons
	— Aldehydes	Mixture of hydrocarbons
	— Ketones	Mixture of hydrocarbons
	— Esters	Normal butyl acetate where the swelling effect is up to 4 % (mass): other cases, mixture of hydrocarbons
	— Nitrogenous substances	Mixture of hydrocarbons
34°(c)	Mixtures of substances of 31° (c) containing not more than 55 % nitrocellulose with a nitrogen content not exceeding 12,6 %.	Normal butyl acetate/normal butyl acetate-saturated wetting solution and mixture of hydrocarbons

Annex
(cont'd)

CLASS 5.1

Item	Substance	Standard Liquid
	A. Liquid oxidizing substances and their aqueous solutions	
1°	Hydrogen peroxide and its solutions (1)	
(b)	Aqueous solutions with not less than 20 % but not more than 60 % hydrogen peroxide	Water
(c)	Aqueous solutions with not less than 8 % but less than 20 % hydrogen peroxide	Water
3°(a)	Perchloric acid with more than 50 % but not more than 72 % acid (mass)	Nitric acid
	B. Aqueous solutions of solid oxidizing substances	
11°(b)	Calcium chlorate solution	Water
	Potassium chlorate solution	Water
	Sodium chlorate solution	Water

CLASS 6.1

Item	Substance	Standard Liquid
	B. Organic substances which have a flashpoint of 23 °C, or above or non-flammable organic substances	
12°	Nitrogenous substances having a flashpoint above 61 °C:	
(b)	aniline	Acetic acid
14°	Oxygenated substances having a flashpoint above 61 °C:	
(c)	ethylene glycol monobutyl ether	Acetic acid
	furfuryl alcohol	Acetic acid
	phenol solution	Acetic acid
27°	Corrosive toxic organic substances, articles containing corrosive toxic organic substances (such as preparations and wastes), which cannot be classified under other collective headings	
(b)	cresols or cresylic acid	Acetic acid

CLASS 6.2

Item	Substance	Standard Liquid
3° and 4°	All infectious substances considered to be liquids in accordance with marginal 2650 (5)	Water

(1) Test to be performed only with a vent.

Annex
(cont'd)

CLASS 8

Item	Substance	Standard Liquid
	A. Acid substances	
	Inorganic acids	
1°(b)	Sulphuric acid	Water
	Sulphuric acid, spent	Water
2°(b)	Nitric acid with not more than 55 % acid	Nitric acid
4°(b)	Perchloric acid with not more than 50 % acid, by mass in aqueous solution	Nitric acid
5°(b) and (c)	Hydrochloric acid with not more than 36 % pure acid	Water
	Hydrobromic acid	
	Hydriodic acid	
7°(b)	Hydrofluoric acid with not more than 60 % hydrogen fluoride (1)	Water
8°(b)	Fluoroboric acid with not more than 50 % pure acid	Water
	Fluorosilicic acid (hydrofluorosilicic acid)	Water
17°(b) and (c)	Chromic acid solution with not more than 30 % pure acid	Nitric acid
17°(c)	Phosphoric acid	Water
	Organic substances	
32°(b)	Acrylic acid, formic acid, acetic acid, thioglycolic acid	Acetic acid
32°(c)	Methacrylic acid, propionic acid	Acetic acid
40°(c)	Alkylphenols, liquid	Acetic acid
	B. Basic substances	
	Inorganic substances	
42°(b) and (c)	Sodium hydroxide solution, potassium hydroxide solution	Water
43°(c)	Ammonia solution	Water
44°(b)	Hydrazine, aqueous solutions with not more than 64 % hydrazine, by mass	Water
	C. Other corrosive substances	
61°(c)	Chlorite and hypochlorite solutions (2)	Nitric acid
63°(c)	Formaldehyde solutions	Water

(1) Maximum 60 litres; permissible period of use two years.
(2) Test to be carried out only with vent. If the test is carried out with nitric acid as the standard liquid, an acid-resistant vent shall be used. For hypochlorite solutions, vents of same design type, resistant to hypochlorite (e.g. of silicone rubber) but not resistant to nitric acid, are also permitted.

APPENDIX A.6

GENERAL CONDITIONS FOR THE USE OF INTERMEDIATE BULK CONTAINERS (IBCs), TYPES OF IBCs, REQUIREMENTS RELATING TO THE CONSTRUCTION OF IBCs AND TEST SPECIFICATIONS FOR IBCs

3600 'Intermediate Bulk Container' (IBC) means a rigid, semi-rigid or flexible portable packaging, other than those specified in Appendix A.5, that:

(a) has a capacity of

(i) not more than 3,0 m^3 (3 000 litres) for solids and liquids of Packing Groups II and III;

(ii) not more than 1,5 m^3 for solids of Packing Group I when packed in flexible, rigid plastics, composite, fibreboard and wooden IBCs;

(iii) not more than 3,0 m^3 for solids of Packing Group I when packed in metal IBCs;

(b) is designed for mechanical handling;

(c) is resistant to the stresses produced in handling and transport as determined by the tests specified in this Appendix.

Notes: 1. The provisions of this Appendix apply to intermediate bulk containers (IBCs) the use of which is expressly authorized in the relevant classes for the carriage of certain dangerous substances.

2. Tank containers which meet the provisions of Appendix B.1b are not considered to be intermediate bulk containers (IBCs).

3. Intermediate bulk containers (IBCs) which meet the conditions of this Appendix are not considered to be containers for the purposes of ADR.

4. The letters IBC only will be used in the rest of the text to refer to intermediate bulk containers.

Section 1

General conditions applicable to IBCs

3601 (1) IBCs shall be designed, manufactured and tested under a quality assurance programme which satisfies the competent authority, in order to ensure that each IBC meets the provisions of this Appendix.

(2) Every IBC shall correspond in all respects to its design type.

The competent authority may at any time require proof, by conducting tests in accordance with the provisions of this Appendix, that IBCs meet the requirements for design type tests.

(3) Before being filled and handed over for carriage, every IBC shall be inspected to ensure that it is free from corrosion, contamination or other damage and with regard to proper functioning of service equipment. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so repaired that it is able to withstand the design type tests.

(4) Where two or more closure systems are fitted in series, that nearest to the substance being carried shall be closed first.

(5) During carriage, no dangerous residue shall adhere to the outside of the IBC.

(6) Where overpressure may develop in an IBC through the emission of gas from the contents (as a result of temperature increase or other causes), the IBC may be fitted with a vent provided that the gas emitted will not cause any danger on account of its toxicity, its flammability, the quantity released, etc. The vent shall be so designed that, when the IBC is in the position in which it is intended to be carried, leakages of liquid and the penetration of foreign matter are prevented under normal conditions of carriage. However, a substance may be carried in such an IBC only where a vent is prescribed for that substance in the conditions of carriage of the relevant class.

3601 *(cont'd)*

(7) When IBCs are filled with liquids, sufficient ullage shall be left to ensure that no leakage of liquid and no permanent distortion of the IBC occurs as a result of expansion of the liquid, due to temperatures which may be attained during carriage.

For a filling temperature of 15 °C, the maximum degree of filling shall be determined as follows, unless otherwise provided under a particular class:

Either (a)

Boiling point (initial boiling point) of the substance in °C	> 35 < 60	≥ 60 < 100	≥ 100 < 200	≥ 200 < 300	≥ 300
Degree of filling as a percentage of the capacity of the IBC	90	92	94	96	98

Or (b)

$$\text{Degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)}\ \%\ \text{of the capacity of the IBC.}$$

In this formula, α represents the mean coefficient of cubic expansion of the liquid between 15 °C and 50 °C, that is to say, for a maximum rise in temperature of 35 °C;

α is calculated according to the formula : $\alpha = \dfrac{d_{15} - d_{50}}{35 \times d_{50}}$

d_{15} and d_{50} being the relative densities of the liquid at 15 °C and 50 °C and t_F the mean temperature of the liquid at the time of filling.

(8) When IBCs are used for the carriage of liquids with a flash-point of 55 °C (closed cup) or lower, or powders liable to dust explosion, measures shall be taken to prevent a dangerous electrostatic discharge during filling and emptying.

(9) The closure of IBCs containing wetted or diluted substances shall be such that the percentage of liquid (water, solvent or phlegmatizer) does not fall below the prescribed limits during carriage.

(10) Liquids shall be loaded only into rigid plastics IBCs or composite IBCs which have an adequate resistance to the internal pressure that may be developed under normal conditions of carriage. IBCs marked with the hydraulic test pressure as prescribed in marginal 3612 (2) shall be filled only with a liquid having a vapour pressure:

(a) such that the total gauge pressure in the packaging (i.e. the vapour pressure of the filling substance plus the partial pressure of air or other inert gases, less 100 kPa) at 55 °C determined on the basis of a maximum degree of filling in accordance with paragraph (7) and a filling temperature of 15 °C, will not exceed two-thirds of the marked test pressure; or

(b) at 50 °C less than four-sevenths of the sum of the marked test pressure plus 100 kPa; or

(c) at 55 °C less than two-thirds of the sum of the marked test pressure plus 100 kPa.

(11) During carriage, IBCs shall be securely fastened to or retained within the transport unit so as to prevent lateral or longitudinal movement or impact, and so as to provide adequate external support.

3602-3609

Section 2

Types of IBCs

Definitions

3610 (1) Subject to the particular provisions of each class, the IBCs mentioned below may be used:

Metal IBCs

Metal IBCs consist of a metal body together with appropriate service and structural equipment.

Flexible IBCs

Flexible IBCs consist of a body constituted of film, woven fabric or any other flexible material or combinations thereof, and if necessary an inner coating or liner, together with any appropriate service equipment and handling devices.

Rigid plastics IBCs

Rigid plastics IBCs consist of a rigid plastics body, which may have structural equipment together with appropriate service equipment.

Composite IBCs with plastics inner receptacle

Composite IBCs consist of structural equipment in the form of a rigid outer casing enclosing a plastics inner receptacle together with any service or other structural equipment. They are so constructed that the inner receptacle and outer casing once assembled form, and are used as, an integrated single unit to be filled, stored, transported or emptied as such.

Fibreboard IBCs

Fibreboard IBCs consist of a fibreboard body with or without separate top and bottom caps, if necessary an inner liner (but no inner packagings), and appropriate service and structural equipment.

Wooden IBCs

Wooden IBCs consist of a rigid or collapsible wooden body, together with an inner liner (but no inner packagings) and appropriate service and structural equipment.

(2) The following definitions apply to the IBCs listed in (1):

Body (for all categories of IBC other than composite IBCs) means the receptacle proper, including openings and their closures, but does not include service equipment (see below);

Service equipment (for all categories of IBC) means the filling and discharge devices and, according to the category of IBC, pressure relief or venting, safety, heating and heat-insulating devices and measuring instruments;

Structural equipment (for all categories of IBC other than flexible IBCs) means the reinforcing, fastening, handling, protective or stabilizing members of the body (including the base pallet for composite IBCs with plastics inner receptacle);

Maximum permissible gross mass (for all categories of IBC other than flexible IBCs) means the mass of the body, its service equipment and structural equipment and the maximum permissible load;

Maximum permissible load (for flexible IBCs) means the maximum net mass for which the IBC is intended to be used and which it is authorized to carry;

3610 (cont'd) *Protected* (for metal IBCs) means provided with additional protection against impact, the protection taking the form of, for example, a multi-layer (sandwich) or double-wall construction, or a frame with a metal lattice-work casing;

Woven plastics (for flexible IBCs) means a material made from stretched tapes or monofilaments of suitable plastics material;

Plastics (for composite IBCs with plastics inner receptacle), when used in connection with inner receptacles for composite IBCs, is taken to include other polymeric materials such as rubber, etc.;

Handling device (for flexible IBCs) means any sling, loop, eye or frame attached to the body of the IBC or formed from a continuation of the IBC body material;

Liner (for flexible fibreboard and wooden IBCs) means a separate tube or bag inserted in the body but not forming an integral part of it, including the closures of its openings.

Coding of IBC design types

3611 (1) Code system for IBCs

The code consists of:

— two Arabic numerals indicating the type of IBC as specified under (a) below;

— a capital letter or letters (Latin characters) as specified under (b) below, indicating the nature of the material (e.g. metal, plastics, etc.);

— where necessary, an Arabic numeral indicating the category of IBC within the type to which the IBC belongs.

For composite IBCs, two capital letters (Latin characters) shall be used. The first shall indicate the material of the inner receptacle of the IBC and the second that of the outer packaging of the IBC.

(a)

Type	For solids, loaded and/or discharged		for liquids
	by gravity	under pressure of more than 10 kPa (0,1 bar)	
Rigid	11	21	31
Semi-rigid	12	22	32
Flexible	13	—	—

(b) A. Steel (all types and surface treatments)

B. Aluminium

C. Natural wood

D. Plywood

F. Reconstituted wood

G. Fibreboard

H. Plastics material

L. Textile

M. Paper, multiwall

N. Metal (other than steel or aluminium).

3611 (cont'd) (2) The IBC code shall be followed in the marking by a letter indicating the groups of substances for which the design type is approved, i.e.:

X for substances of Packing groups I, II and III (IBCs for solids only);

Y for substances of packing groups II and III;

Z for substances of packing group III.

Note: For packing groups, see marginal 3511 (2).

Marking

3612 (1) Primary marking

All IBCs built and intended for use in conformity with these provisions shall bear a durable and legible marking giving the following particulars:

(a) The United Nations packaging symbol Ⓤ

(for metal IBCs on which the marking is stamped or embossed, the letters 'UN' may be applied instead of the symbol);

(b) the code designating the type of IBC according to marginal 3611 (1);

(c) a letter (X, Y or Z) designating the packing group(s) for which the design type has been approved;

(d) the month and year (last two digits) of manufacture;

(e) the mark [1] of the State in which the approval was issued;

(f) the name or symbol of the manufacturer or any other identification of the IBC as specified by the competent authority;

(g) the stacking test load in kg;

(h) maximum permissible gross mass or, for flexible IBCs, maximum permissible load, in kg.

The primary marking required above shall be applied in the sequence of the subparagraphs above. The marking required by paragraph (2) and any further marking authorized by a competent authority shall be arranged so as to enable the various parts of the marking to be correctly identified.

Examples of primary marking

Ⓤ 11C/X/01 93 S/Aurigny 9876 3000/910	For a wooden IBC for solids with an inner liner and authorized for packing Group I solids.
Ⓤ 11A/Y/0289 NL/Mulder 007/5500/1500	Metal IBC made of steel for solids discharged for instance by gravity for Packing Groups II and III manufactured in February 1989 approved by the Netherlands manufactured by Mulder in conformity with a design type to which the competent authority has allocated serial number 007 load used for the stacking test in kg maximum permissible gross mass in kg.
Ⓤ 13H3/Z/0389 F/Meunier 1713/1000/500	Flexible IBC for solids discharged for instance by gravity and made from woven plastics with a liner.

[1] Distinguishing sign for motor vehicles in international traffic prescribed in the Vienna Convention on Road Traffic (1968).

3612 *(cont'd)*

(UN) 31H1/Y/0489 GB/9099/10800/1200	Rigid plastics IBC for liquids, made from plastics with structural equipment to withstand the stacking load.
(UN) 31HA1/Y/0589 D/Muller/1683/10800/1200	Composite IBC for liquids with a rigid plastics inner receptacle and a steel outer casing.

(2) Additional marking [1]

For all categories of IBCs other than flexible IBCs:

(i) tare mass in kg [2],.

For metal IBCs, rigid plastics IBCs and composite IBCs with plastics inner receptacle:

(j) capacity in litres [2] at 20 °C,

(k) date of last leakproofness test (month and year), if applicable,

(l) date of last inspection (month and year),

(m) maximum filling discharge pressure in kPa (or in bar) [2], if applicable,

For metal IBCs:

(n) body material and its minimum thickness in mm,

(o) serial number of the manufacturer,

For rigid plastics IBCs and composite IBCs with plastics inner receptacle:

(p) Test pressure (gauge) in kPa (or bar) [2], if applicable.

(3) IBCs marked in accordance with this Appendix but approved in a State which is not a Contracting Party to ADR may also be used for carriage under ADR.

Certification

3613 The manufacturer shall certify, by affixing marking in accordance with this Appendix, that mass-produced IBCs correspond to the approved design type and that the conditions referred to in the approval certificate have been met.

Index of IBCs

3614 The codes corresponding to the various types of IBCs are as follows:

1. IBCs for solids loaded and discharged by gravity:

Type	Material	Category	Code	Marginals
11 rigid	steel	metal	11A	3622
	aluminium		11B	
	natural wood	wooden	11C	3627
	plywood		11D	
	reconstituted wood		11F	
	fibreboard	fibreboard	11G	3626
	plastics	rigid plastics (fitted with structural equipment)	11H1	3624
		rigid plastics (freestanding)	11H2	
		composite with plastics inner receptacle (rigid)	11HZ1[1]	3625
		composite with plastics inner receptacle (flexible)	11HZ2[1]	
	other metal	metal	11N	3622

[1] Each flexible IBC may also bear a pictogram indicating recommended lifting methods.
[2] The unit used shall be indicated.

3614 *(cont'd)*

Type	Material	Category	Code	Marginals
12 semi-rigid	reserved			
13 flexible	woven plastics without coating or liner	flexible	13H1	3623
	woven plastics, coated		13H2	
	woven plastics, with liner		13H3	
	woven plastics, coated and with liner		13H4	
	plastics film		13H5	
	textile without coating or liner		13L1	
	textile, coated		13L2	
	textile with liner		13L3	
	textile, coated and with liner		13L4	
	paper, multiwall		13M1	
	paper, multiwall water resistant		13M2	

(1) With regard to the letter Z, see marginal 3625 (1) (b).

2. IBCs for solids loaded or discharged under pressure of more than 10 kPa (0,1 bar)

Type	Material	Category	Code	Marginals
21 rigid	steel	metal	21A	3622
	aluminium		21B	
	plastics	rigid plastics (fitted with structural equipment)	21H1	3624
		rigid plastics (freestanding)	21H2	
		composite with plastics inner receptacle (rigid)	21HZ1(1)	3625
		composite with plastics inner receptacle (flexible)	21HZA(1)	
	other metal	metal	21N	3622
22 semi-rigid	reserved			

(1) With regard to the letter Z, see marginal 3625 (1) (B).

3614 (cont'd) 3. IBCs for liquids

Type	Material	Category	Code	Marginals
31 rigid	steel	metal	31A	3622
	aluminium		31B	
	plastics	rigid plastics (fitted with structural equipment)	31H1	3624
		rigid plastics (freestanding)	31H2	
		composite with plastics inner receptacle (rigid)	31HZ1(1)	3625
		composite with plastics inner receptacle (flexible)	31HZ2(1)	
	other metal	metal	31N	3622
32 semi-rigid	reserved			

(1) With regard to the letter Z, see marginal (3625 (1) (b).

3615-3620

Section 3

Construction requirements for IBCs

General provisions

3621 (1) IBCs shall be resistant to or adequately protected from deterioration due to the environment.

(2) IBCs shall be so constructed and closed that none of the contents can escape under normal conditions of carriage.

(3) IBCs and their closures shall be constructed of materials compatible with their contents, or be protected internally, so that they are not liable:

a) to be attacked by the contents so as to make their use dangerous;

b) to cause the contents to react or decompose, or form harmful or dangerous compounds with the IBC.

(4) Gaskets, where used, shall be made of materials not subject to attack by the contents of the IBCs.

(5) All service equipment shall be so positioned or protected as to minimize the risk of escape of the contents owing to damage during handling and transport.

(6) IBCs, their attachments and their service and structural equipment shall be designed to withstand, without loss of contents, the internal pressure of the contents and the stresses of normal handling and transport. IBCs intended for stacking shall be designed for stacking. Any lifting or securing features of IBCs shall be of sufficient strength to withstand the normal conditions of handling and transport without gross distortion or failure and shall be so positioned that no undue stress is caused in any part of the IBC.

3621 (cont'd) (7) Where an IBC consists of a body within a framework, it shall be so constructed that:

— the body does not chafe or rub against the framework so as to cause material damage to the body,

— the body is retained within the framework at all times,

— the items of equipment are fixed in such a way that they cannot be damaged if the connections between body and frame allow relative expansion or movement.

(8) Where a bottom discharge valve is fitted, it shall be capable of being made secure in the closed position and the whole discharge system shall be suitably protected from damage. Valves having lever closures shall be able to be secured against accidental opening and the open or closed position shall be readily apparent. For IBCs containing liquids, a secondary means of sealing the discharge aperture shall also be provided, e.g. by a blank flange or equivalent device.

(9) New, reused or repaired IBCs shall be capable of passing the prescribed tests.

Special provisions for metal IBCs

3622 (1) These provisions apply to metal IBCs intended for the carriage of solids or liquids.

These IBCs are of the following types:

11A, 11B, 11N.

For solids which are loaded or discharged by gravity.

21A, 21B, 21N.

For solids which are loaded or discharged under a gauge pressure greater than 10 kPa (0,1 bar).

31A, 31B, 31N.

For liquids. Metal IBCs intended for the carriage of liquids and which comply with the provisions of this Appendix shall not be used to carry liquids having a vapour pressure of more than 110 kPa (1,1 bar) at 50 °C or more than 130 kPa (1,3 bar) at 55 °C.

(2) Bodies shall be made of a suitable ductile metal of which the weldability has been fully demonstrated. Welds shall be skilfully made and afford complete safety.

(3) If contact between the substance carried and the material used for the construction of the body entails a progressive decrease in the thickness of the walls, this thickness shall be increased at manufacture by an appropriate amount. This extra thickness to allow for corrosion shall be added to the wall thickness as determined according to paragraph (7) [see also marginal 3621 (3)].

(4) Care shall be taken to avoid damage by galvanic action due to the juxtaposition of dissimilar metals.

(5) Aluminium IBCs intended for the carriage of flammable liquids with a flash-point of not more than 55 °C shall have no movable parts, such as covers, closures etc., made of unprotected steel liable to rust, which might cause a dangerous reaction by coming into frictional or percussive contact with the aluminium.

(6) Metal IBCs shall be made of metals which meet the following requirements:

(a) for steel the elongation at fracture, in per cent, shall not be less than $\frac{10\,000}{Rm}$, with an absolute minimum of 20 %

where Rm = guaranteed minimum tensile strength of the steel used in N/mm^2;

3622 *(cont'd)*

(b) for aluminium and its alloys the elongation at fracture, in per cent, shall not be less than $\frac{10\,000}{6\,Rm}$, with an absolute minimum of 8 %.

Specimens used to determine the elongation at fracture shall be taken transversely to the direction of rolling and be so secured that:

$L_o = 5\,d$

or

$L_o = 5{,}65\sqrt{A}$

where L_o = gauge length of the specimen before the test

d = diameter

A = cross-sectional area of test specimen.

(7) Minimum wall thickness:

(a) For a reference steel having a product of $R_m \times A_o = 10\,000$, the wall thickness shall not be less than:

Capacity in m³	Wall thickness in mm			
	Types 11A, 11B, 11N		Types 21A, 21B, 21N, 31A, 31B, 31N	
	Unprotected	Protected	Unprotected	Protected
> 0,25 ≤ 1,0	2,0	1,5	2,5	2,0
> 1,0 ≤ 2,0	2,5	2,0	3,0	2,5
> 2,0 ≤ 3,0	3,0	2,5	4,0	3,0

where A_o = minimum elongation (as a percentage) of the reference steel used on fracture under tensile stress [see paragraph (6)].

(b) For metals other than the reference steel described in (a), the minimum wall thickness is calculated by the following equivalence formula:

$$e_1 = \frac{21{,}4 \times e_0}{\sqrt[3]{Rm_1 \times A_1}}$$

where e_1 = required equivalent wall thickness of the metal to be used (in mm);

e_0 = required minimum wall thickness for the reference steel (in mm);

Rm_1 = guaranteed minimum tensile strength of the metal to be used (in N/mm²);

A_1 = minimum elongation (as a percentage) of the metal to be used on fracture under tensile stress [see paragraph (6)].

However, in no case shall the wall thickness be less than 1,5 mm.

(8) Pressure relief requirements

IBCs for liquids shall be capable of releasing a sufficient amount of vapour to ensure that, in the event of fire engulfment, no rupture of the body will occur. This can be achieved by conventional pressure relief devices or by other constructional means.

The start-to-discharge pressure shall not be higher than 65 kPa (0,65 bar) and no lower than the total gauge pressure experienced in the IBC [i.e. the vapour pressure of the filling substance plus the partial pressure of the air or other inert gases, minus 100 kPa (1 bar)] at 55 °C, determined on the basis of a maximum degree of filling as defined in marginal 3601 (7). The required relief devices shall be fitted in the vapour space.

Special provisions for flexible IBCs

3623 (1) These provisions apply to flexible IBCs intended for the carriage of solids. These IBCs are of the following types:

13H1 woven plastics without coating or liner

13H2 woven plastics, coated

13H3 woven plastics with liner

13H4 woven plastics, coated and with liner

13H5 plastics film

13L1 textile without coating or liner

13L2 textile, coated

13L3 textile with liner

13L4 textile, coated and with liner

13M1 paper, multiwall

13M2 paper, multiwall, water resistant.

(2) Bodies shall be manufactured from suitable materials. The strength of the material and the construction of the flexible IBC shall be appropriate to its capacity and its intended use.

(3) All materials used in the construction of flexible IBCs of types 13M1 and 13M2 shall, after complete immersion in water for not less than 24 hours, retain at least 85 % of the tensile strength as measured originally on the material conditioned to equilibrium at 67 % relative humidity or less.

(4) Seams shall be formed by stitching, heat sealing, gluing or any equivalent method. All stitched seam-ends shall be secured.

(5) Flexible IBCs shall provide adequate resistance to ageing and degradation caused by ultraviolet radiation, climatic conditions or the substance contained, thereby rendering them appropriate to their intended use.

(6) For plastics flexible IBCs, where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the body. Where use is made of carbon black, pigments or inhibitors other than those used in the manufacture of the tested design type, retesting may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

(7) Additives may be incorporated into the material of the body to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

(8) No material recovered from used receptacles shall be used in the manufacture of IBC bodies. Production residues or scrap from the same manufacturing process may, however, be used. Component parts such as fittings and pallet bases may also be used, provided such components have not been damaged in any way in previous use.

(9) When filled, the ratio of height to width shall be not more than 2:1.

(10) The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity of the IBC and the intended use. Joins and closures shall be sift-proof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and carriage.

Special provisions for rigid plastics IBCs

3624 (1) These provisions apply to rigid plastics IBCs intended for the carriage of solids or liquids. These IBCs are of the following types:

11H1 for solids which are loaded and discharged by gravity, fitted with structural equipment designed to withstand the whole load when IBCs are stacked,

11H2 for solids which are loaded and discharged by gravity, freestanding,

21H1 for solids which are loaded or discharged under pressure of more than 10 kPa (0,1 bar), fitted with structural equipment designed to withstand the whole load when IBCs are stacked,

21H2 for solids which are loaded or discharged under pressures of more than 10 kPa (0,1 bar), freestanding,

31H1 for liquids, fitted with structural equipment designed to withstand the whole load when IBCs are stacked,

31H2 for liquids, freestanding.

(2) The body shall be manufactured from suitable plastics material of known specifications and be of adequate strength in relation to its capacity and its intended use.

The material shall be adequately resistant to ageing and to degradation caused by the substance contained or, where relevant, by ultraviolet radiation.

Any permeation of the substance contained shall not constitute a danger under normal conditions of transport.

(3) Where protection against ultraviolet radiation is required, it shall be provided by the addition of carbon black or other suitable pigments or inhibitors. These additives shall be compatible with the contents and remain effective throughout the life of the body. Where use is made of carbon black, pigments or inhibitors, other than those used in the manufacture of the tested design type, retesting may be waived if changes in the carbon black content, the pigment content or the inhibitor content do not adversely affect the physical properties of the material of construction.

(4) Additives may be incorporated in the material of the body to improve the resistance to ageing or to serve other purposes, provided that these do not adversely affect the physical or chemical properties of the material.

(5) No used material other than production residues or regrind from the same manufacturing process may be used in the manufacture of rigid plastics IBCs.

(6) Rigid plastics IBCs for liquids shall be capable of releasing a sufficient amount of vapour to ensure that no rupture of the body will occur. This can be achieved by conventional pressure relief devices or by other constructional means. The start-to-discharge pressure shall not be higher than the pressure used in the hydraulic pressure test.

(7) Unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous liquids shall not exceed five years from the date of manufacture of the receptacle of the IBC except where a shorter period of use is prescribed because of the nature of the liquid to be transported.

Special provisions for composite IBCs with plastics inner receptacle

3625 (1) These provisions apply to composite IBCs intended for the carriage of solids or liquids. These IBCs are of the following types:

(a) 11HZ1 for solids loaded and discharged by gravity, fitted with a rigid plastics inner receptacle;

11HZ2 for solids loaded and discharged by gravity, fitted with a flexible plastics inner receptacle;

21HZ1 for solids loaded or discharged under pressure of more than 10 kPa (0,1 bar), fitted with a rigid plastics inner receptacle;

3625 *(cont'd)*

21HZ2 for solids loaded or discharged under pressure of more than 10 kPa (0,1 bar), fitted with a flexible plastics inner receptacle;

31HZ1 for liquids, fitted with a rigid plastics inner receptacle;

31HZ2 for liquids, fitted with a flexible plastics inner receptacle.

(b) This code shall be completed by replacing the letter Z with a capital letter in accordance with marginal 3611 (1) (b) to indicate the nature of the material used for the outer casing.

(2) *General*

(a) The inner receptacle is not intended to perform a containment function without its outer casing.

(b) The outer casing normally consists of rigid material formed so as to protect the inner receptacle from physical damage during handling and transport but is not intended to perform the containment function; it includes the base pallet where appropriate.

(c) A composite IBC with a fully enclosing outer casing shall be so designed that the integrity of the inner container may be readily assessed following the leakproofness and hydraulic tests.

(3) *Inner receptacle*

The same requirements as provided for in marginal 3624 (2) to (6) for rigid plastics IBCs apply to the inner receptacle, on the understanding that, in this case, the requirements applicable to the body of rigid plastics IBCs are applicable to the inner receptacle of composite IBCs.

(4) *Outer casing*

(a) The strength of the material and the construction of the outer casing shall be appropriate to the capacity of the composite IBC and its intended use.

(b) The outer casing shall be free of any projection that might damage the inner receptacle.

(c) Full-walled or mesh-formed metal outer casings shall be constructed of a suitable material of adequate thickness.

(d) Outer casings of natural wood shall be of well seasoned wood, commercially dry and free from defects that would materially lessen the strength of any part of the casing. The tops and bottoms may be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

(e) Outer casings of plywood shall be made of well seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the casing. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used with plywood for the construction of casings. Casings shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

(f) The walls of outer casings of reconstituted wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type. Other parts of the casings may be made of other suitable material.

(g) For fireboard outer casings, strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used appropriate to the capacity of the casing and to its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in test carried out over 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m^2 — see ISO International Standard 535-1976 (E). It shall have proper bending qualities. Fibreboard shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard shall be firmly glued to the facings.

(h) The ends of fibreboard casings may have a wooden frame or be entirely of wood. Reinforcements of wooden battens may be used.

3625 *(cont'd)*

(i) Manufacturing joins in the fibreboard casings shall be taped, lapped and glued, or lapped and stitched with metal staples. Lapped joins shall have an appropriate overlap. Where closing is effected by gluing or taping, a water-resistant adhesive shall be used.

(j) Where the outer casing is of plastics material, the relevant provisions of marginal 3624 (2) to (5) for rigid plastics IBCs apply, on the understanding that, in this case, the requirements applicable to the body of rigid plastics IBCs are applicable to the outer casing of composite IBCs.

(5) *Other structural equipment*

(a) Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling of the IBC filled to its maximum permissible gross mass.

(b) The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to cause damage in handling.

(c) The outer casing shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the IBC.

(d) Strengthening devices such as timber supports to increase stacking performance may be used, but shall be external to the inner receptacle.

(e) Where IBCs are intended for stacking the bearing surface shall be such as to distribute the load in a safe manner. Such IBCs shall be designed so that the load is not supported by the inner receptacle.

(6) Unless otherwise approved by the competent authority, the period of use permitted for the transport of dangerous liquids shall not exceed five years from the date of manufacture of the receptacle of the IBC except where a shorter period of use is prescribed because of the nature of the liquid to be transported.

Special provisions for fibreboard IBCs

3626 (1) These provisions apply to fibreboard IBCs for the carriage of solids which are loaded and discharged by gravity. Fibreboard IBCs are of the following type: 11G.

(2) Fibreboard IBCs shall not incorporate top lifting devices.

(3) *Body*

(a) Strong and good quality solid or double-faced corrugated fibreboard (single or multiwall) shall be used, appropriate to the capacity of the IBC and its intended use. The water resistance of the outer surface shall be such that the increase in mass, as determined in a test carried out over a period of 30 minutes by the Cobb method of determining water absorption, is not greater than 155 g/m^2 — see the International Standard ISO 535:1991. The fibreboard shall have proper bending qualities. It shall be cut, creased without scoring, and slotted so as to permit assembly without cracking, surface breaks or undue bending. The fluting of corrugated fibreboard shall be firmly glued to the facings.

(b) The walls, including top and bottom, shall have a minimum puncture resistance of 15 J measured according to ISO International Standard 3036: 1975.

(c) Manufacturing joins in the body of IBCs shall be made with an appropriate overlap and shall be taped, glued, stitched with metal staples, or fastened by other means at least equally effective. Where joins are effected by glueing or taping, a water-resistant adhesive shall be used. Metal staples shall pass completely through all pieces to be fastened and be formed or protected so that any inner liner cannot be abraded or punctured by them.

(4) *Liner*

The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity and intended use of the IBC. Joins and closures shall be siftproof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

3626 (cont'd)

(5) *Structural equipment*

(a) Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling of the IBC filled to its maximum permissible mass.

(b) The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to damage in handling.

(c) The body shall be secured to any detachable pallet to ensure stability in handling and transport. Where a detachable pallet is used, its top surface shall be free from sharp protrusions that might damage the IBC.

(d) Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

(e) Where IBCs are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

Special provisions for wooden IBCs

3627 (1) These provisions apply to wooden IBCs for the carriage of solids which are loaded and discharged by gravity. Wooden IBCs are of the following types:

11C Natural wood with inner liner;
11D Plywood with inner liner;
11F Reconstituted wood with inner liner.

(2) Wooden IBCs shall not incorporate top lifting devices.

(3) *Body*

(a) The strength of the materials used and the method of construction shall be appropriate to the capacity and intended use of the IBC.

(b) If bodies are of natural wood, this shall be well seasoned, commercially dry and free from defects that would materially lessen the strength of any part of the IBC. Each part of the IBC shall consist of one piece or be equivalent thereto. Parts are considered equivalent to one piece when:

— a suitable method of glued assembly (as for instance Lindermann joint, tongue and groove joint, ship-lap or rabbet joint),

— butt joint with at least two corrugated metal fasteners at each joint,

— or other methods at least equally effective, are used.

(c) If bodies are of plywood, this shall be at least 3-ply. It shall be made of well-seasoned rotary cut, sliced or sawn veneer, commercially dry and free from defects that would materially lessen the strength of the body. All adjacent plies shall be glued with water-resistant adhesive. Other suitable materials may be used with plywood for the construction of the body.

(d) Bodies of reconstituted wood shall be made of water-resistant reconstituted wood such as hardboard, particle board or other suitable type.

(e) IBCs shall be firmly nailed or secured to corner posts or ends or be assembled by equally suitable devices.

(4) *Liner*

The liner shall be made of a suitable material. The strength of the material used and the construction of the liner shall be appropriate to the capacity and intended use of the IBC. Joins and closures shall be siftproof and capable of withstanding pressures and impacts liable to occur under normal conditions of handling and transport.

(5) *Structural equipment*

(a) Any integral pallet base forming part of an IBC or any detachable pallet shall be suitable for mechanical handling of the IBC filled to its maximum permissible gross mass.

3627 *(cont'd)*

(b) The pallet or integral base shall be designed so as to avoid any protrusion of the base of the IBC that might be liable to damage in handling.

(c) The body shall be secured to any detachable pallet to ensure stability in handling and transport. The top surface of the detachable pallet shall be free from sharp protrusions that might damage the IBC.

(d) Strengthening devices such as timber supports to increase stacking performance may be used but shall be external to the liner.

(e) Where IBCs are intended for stacking, the bearing surface shall be such as to distribute the load in a safe manner.

3628-3649

Section 4

Test requirements for IBCs

A. Design type tests

General requirements

3650 (1) The design type of each IBC shall be tested and approved by the competent authority or by a body designated by that authority.

(2) For each design type, a single IBC shall successfully be subjected to the tests listed in (5) below in the order mentioned in the table and according to the provisions specified in marginals 3652 to 3660, (and, for flexible IBCs, in accordance with the procedures established by the competent authority) before such an IBC is used. An IBC design type is defined by the design, size, material and thickness, manner of construction and means of filling and discharging but may include various surface treatments. It also includes IBCs which differ from the design type only in their lesser external dimensions.

The competent authority may nevertheless authorize the selective testing of IBCs which differ from a type already tested only in minor respects, for example, slight reductions in the external dimensions.

(3) Tests shall be carried out on IBCs prepared as for dispatch. IBCs shall be filled as indicated for the various tests. The substances to be carried in the IBCs may be replaced by other substances, except where this would invalidate the results of the tests. For solids, if another substance is used, it shall have the same physical characteristics (mass, grain size, etc.) as thesubstance to be carried. It is permissible to use additives, such as bags of lead shot, to achieve the requisite total package mass, provided they are placed so that the test results are not affected.

(4) In the drop tests for liquids, if another substance is used, its relative density and viscosity shall be similar to those of the substance to be carried. Water may also be used for the liquid drop test under the following conditions:

(a) if the substances to be carried have a relative density not exceeding 1.2, the drop heights shall be those shown under the relevant sections for the various types of IBC;

(b) where the substances to be carried have a relative density exceeding 1.2, the drop heights shall calculated on the basis of the relative density (d) of the substance to be carried rounded up to the first decimal as follows:

Packing Group I	Packing Group II	Packing Group III
d x 1,5 m	d x 1,0 m	d x 0,67 m

3650 (cont'd) (5) Tests required for every IBC design type.

Each × indicates that the IBC category shown at the head of the column has to be subjected to the test indicated on the line in question, in the order listed.

	Metal IBCs	Flexible IBCs	Rigid plastics IBCs	Composite IBCs with plastics inner receptacle	Fibre-board IBCs	Wooden IBCs
Bottom lift	× (a)		×	×	×	×
Top lift	× (a)	× (d)	× (a)	× (a)		
Tear		×				
Stacking	×	×	×	×	×	×
Leakproofness	× (e)		× (e)	× (e)		
Internal hydraulic pressure	× (b)		× (b)	× (b)		
Drop	× (c)	×	×	× (c)	×	×
Topple		×				
Righting		× (d)				

(a) For IBCs designed to be handled in this way.
(b) The internal hydraulic pressure test is not required for IBCs of type 11A, 11B, 11N, 11H1, 11H2, 11HZ1 or 11HZ2.
(c) Another IBC of the same design may be used for the drop test.
(d) When the IBCs are designed to be lifted from the top or from the side.
(e) The leakproofness test is not required for IBCs of type 11A, 11B, 11N, 11H1, 11H2, 11HZ1 or 11HZ2.

Preparation of IBCs for testing

3651 (1) Flexible IBCs, fibreboard IBCs and composite IBCs with fibreboard outer casing

Paper IBCs, fibreboard IBCs and composite IBCs with fibreboard outer casings shall be conditioned for at least 24 hours in an atmosphere having a controlled temperature and relative humidity (r.h.). There are three options, one of which shall be chosen. The preferred atmosphere is 23 °C ± 2 °C and 50 % ± 2 % r.h. The other two options are 20 °C ± 2 °C and 65 % ± 2 % r.h. or 27 °C ± 2 °C and 65 % ± 2 % r.h.

Note: These values correspond to average values. In the short term the relative humidity values may vary by ± 5 % without this having an influence on the test.

(2) Rigid plastics IBCs and composite IBCs with plastics inner receptacle

Steps shall be taken to ascertain that the plastics material used in the manufacture of rigid plastics IBCs and composite IBCs complies with the provisions of marginal 3624.

To prove there is sufficient chemical compatibility with the contained goods, the sample IBC shall be subjected to a preliminary storage for six months, during which the samples remain filled with the substances they are intended to contain or with substances which are known to have at least as severe a stress-cracking, weakening or molecular degradation effect on the plastics materials in question, and after which the samples shall be subjected to the applicable tests listed in marginal 3650 (5).

Where the behaviour of the plastics material has been established by other means, the above compatibility test may be dispensed with. Such procedures shall be at least equivalent to the above compatibility test and be recognized by the competent authority.

Testing procedures

3652 Bottom lift test

(1) *Applicability*

For all types of IBC which are fitted with means of lifting from the base.

3652 (cont'd)

(2) *Preparation of IBCs for test*

The IBC shall be filled to 1,25 times its maximum permissible gross mass, the load being evenly distributed.

(3) *Method of testing*

The IBC shall be raised and lowered twice by a lift truck with the forks centrally positioned and spaced at three quarters of the dimension of the side of entry (unless the points of entry are fixed). The forks shall penetrate to three quarters of the direction of entry. The test shall be repeated from each possible direction of entry.

(4) *Criteria for passing the test*

No permanent deformation which renders the IBC (including the pallet base for composite IBCs with plastics inner receptacle, fibreboard IBCs and wooden IBCs) unsafe for transport and no loss of contents.

3653 Top lift test

(1) *Applicability*

For all types of IBC which are fitted with means of lifting from the top or, where appropriate, from the side for flexible IBCs.

(2) *Preparation of IBCs for test*

Metal IBCs, rigid plastics IBCs and composite IBCs with plastics inner receptacle:

The IBC shall be filled to twice its maximum permissible gross mass.

Flexible IBCs:

The IBC shall be filled to six times its maximum permissible load, the load being evenly distributed.

(3) *Method of testing*

Metal and flexible IBCs:

The IBC shall be lifted in the manner for which it is designed until it is clear of the floor and maintained in that position for a period of five minutes.

For flexible IBCs other methods of top lift testing and preparation at least equally effective may be used.

Rigid plastics IBCs and composite IBCs with plastics inner receptacle:

The IBC shall be lifted by each pair of diagonally opposite lifting devices, so that the hoisting forces are applied vertically, for a period of five minutes; and

The IBC shall be lifted by each pair of diagonally opposite lifting devices, so that the hoisting forces are applied towards the centre at 45° to the vertical, for a period of five minutes.

(4) *Criteria for passing the test*

Metal IBCs, rigid plastics IBCs, composite IBCs with plastics inner receptacle:

No permanent deformation which renders the IBC (including the pallet base for composite IBCs) unsafe for transport and no loss of contents.

Flexible IBCs:

No damage to the IBC or its lifting devices which renders the IBC unsafe for transport or handling.

3654 Tear test

(1) *Applicability*

For all types of flexible IBCs.

3654 (cont'd)

(2) *Preparation of IBCs for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible load, the load being evenly distributed.

(3) *Method of testing*

Once the IBC is placed on the ground, a 100 mm knife score, completely penetrating the wall of a wide face, is made at a 45° angle to the principal axis of the IBC, halfway between the bottom surface and the top level of contents. The IBC shall then be subjected to a uniformly distributed superimposed load equivalent to twice the maximum permissible load. The load shall be applied for at least five minutes.

IBCs which are designed to be lifted from the top or the side shall then, after removal of the superimposed load, be lifted clear of the floor and maintained in that position for a period of five minutes. Other equivalent methods may be used.

(4) *Criterion for passing the test*

The cut shall not propagate more than 25 % of its original length.

3655 Stacking test

(1) *Applicability*

For all types of IBC.

(2) *Preparation of IBCs for test*

All categories of IBC other than flexible IBCs:

The IBC shall be filled to its maximum permissible gross mass.

Flexible IBCs:

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible load, the load being evenly distributed.

(3) *Method of testing*

The IBC shall be placed on its base on level hard ground and subjected to a uniformly distributed superimposed test load (see (4) below).

Categories and Types of IBC	Testing time
— Metal IBCs	5 minutes
— Flexible IBCs, rigid plastics IBCs of types 11H1, 21H1 and 31H1 — Composite IBCs with plastics inner receptacle of types 11HZ1, 21HZ1 and 31HZ1 — Fibreboard IBCs, wooden IBCs	24 hours
— Rigid plastics IBCs of types 11H2, 21H2 and 31H2 — Composite IBCs with plastics inner receptacle of types 11HZ2, 21HZ2 and 31HZ2	28 days at 40 °C

For all categories of IBC other than metal IBCs, the superimposed test load shall be applied by one of the following methods:

— one or more IBCs of the same type loaded to their maximum permissible gross mass (maximum permissible load in the case of flexible IBCs) are stacked on the test IBC;

— appropriate weights are loaded on to a flat plate or a reproduction of the base of the IBC, which is placed on the test IBC.

3655 (cont'd)

(4) *Calculation of superimposed test load*

The load to be placed on the IBC shall be at least 1,8 times the combined maximum permissible gross mass of the number of similar IBCs that may be stacked on top of the IBC during carriage.

(5) *Criteria for passing the test*

— IBCs other than flexible IBCs:

No permanent deformation which renders the IBC (including the pallet base for composite IBCs, fibreboard IBCs or wooden IBCs) unsafe for transport and no loss of contents.

— Flexible IBCs:

No deterioration of the body which renders the IBC unsafe for transport and no loss of contents.

3656 Leakproofness test

(1) *Applicability*

For all types of metal IBC and for types of plastics IBC and composite IBCs with plastics inner receptacle for the transport of solids loaded or discharged under pressure or for the transport of liquids.

(2) *Preparation of IBCs for test*

Vented closures shall either be replaced by similar non-vented closures or the vent shall be sealed. In addition, for metal IBCs, the design type test shall be carried out before the fitting of any thermal insulation equipment.

For this test the IBC need not have its closures fitted. The inner receptacle of composite IBCs may be tested without the outer packaging provided the test results are not affected.

(3) *Method of testing and pressure to be applied*

The test shall be carried out for a period of at least 10 minutes using air at a constant gauge pressure of not less than 20 kPa (0,2 bar). The airtightness of the IBC shall be determined by a suitable method such as the air-pressure differential test or by immersing the IBC in water. In the latter case a correction factor shall be applied for the hydrostatic pressure. Other methods at least as effective may be used for rigid plastics IBCs and for composite IBCs.

(4) *Criterion for passing the test*

No leakage of air.

3657 Internal (hydraulic) pressure test

(1) *Applicability*

For IBCs of types:

— 21A, 21B, 21N, 31A, 31B, 31N

— 21H1, 21H2, 31H1, 31H2

— 21HZ1, 21HZ2, 31HZ1, 31HZ2.

(2) *Preparation of IBCs for test*

Pressure relief devices shall be removed and their apertures plugged, or shall be rendered inoperative. In addition, for metal IBCs, the test shall be carried out before the fitting of any thermal insulation equipment.

3657 (cont'd)

(3) *Method of testing*

The test shall be carried out for a period of at least 10 minutes applying a hydraulic pressure not less than that indicated in (4). The IBCs shall not be mechanically restrained during the test.

(4) *Pressures to be applied*

(a) Metal IBCs:

1. For IBCs of types 21A, 21B and 21N, for Packing Group I solids, a 250 kPa (2,5 bar) gauge pressure;
2. For IBCs of types 21A, 21B, 21N, 31A, 31B and 31N, for Packing Group II or III substances, a 200 kPa (2 bar) gauge pressure;
3. In addition, for IBCs of types 31A, 31B and 31N, a 65 kPa (0,65 bar) gauge pressure. This test shall be performed before the 2 bar test.

(b) Rigid plastics IBCs and composite IBCs with inner plastics receptacle:

1. For IBCs of types 21H1, 21H2, 21HZ1 and 21HZ2: a gauge pressure of 75 kPa (0,75 bar);
2. For IBCs of types 31H1, 31H2, 31HZ1 and 31HZ2: whichever is the greater of the values under (i) or (ii):

(i) The total gauge pressure measured in the IBC (i.e. the vapour pressure of the filling substance and the partial pressure of the air or other inert gases, minus 100 kPa) at 55 °C multiplied by a safety factor of 1.5; this total gauge pressure shall be determined on the basis of a maximum degree of filling in accordance with 3601 (7) and a filling temperature of 15 °C; or

1,75 times the vapour pressure at 50 °C of the substance to be carried minus 100 kPa, but with a minimum test pressure of 100 kPa; or

1,5 times the vapour pressure at 55 °C of the substance to be carried minus 100 kPa; but with a minimum test pressure of 100 kPa;

(ii) twice the static pressure of the substance to be carried, with a minimum of twice the static pressure of water.

(5) *Criteria for passing the test(s)*

— Metal IBCs:

For IBCs of types 21A, 21B, 21N, 31A, 31B and 31N, when subjected to the test pressure specified in (4) (a) 1. or 2.: no leakage.

For IBCs of types 31A, 31B and 31N, when subjected to the test pressure specified in (4) (a) 3.: neither permanent deformation which would render the IBC unsafe for carriage, nor leakage.

— Rigid plastics IBCs and composite IBCs:

Neither permanent deformation which would render the IBC unsafe for transport, nor loss of contents.

3658 Drop test

(1) *Applicability*

For all types of IBC.

(2) *Preparation of IBCs for test*

The IBC shall be filled:

— For solids, to not less than 95 % of its capacity,

— For liquids, to not less than 98 % of its capacity in the case of metal IBCs or rigid plastics IBCs, and to not less than 90 % of its capacity in the case of composite IBCs with plastics inner receptacle.

3658 *(cont'd)*

The IBC shall further be filled to its maximum permissible load in accordance with the design type.

For metal IBCs, rigid plastics IBCs and composite IBCs with plastics inner receptacle, pressure relief devices shall be removed and their apertures plugged, or shall be rendered inoperative.

For rigid plastics IBCs and composite IBCs with plastics inner receptacle, testing shall be carried out when the temperature of the test sample and its contents has been reduced to – 18 °C or lower. Where test samples are prepared in this way, the conditioning specified in 3651 (2) may be waived.

Test liquids shall be kept in the liquid state, if necessary by the addition of anti-freeze.

This conditioning may be disregarded if the ductility and tensile strength of the materials in question are not significantly reduced at – 18 °C or lower.

(3) *Method of testing*

The IBC shall be dropped on to a rigid, non-resilient, smooth, flat and horizontal surface, on its base (for flexible IBCs) or in such a manner as to ensure that the point of impact is on that part of the base of the IBC considered to be the most vulnerable (for all other types of IBC).

IBCs of 0,45 m^3 or less capacity shall also be subject to a drop test on the most vulnerable part other than the part of the base of the IBC tested in the first drop (for metal IBCs); on the most vulnerable side (for flexible IBCs); flat on a side, flat on the top and on a corner (for all other types of IBC). The same or different IBCs may be used for each drop.

(4) *Drop height*

Packing Group I	Packing Group II	Packing Group III
1,8 m	1,2 m	0,8 m

(5) *Criteria for passing the test*

All IBCs:

No loss of contents.

IBCs other than metal IBCs:

A slight discharge from closures (or stitch holes in the case of flexible IBCs) upon impact shall not be considered to be a failure of the IBC, provided that no further leakage occurs.

3659 Topple test

(1) *Applicability*

For all types of flexible IBCs.

(2) *Preparation of IBCs for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible load, the load being evenly distributed.

(3) *Method of testing*

The IBC shall be caused to topple on to any part of its top on to a rigid, non-resilient, smooth, flat and horizontal surface.

3659 (cont'd)

(4) *Topple height*

Packing Group I	Packing Group II	Packing Group III
1,8 m	1,2 m	0,8 m

(5) *Criteria for passing the test*

No loss of contents. A very slight discharge, e.g. from closures or stitch holes, upon impact shall not be considered to be a failure of the IBC, provided that no further leakage occurs.

3660 Righting test

(1) *Applicability*

For all IBCs designed to be lifted from the top or side.

(2) *Preparation of IBCs for test*

The IBC shall be filled to not less than 95 % of its capacity and to its maximum permissible load, the load being evenly distributed.

(3) *Method of testing*

The IBC, lying on its side, shall be lifted at a speed of at least 0,1 m/s to upright position, clear of the floor, by one lifting device, or by two lifting devices when four are provided.

(4) *Criterion for passing the test*

No damage to the IBC or its lifting devices which renders the IBC unsafe for transport or handling.

3661 Test report

(1) A test report containing at least the following particulars shall be drawn up and shall be available to the users of the IBC:

1. Name and address of the test facility;
2. Name and address of the applicant (where appropriate);
3. A unique test report identification;
4. Date of the test report;
5. Manufacturer of the IBC;
6. Description of the IBC design type (e.g. dimensions, materials, closures, thickness, etc.) including method of manufacture (e.g. blow moulding) and which may include drawing(s) and/or photograph(s);
7. Maximum capacity;
8. Characteristics of test contents, e.g. viscosity and relative density for liquids and particle size for solids;
9. Test descriptions and results;
10. The test report shall be signed with the name and status of the signatory.

3661 (cont'd) (2) The test report shall contain statements that the IBC prepared as for carriage was tested in accordance with the appropriate provisions of Appendix A.6 and that the use of other packaging methods or components may render it invalid. A copy of the test report shall be available to the competent authority.

B. Tests and inspection for every metal IBC, rigid plastics IBC and composite IBC with plastics inner receptacle

Initial and periodic tests

3662 (1) All metal IBCs of type 21A, 21B, 21N, 31A, 31B and 31N, all rigid plastics IBCs of type 21H1, 21H2, 31H1 and 31H2 and all composite IBCs with plastics inner receptacle of type 21HZ1, 21HZ2, 31HZ1 and 31HZ2 shall successfully undergo the leakproofness test, and be capable of meeting the appropriate levels according to marginal 3656 (3) before they are used for carriage for the first time.

(2) The leakproofness test referred to in (1) shall be repeated

— at least once every two and a half years,

— after any repair, before it is reused for carriage.

(3) The results of the tests shall be entered in the test reports to be kept by the owner of the IBC.

Inspection

3663 (1) All metal IBCs, all rigid plastics IBCs and all composite IBCs with plastics inner receptacle shall be inspected to the satisfaction of the competent authority before they are put into service, and thereafter at intervals not exceeding five years, with regard to:

— conformity to design type including marking;

— internal and external condition;

— proper functioning of service equipment.

For metal IBCs, thermal insulation need be removed only to the extent necessary for a proper examination of the IBC body.

(2) All IBCs referred to in (1) shall be visually inspected to the satisfaction of the competent authority after not more than two and a half years, with reference to the external condition of the IBC and the proper functioning of service equipment.

For metal IBCs, the insulation need be removed only if this is essential for a proper examination of the IBC body.

(3) Every inspection shall be the subject of a report which shall be kept by the owner at least until the following inspection date.

(4) If the structural characteristics of an IBC have been impaired by a violent impact (for example, an accident) or other cause, the IBC shall be repaired and subjected to the leakproofness test according to marginal 3656, if it is required for the design type, and to the inspection prescribed in paragraph (1) above.

3664-3699

APPENDIX A.7

PROVISIONS RELATING TO RADIOACTIVE MATERIAL OF CLASS 7

This Appendix comprises:

Sections:

I Activity and fissile material limits

II Preparation provisions and controls for shipment and for storage in transit

III Provisions for radioactive material, for packaging and packages and test procedures

IV Approval and administrative provisions

V Radioactive material having other hazardous properties

SECTION I

Activity and fissile material limits

Basic A_1 and A_2 values

3700 A_1/A_2 values for radionuclides are given in table I.

TABLE I

A_1 and A_2 values for radionuclides

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{225}Ac (2)	Actinium (89)	0,6	10	1×10^{-2}	2×10^{-1}
^{227}Ac		40	1 000	2×10^{-5}	5×10^{-4}
^{228}Ac		0,6	10	0,4	10
^{105}Ag	Silver (47)	2	50	2	50
$^{108}Ag^{m}$		0,6	10	0,6	10
$^{110}Ag^{m}$		0,4	10	0,4	10
^{111}Ag		0,6	10	0,5	10
^{26}Al	Aluminium (13)	0,4	10	0,4	10
^{241}Am	Americium (95)	2	50	2×10^{-4}	5×10^{-3}
^{242}Am		2	50	2×10^{-4}	5×10^{-3}
^{243}Am		2	50	2×10^{-4}	5×10^{-3}
^{37}Ar	Argon (18)	40	1 000	40	1 000
^{39}Ar		20	500	20	500
^{41}Ar		0,6	10	0,6	10
^{42}Ar (2)		0,2	5	0,2	5
^{72}As	Arsenic (33)	0,2	5	0,2	5
^{73}As		40	1 000	40	1 000
^{74}As		1	20	0,5	10
^{76}As		0,2	5	0,2	5
^{77}As		20	500	0,5	10
^{211}At	Astatine (85)	30	800	2	50
^{193}Au	Gold (79)	6	100	6	100
^{194}Au		1	20	1	20
^{195}Au		10	200	10	200
^{196}Au		2	50	2	50
^{198}Au		3	80	0,5	10
^{199}Au		10	200	0,9	20

3700 *(cont'd)*

Symbol of radionuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{131}Ba	Barium (56)	2	50	2	50
$^{133}Ba^{m}$		10	200	0,9	20
^{133}Ba		3	80	3	80
^{140}Ba (2)		0,4	10	0,4	10
^{7}Be	Beryllium (4)	20	500	20	500
^{10}Be		20	500	0,5	10
^{205}Bi	Bismuth (83)	0,6	10	0,6	10
^{206}Bi		0,3	8	0,3	8
^{207}Bi		0,7	10	0,7	10
$^{210}Bi^{m}$ (2)		0,3	8	3×10^{-2}	8×10^{-1}
^{210}		0,6	10	0,5	10
^{212}Bi (2)		0,3	8	0,3	8
^{247}Bk	Berkelium (97)	2	50	2×10^{-4}	5×10^{-3}
^{249}Bk		40	1 000	8×10^{-2}	2
^{76}Br	Bromine (35)	0,3	8	0,3	8
^{77}Br		3	80	3	80
^{82}Br		0,4	10	0,4	10
^{11}C	Carbon (6)	1	20	0,5	10
^{14}C		40	1 000	2	50
^{41}Ca	Calcium (20)	40	1 000	40	1 000
^{45}Ca		40	1 000	0,9	20
^{47}Ca		0,9	20	0,5	10
^{109}Cd	Cadmium (48)	40	1 000	1	20
$^{113}Cd^{m}$		20	500	9×10^{-2}	2
$^{115}Cd^{m}$		0,3	8	0,3	8
^{115}Cd		4	100	0,5	10
^{139}Ce	Cerium (58)	6	100	6	100
^{141}Ce		10	200	0,5	10
^{143}Ce		0,6	10	0,5	10
^{144}Ce (2)		0,2	5	0,2	5
^{248}Cf	Californium (98)	30	800	3×10^{-3}	8×10^{-2}
^{249}Cf		2	50	2×10^{-4}	5×10^{-3}
^{250}Cf		5	100	5×10^{-4}	1×10^{-2}
^{251}Cf		2	50	2×10^{-4}	5×10^{-3}
^{252}Cf		0,1	2	1×10^{-3}	2×10^{-2}
^{253}Cf		40	1 000	6×10^{-2}	1
^{254}Cf		3×10^{-3}	8×10^{-2}	6×10^{-4}	1×10^{-2}
^{36}Cl	Chlorine (17)	20	500	0,5	10
^{38}Cl		0,2	5	0,2	5
^{240}Cm	Curium (96)	40	1 000	2×10^{-2}	5×10^{-1}
^{241}Cm		2	50	0,9	20
^{242}Cm		40	1 000	1×10^{-2}	2×10^{-1}
^{243}Cm		3	80	3×10^{-4}	8×10^{-3}
^{244}Cm		4	100	4×10^{-4}	1×10^{-2}
^{245}Cm		2	50	2×10^{-4}	5×10^{-3}
^{246}Cm		2	50	2×10^{-4}	5×10^{-3}
^{247}Cm		2	50	2×10^{-4}	5×10^{-3}
^{248}Cm		4×10^{-2}	1	5×10^{-5}	1×10^{-3}
^{55}Co	Cobalt (27)	0,5	10	0,5	10
^{56}Co		0,3	8	0,3	8
^{57}Co		8	200	8	200
$^{58}Co^{m}$		40	1 000	40	1 000
^{58}Co		1	20	1	20
^{60}Co		0,4	10	0,4	10
^{51}Cr	Chromium (24)	30	800	30	800

3700 *(cont'd)*

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{129}Cs	Caesium (55)	4	100	4	100
^{131}Cs		40	1 000	40	1 000
^{132}Cs		1	20	1	20
$^{134}Cs^{m}$		40	1 000	9	200
^{134}Cs		0,6	10	0,5	10
^{135}Cs		40	1 000	0,9	20
^{136}Cs		0,5	10	0,5	10
^{137}Cs (2)		2	50	0,5	10
^{64}Cu	Copper (29)	5	100	0,9	20
^{67}Cu		9	200	0,9	20
^{159}Dy	Dysprosium (66)	20	500	20	500
^{165}Dy		0,6	10	0,5	10
^{166}Dy (2)		0,3	8	0,3	8
^{169}Er	Erbium (68)	40	1 000	0,9	20
^{171}Er		0,6	10	0,5	10
^{147}Eu	Europium (63)	2	50	2	50
^{148}Eu		0,5	10	0,5	10
^{149}Eu		20	500	20	500
^{150}Eu		0,7	10	0,7	10
$^{152}Eu^{m}$		0,6	10	0,5	10
^{152}Eu		0,9	20	0,9	20
^{154}Eu		0,8	20	0,5	10
^{155}Eu		20	500	2	50
^{156}Eu		0,6	10	0,5	10
^{18}F	Fluorine (9)	1	20	0,5	10
^{52}Fe (2)	Iron (26)	0,2	5	0,2	5
^{55}Fe		40	1 000	40	1 000
^{59}Fe		0,8	20	0,8	20
^{60}Fe		40	1 000	0,2	5
^{67}Ga	Gallium (31)	6	100	6	100
^{68}Ga		0,3	8	0,3	8
^{72}Ga		0,4	10	0,4	10
^{146}Gd (2)	Gadolinium (64)	0,4	10	0,4	10
^{148}Gd		3	80	3×10^{-4}	8×10^{-3}
^{153}Gd		10	200	5	100
^{159}Gd		4	100	0,5	10
^{68}Ge (2)	Geranium (32)	0,3	8	0,3	8
^{71}Ge		40	1 000	40	1 000
^{77}Ge		0,3	8	0,3	8
^{172}Hf (2)	Hafnium (72)	0,5	10	0,3	8
^{175}Hf		3	80	3	80
^{181}Hf		2	50	0,9	20
^{182}Hf		4	100	3×10^{-2}	8×10^{-1}
^{194}Hg (2)	Mercury (80)	1	20	1	20
^{185}Hg		5	100	5	100
$^{197}Hg^{m}$		10	200	0,9	20
^{197}Hg		10	200	10	200
^{203}Hg		4	100	0,9	20
^{163}Ho	Holmium (67)	40	1 000	40	1 000
$^{166}Ho^{m}$		0,6	10	0,3	8
^{166}Ho		0,3	8	0,3	8
^{123}I	Iodine (53)	6	100	6	100
^{124}I		0,9	20	0,9	20
^{125}I		20	500	2	50
^{126}I		2	50	0,9	20
^{129}I		Unlimited		Unlimited	
^{131}I		3	80	0,5	10
^{132}I		0,4	10	0,4	10

3700 *(cont'd)*

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{133}I		0,6	10	0,5	10
^{134}I		0,3	8	0,3	8
^{135}I		0,6	10	0,5	10
^{111}In	Indium (49)	2	50	2	50
$^{113}In^{m}$		4	100	4	100
$^{114}In^{m}$ (2)		0,3	8	0,3	8
$^{115}In^{m}$		6	100	0,9	20
^{189}Ir	Iridium (77)	10	200	10	200
^{190}Ir		0,7	10	0,7	10
^{192}Ir		1	20	0,5	10
$^{193}Ir^{m}$		10	200	10	200
^{194}Ir		0,2	5	0,2	5
^{40}K	Potassium (19)	0,6	10	0,6	10
^{42}K		0,2	5	0,2	5
^{43}K		1	20	0,5	10
^{81}Kr	Krypton (36)	40	1 000	40	1 000
$^{85}Kr^{m}$		6	100	6	100
^{85}Kr		20	500	10	200
^{87}Kr		0,2	5	0,2	5
^{137}La	Lanthanum (57)	40	1 000	2	50
^{140}La		0,4	10	0,4	10
LSA	Low specific activity material [see marginal 2700 (2)]				
^{172}Lu	Lutetium (71)	0,5	10	0,5	10
^{173}Lu		8	200	8	200
$^{174}Lu^{m}$		20	500	8	200
^{174}Lu		8	200	4	100
^{177}Lu		30	800	0,9	20
MFP	For mixed fission products, use formula for mixtures or table II (marginal 3701)				
^{28}Mg (2)	Magnesium (12)	0,2	5	0,2	5
^{52}Mn	Manganese (25)	0,3	8	0,3	8
^{53}Mn		Unlimited		Unlimited	
^{54}Mn		1	20	1	20
^{56}Mn		0,2	5	0,2	5
^{93}Mo	Molybdenum (42)	40	1 000	7	100
^{99}Mo		0,6	10	0,5	10
^{13}N	Nitrogen (7)	0,6	10	0,5	10
^{22}Na	Sodium (11)	0,5	10	0,5	10
^{24}Na		0,2	5	0,2	5
$^{92}Nb^{m}$	Niobium (41)	0,7	10	0,7	10
$^{93}Nb^{m}$		40	1 000	6	100
^{94}Nb		0,6	10	0,6	10
^{95}Nb		1	20	1	20
^{97}Nb		0,6	10	0,5	10
^{147}Nd	Neodymium (60)	4	100	0,5	10
^{149}Nd		0,6	10	0,5	10
^{59}Ni	Nickel (28)	40	1 000	40	1 000
^{63}Ni		40	1 000	30	800
^{65}Ni		0,3	8	0,3	8
^{235}Np	Neptunium (93)	40	1 000	40	1 000
^{236}Np		7	100	1×10^{-3}	2×10^{-2}
^{237}Np		2	50	2×10^{-4}	5×10^{-3}
^{239}Np		6	100	0,5	10
^{185}Os	Osmium (76)	1	20	1	20
$^{191}Os^{m}$		40	1 000	40	1 000
^{191}Os		10	200	0,9	20

3700 *(cont'd)*

Symbol of radionuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{193}Os		0,6	10	0,5	10
^{194}Os (2)		0,2	5	0,2	5
^{32}P	Phosphorus (15)	0,3	8	0,3	8
^{33}P		40	1 000	0,9	20
^{230}Pa	Protactinium (91)	2	50	0,1	2
^{231}Pa		0,6	10	6×10^{-5}	1×10^{-3}
^{233}Pa		5	100	0,9	20
^{201}Pb	Lead (82)	1	20	1	20
^{202}Pb		2	50	2	50
^{203}Pb		3	80	3	80
^{205}Pb		Unlimited		Unlimited	
^{210}Pb (2)		0,6	10	9×10^{-3}	2×10^{-1}
^{212}Pb (2)		0,3	8	0,3	8
^{103}Pd	Palladium (46)	40	1 000	40	1 000
^{107}Pd		Unlimited		Unlimited	
^{109}Pd		0,6	10	0,5	10
^{143}Pm	Promethium (61)	3	80	3	80
^{144}Pm		0,6	10	0,6	10
^{145}Pm		30	800	7	100
^{147}Pm		40	1 000	0,9	20
$^{148}Pm^{m}$		0,5	10	0,5	10
^{149}Pm		0,6	10	0,5	10
^{151}Pm		3	80	0,5	10
^{208}Po	Polonium (84)	40	1 000	2×10^{-2}	5×10^{-1}
^{209}Po		40	1 000	2×10^{-2}	5×10^{-1}
^{210}Po		40	1 000	2×10^{-2}	5×10^{-1}
^{142}Pr	Praseodymium (59)	0,2	5	0,2	5
^{143}Pr		4	100	0,5	10
^{188}Pt (2)	Platinum (78)	0,6	10	0,6	10
^{191}Pt		3	80	3	80
$^{193}Pt^{m}$		40	1 000	9	200
^{193}Pt		40	1 000	40	1 000
$^{195}Pt^{m}$		10	200	2	50
$^{197}Pt^{m}$		10	200	0,9	20
^{197}Pt		20	500	0,5	10
^{236}Pu	Plutonium (94)	7	100	7×10^{-4}	1×10^{-2}
^{237}Pu		20	500	20	500
^{238}Pu		2	50	2×10^{-4}	5×10^{-3}
^{239}Pu		2	50	2×10^{-4}	5×10^{-3}
^{240}Pu		2	50	2×10^{-4}	5×10^{-3}
^{241}Pu		40	1 000	1×10^{-2}	2×10^{-1}
^{242}Pu		2	50	2×10^{-4}	5×10^{-3}
^{244}Pu (2)		0,3	8	2×10^{-4}	5×10^{-3}
^{223}Ra (2)	Radium (88)	0,6	10	3×10^{-2}	8×10^{-1}
^{224}Ra (2)		0,3	8	6×10^{-2}	1
^{225}Ra (2)		0,6	10	2×10^{-2}	5×10^{-1}
^{226}Ra (2)		0,3	8	2×10^{-2}	5×10^{-1}
^{228}Ra (2)		0,6	10	4×10^{-2}	1
^{81}Rb	Rubidium (37)	2	50	0,9	20
^{83}Rb		2	50	2	50
^{84}Rb		1	20	0,9	20
^{86}Rb		0,3	8	0,3	8
^{87}Rb		Unlimited		Unlimited	
Rb(natural)		Unlimited		Unlimited	
^{183}Re	Rhenium (75)	5	100	5	100
$^{184}Re^{m}$		1	20	1	20
^{184}Re		1	20	1	20
^{186}Re		4	100	0,5	10
^{187}Re		Unlimited		Unlimited	
^{188}Re		0,2	5	0,2	5
^{189}Re		4	100	0,5	10

3700 *(cont'd)*

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
Re(natural)		Unlimited		Unlimited	
^{99}Rh	Rhodium (45)	2	50	2	50
^{101}Rh		4	100	4	100
^{102}Rh^{m}		2	50	0,9	20
^{102}Rh		0,5	10	0,5	10
^{103}Rh^{m}		40	1 000	40	1 000
^{105}Rh		10	200	0,9	20
^{222}Rn (2)	Radon (86)	0,2	5	4×10^{-3}	1×10^{-1}
^{97}Ru	Ruthenium (44)	4	100	4	100
^{103}Ru		2	50	0,9	20
^{105}Ru		0,6	10	0,5	10
^{106}Ru (2)		0,2	5	0,2	5
^{35}S	Sulphur (16)	40	1 000	2	50
^{122}Sb	Antimony (51)	0,3	8	0,3	8
^{124}Sb		0,6	10	0,5	10
^{125}Sb		2	50	0,9	20
^{126}Sb		0,4	10	0,4	10
^{44}Sc	Scandium (21)	0,5	10	0,5	10
^{46}Sc		0,5	10	0,5	10
^{47}Sc		9	200	0,9	20
^{48}Sc		0,3	8	0,3	8
SCO	Surface contaminated objects [see marginal 2700 (2)]				
^{75}Se	Selenium (34)	3	80	3	80
^{79}Se		40	1 000	2	50
^{31}Si	Silicon (14)	0,6	10	0,5	10
^{32}Si		40	1 000	0,2	5
^{145}Sm	Samarium (62)	20	500	20	500
^{147}Sm		Unlimited		Unlimited	
^{151}Sm		40	1 000	4	100
^{153}Sm		4	10	0,5	10
^{113}Sn (2)	Tin (50)	4	100	4	100
^{117}Sn^{m}		6	100	2	50
^{119}Sn^{m}		40	1 000	40	1 000
^{121}Sn^{m}		40	1 000	0,9	20
^{123}Sn		0,6	10	0,5	10
^{125}Sn		0,2	5	0,2	5
^{126}Sn (2)		0,3	8	0,3	8
^{82}Sr (2)	Strontium (38)	0,2	5	0,2	5
^{85}Sr^{m}		5	100	5	100
^{85}Sr		2	50	2	50
^{87}Sr^{m}		3	80	3	80
^{89}Sr		0,6	10	0,5	10
^{90}Sr (2)		0,2	5	0,1	2
^{91}Sr		0,3	8	0,3	8
^{92}Sr		0,8	20	0,5	10
T (all forms)	Tritium (1)	40	1 000	40	1 000
^{178}Ta	Tantalum (73)	1	20	1	20
^{179}Ta		30	800	30	800
^{182}Ta		0,8	20	0,5	10
^{157}Tb	Terbium (65)	40	1 000	10	200
^{158}Tb		1	20	0,7	10
^{160}Tb		0,9	20	0,5	10
^{95}Tc^{m}	Technetium (43)	2	50	2	50
^{96}Tc^{m} (2)		0,4	10	0,4	10
^{96}Tc		0,4	10	0,4	10
^{97}Tc^{m}		40	1 000	40	1 000
^{97}Tc		Unlimited		Unlimited	
^{98}Tc		0,7	10	0,7	10
^{99}Tc^{m}		8	200	8	200
^{99}Tc		40	1 000	0,9	20
^{118}Te (2)	Tellurium (52)	0,2	5	0,2	5
^{121}Te^{m}		5	100	5	100

3700 *(cont'd)*

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{121}Te		2	50	2	50
^{123}Te		7	100	7	100
$^{125}Te^{m}$		30	800	9	200
$^{127}Te^{m}$		20	500	0,5	10
^{127}Te		20	500	0,5	10
$^{129}Te^{m}$ (2)		0,6	10	0,5	10
^{129}Te		0,6	10	0,5	10
$^{131}Te^{m}$		0,7	10	0,5	10
^{132}Te (2)		0,4	10	0,4	10
^{227}Th	Thorium (90)	9	200	1×10^{-2}	2×10^{-1}
^{228}Th (2)		0,3	8	4×10^{-4}	1×10^{-2}
^{229}Th		0,3	8	3×10^{-5}	8×10^{-4}
^{230}Th		2	50	2×10^{-4}	5×10^{-3}
^{231}Th		40	1 000	0,9	20
^{232}Th		Unlimited		Unlimited	
^{234}Th (2)		0,2	5	0,2	5
Th (nat)		Unlimited		Unlimited	
^{44}Ti	Titanium (22)	0,5	10	0,2	5
^{200}Tl	Thallium (81)	0,8	20	0,8	20
^{201}Tl		10	200	10	200
^{202}Tl		2	50	2	50
^{204}Tl		4	100	0,5	10
^{167}Tm	Thulium (69)	7	100	7	100
^{168}Tm		0,8	20	0,8	20
^{170}Tm		4	100	0,5	10
^{171}Tm		40	1 000	10	200
^{230}U	Uranium (92)	40	1 000	1×10^{-2}	2×10^{-1}
^{232}U		3	80	3×10^{-4}	8×10^{-3}
^{233}U		10	200	1×10^{-3}	2×10^{-2}
^{234}U		10	200	1×10^{-3}	2×10^{-2}
^{235}U		Unlimited (3)		Unlimited (3)	
^{236}U		10	200	1×10^{-3}	2×10^{-2}
^{238}U		Unlimited		Unlimited	
U(natural)		Unlimited		Unlimited (4)	
U (enriched 5 % or less)		Unlimited (3)		Unlimited (3) (4)	
U (enriched more than 5 %)		10	200	1×10^{-3} (4)	2×10^{-2}
U (depleted)		Unlimited		Unlimited (3) (4)	
^{48}V	Vanadium (23)	0,3	8	0,3	8
^{49}V		40	1 000	40	1 000
^{178}W (2)	Tungsten (74)	1	20	1	20
^{181}W		30	800	30	800
^{185}W		40	1 000	0,9	20
^{187}W		2	50	0,5	10
^{188}W (2)		0,2	5	0,2	5
^{122}Xe (2)	Xenon (54)	0,2	5	0,2	5
^{123}Xe		0,2	5	0,2	5
^{127}Xe		4	100	4	100
$^{131}Xe^{m}$		40	1 000	40	1 000
^{133}Xe		20	500	20	500
^{135}Xe		4	100	4	100
^{87}Y	Yttrium (39)	2	50	2	50
^{88}Y		0,4	10	0,4	10
^{90}Y		0,2	5	0,2	5
$^{91}Y^{m}$		2	50	2	50
^{91}Y		0,3	8	0,3	8
^{92}Y		0,2	5	0,2	5

3700 *(cont'd)*

Symbol of radio-nuclide	Element and atomic number	A_1		A_2	
		TBq	(Ci) [approx. (1)]	TBq	(Ci) [approx. (1)]
^{93}Y		0,2	5	0,2	5
^{169}Yb	Ytterbium (70)	3	80	3	80
^{175}Yb		30	800	0,9	20
^{65}Zn	Zinc (30)	2	50	2	50
$^{69}Zn^{m}$ (2)		2	50	0,5	10
^{69}Zn		4	100	0,5	10
^{88}Zr	Zirconium (40)	3	80	3	80
^{93}Zr		40	1 000	0,2	5
^{95}Zr		1	20	0,9	20
^{97}Zr		0,3	8	0,3	8

(1) The Ci values quoted are obtained by rounding down from the TBq figure after conversion to Ci. This ensures that the magnitude of A_1 or A_2 in Ci is always less than that in TBq.
(2) A_1 and/or A_2 value limited by daughter product decay.
(3) A_1 and/or A_2 are unlimited for radiation control purposes only. For nuclear criticality safety, this material is subject to the control placed on fissile material.
(4) These values do not apply to reprocessed uranium.

Determination of A_1 and A_2

3701 (1) For individual radionuclides whose identities are known, but which are not listed in Table I, the determination of the values of A_1 and A_2 shall require multilateral approval. Alternatively, the values of A_1 and A_2 in Table II may be used without obtaining competent authority approval.

TABLE II

General values for A_1 and A_2

Contents	A_1		A_2	
	TBq	(Ci) (1)	TBq	(Ci) (1)
Only beta or gamma emitting nuclides are known to be present	0,2	5	0,02	0,5
Alpha emitting nuclides are known to be present or no relevant data are available	0,1	2	2×10^{-5}	5×10^{-4}

(1) The curie values quoted are obtained by rounding down from the TBq figure after conversion to Ci.

(2) In the calculations of A_1 and A_2 for a radionuclide not in Table I, a single radioactive decay chain in which the radionuclides are present in their naturally occurring proportions and in which no daughter nuclide has a half-life either longer than 10 days or longer than that of the parent nuclide shall be considered as a single radionuclide, and the activity to be taken into account and the A_1 or A_2 value to be applied shall be those corresponding to the parent nuclide of that chain. In the case of radioactive decay chains in which any daughter nuclide has a half-life either longer than 10 days or greater than that of the parent nuclide, the parent and such daughter nuclides shall be considered as mixtures of different nuclides.

3701 *(cont'd)*

(3) For mixtures of radionuclides whose identities and respective activities are known, the following conditions shall apply:

(a) For special form radioactive material:

$$\Sigma_i \frac{B(i)}{A_1(i)} \text{ less than or equal to 1}$$

(b) For other forms of radioactive material:

$$\Sigma_i \frac{B(i)}{A_2(i)} \text{ less than or equal to 1}$$

where B(i) is the activity of radionuclide i and $A_1(i)$ and $A_2(i)$ are the A_1 and A_2 values for radionuclide i, respectively.

Alternatively, an A_2 value for mixtures may be determined as follows:

$$A_2 \text{ for a mixture} = \frac{1}{\Sigma_i \frac{f(i)}{A_2(i)}}$$

where f(i) is the fraction of activity of nuclide i in the mixture and $A_2(i)$ is the appropriate A_2 value for nuclide i.

(4) When the identity of each radionuclide is known but the individual activities of some of the radionuclides are not known, the radionuclides may be grouped and the lowest A_1 or A_2 value, as appropriate, for the radionuclides in each group may be used in applying the formulas in paragraph (3) above. Groups may be based on the total alpha activity and the total beta/gamma activity when these are known, using the lowest A_1 or A_2 values for the alpha emitters or beta/gamma emitters, respectively.

(5) For individual radionuclides or for mixtures of radionuclides for which adequate data are not available, the values shown in Table II shall be used.

Contents limits for packages

3702 The quantity of radioactive material in a package shall not exceed the relevant limits specified in this marginal.

(1) Excepted packages

(a) For radioactive material other than articles manufactured of natural uranium, depleted uranium or natural thorium, an excepted package shall not contain activities greater than the following:

(i) Where the radioactive material is enclosed in or forms a component part of an instrument or other manufactured article, such as a clock or electronic apparatus, the limits specified in marginal 3713 (4) for each individual item and each package, respectively; and

(ii) Where the radioactive material is not so enclosed or manufactured, the limits specified in marginal 3713 (5).

(b) For articles manufactured of natural uranium, depleted uranium or natural thorium, an excepted package may contain any quantity of such material provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

(2) Industrial packages

The total activity in a single package of LSA material or in a single package of SCO shall be so restricted that the radiation level specified in marginal 3714 (1) shall not be exceeded, and the activity in a single package shall also be so restricted that the activity limits for a vehicle specified in marginal 3714 (6) shall not be exceeded.

3702 (cont'd)

(3) Type A packages

Type A packages shall not contain activities greater than the following:

(a) For special form radioactive material — A_1; or

(b) For all other radioactive material — A_2.

Values for A_1 and A_2 are listed in Tables I and II of marginals 3700 and 3701 respectively.

(4) Type B packages

Type B packages shall not contain:

(a) activities greater than those authorised for the package design,

(b) radionuclides different from those authorised for the package design, or

(c) contents in a form, or a physical or chemical state different from those authorised for the package design, as specified in their certificates of approval.

(5) Packagings containing fissile material

All packagings containing fissile material shall comply with the applicable activity limits for packages specified in paragraphs (1) to (4) above.

Packagings containing fissile material, other than those containing materials which comply with the provisions of marginal 3703 shall not contain:

(a) a mass of fissile material greater than that authorised for the package design,

(b) any radionuclide or fissile material different from those authorised for the package design, or

(c) contents in a form or physical or chemical state, or in a spatial arrangement, different from those authorised for the package design, as specified in their certificates of approval.

3703 Packages meeting one of the conditions of this marginal shall be excepted from the provisions specified in marginal 3741 and from the other provisions of this Appendix that apply specifically to fissile material; such packages, however, shall be regulated as non-fissile radioactive material packages, as applicable, and shall still be subject to those provisions of this Appendix which pertain to their radioactive nature and properties:

(a) Packages containing individually not more than 15 g of fissile material, provided that the smallest external dimension of each package is not less than 10 cm. For unpackaged material, the quantity limitation shall apply to the consignment being carried in or on the vehicle.

(b) Packages containing homogeneous hydrogenous solutions or mixtures satisfying the conditions listed in Table III. For unpackaged material, the quantity limitations in Table III shall apply to the consignment being carried in or on the vehicle.

(c) Packages containing uranium enriched in uranium-235 to a maximum of 1 % by mass, and with a total plutonium and uranium-233 content not exceeding 1 % of the mass of uranium-235, provided that the fissile material is distributed essentially homogeneously throughout the material. In addition, if uranium-235 is present in metallic, oxide, or carbide forms, it shall not form a lattice arrangement within the package.

3703 *(cont'd)*

(d) Packages containing not more than 5 g of fissile material in any 10 litre volume, provided that the radioactive material is contained in packages which will maintain the limitations on fissile material distribution under conditions likely be encountered during routine transport.

(e) Packages containing individually not more than 1 kg of total plutonium, of which not more than 20 % by mass may consist of plutonium-239, plutonium-241, or any combination of those radionuclides.

(f) Packages containing liquid solutions of uranyl nitrate enriched in uranium-235 to a maximum of 2 % by mass, with a total plutonium and uranium-233 content not exceeding 0,1 % of the mass of uranium-235, and with a minimum nitrogen to uranium atomic ratio (N/U) of 2.

TABLE III

Limitations on homogeneous hydrogenous solutions or mixtures of fissile material

Parameters	Uranium-235 only	Any other fissile material (including mixtures)
Minimum H/X (1)	5 200	5 200
Maximum concentration of fissile material (g/l)	5	5
Maximum mass of fissile material in a package or vehicle (g)	800 (2)	500

(1) Where H/X is the ratio of the number of hydrogen atoms to the number of atoms of fissile nuclide.
(2) With a total plutonium and uranium-233 content of not more than 1 % of the mass of uranium-235.

3704-3709

Section II

Preparation provisions and controls for shipment and for storage in transit

Package inspection provisions

3710 (1) Before the first shipment of any package, the following provisions shall be fulfilled:

a) If the design pressure of the containment system exceeds 35 kPa (0,35 bar gauge), it shall be ensured that the containment system of each package conforms to the approved design provisions relating to the capability of that system to maintain its integrity under pressure.

b) For each Type B package and for each packaging containing fissile material, it shall be ensured that the effectiveness of its shielding and containment and, where necessary, the heat transfer characteristics, are within the limits applicable to or specified for the approved design.

c) For each packaging containing fissile material, where, in order to comply with the provisions of marginal 3741, neutron poisons are specifically included as components of the package, tests shall be performed to confirm the presence and distribution of those neutron poisons.

(2) Before each shipment of any package, the following provisions shall be fulfilled:

a) It shall be ensured that lifting attachments which do not meet the provisions of marginal 3732 have been removed or otherwise rendered incapable of being used for lifting the package.

3710 *(cont'd)*

b) For each Type B package and for each packaging containing fissile material, it shall be ensured that all the requirements specified in the approval certificates and the relevant provisions of this Appendix have been satisfied.

c) Each Type B package shall be held until equilibrium conditions have been approached closely enough to demonstrate compliance with the shipment provisions for temperature and pressure unless an exemption from these provisions has received unilateral approval.

d) For each Type B package, it shall be ensured by examination and/or appropriate tests that all closures, valves and other openings of the containment system through which the radioactive contents might escape are properly closed and, where appropriate, sealed in the manner for which the demonstrations of compliance with the provisions of marginal 3738 were made.

Transport of other goods

3711 (1) A package shall not contain any other items except such articles and documents as are necessary for the use of the radioactive material. This provision shall not preclude the transport of low specific activity material or surface contaminated objects with other items. The transport of such articles and documents in a package, or of low specific activity material or surface contaminated objects with other items may be permitted provided that there is no interaction between them and the packaging or its contents that would reduce the safety of the package.

(2) Tanks used for the transport of radioactive material shall not be used for the storage or transport of other goods.

(3) The carriage of other goods with consignments being transported under exclusive use shall be permitted provided the arrangements are controlled only by the consignor and it is not prohibited by other regulations.

(4) Consignments shall be segregated from other dangerous goods during transport and storage in accordance with the provisions of marginal 2703 under heading 7. and 71 403.

(5) Radioactive material shall be sufficiently segregated from undeveloped photographic film. The basis for determining segregation distances for this purpose shall be that the radiation exposure of undeveloped photographic film due to the transport of radioactive material be limited to 0,1 mSv (10 mrem) per consignment of such film in accordance with marginal 2711.

Requirements and controls for contamination and for leaking packages

3712 (1) The non-fixed contamination on the external surfaces of a package shall be kept as low as practicable and, under conditions likely to be encountered in routine transport, shall not exceed the levels specified in Table IV.

(2) In the case of overpacks and containers, the level of non-fixed contamination on the external and the internal surfaces shall not exceed the limits specified in Table IV.

(3) If it is evident that a package is damaged or leaking, or if it is suspected that the package may have leaked or been damaged, access to the package shall be restricted and a qualified person shall, as soon as possible, assess the extent of contamination and the resultant radiation level of the package. The scope of the survey shall include the package, the vehicle, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the vehicle. When necessary, additional steps for the protection of human health, in accordance with provisions established by the competent authority, shall be taken to overcome and minimize the consequences of such leakage or damage.

3712 *(cont'd)*

TABLE IV

Limits of non-fixed contamination on surfaces

Type of package, overpack, container, tank or vehicle and its equipment	Contaminant			
	Limit (1) of beta and gamma emitters and low toxicity alpha emitters		Limit (1) of all other alpha emitters	
	Bq/cm²	(μCi/cm²)	Bq/cm²	(μCi/cm²)
External surfaces of:				
— excepted packages	0,4	(10^{-5})	0,04	(10^{-6})
— other than excepted packages	4	(10^{-4})	0,4	(10^{-5})
External and internal surfaces of overpacks, containers, vehicles and their equipment when carrying or being prepared to carry:				
— Loads including excepted packages and/or non-radioactive goods	0,4	(10^{-5})	0,04	(10^{-6})
— Loads consisting only of radiocative material in packages other than excepted packages	4	(10^{-4})	0,4	(10^{-5})
External surfaces of containers, tanks and vehicles and their equipment used in the carriage of unpackaged radioactive material	4	(10^{-4})	0,4	(10^{-5})

(1) The limits are applicable when averaged over any area of 300 cm² of any part of the surface.

(4) Packages leaking radioactive contents in excess of allowable limits for normal conditions of transport may be removed under supervision but shall not be forwarded until repaired or reconditioned and decontaminated.

(5) A vehicle and equipment used routinely for the carriage of radioactive material shall be periodically checked to determine the level of contamination. The frequency of such checks shall be related to the likelihood of contamination and the extent to which radioactive material is carried.

(6) Except as provided in paragraph (7) below, any vehicle, equipment, or part thereof which has become contaminated above the limits specified in Table IV or which shows radiation level in excess of 5 μSv/h (0,5 mrem/h) in the course of the carriage of radioactive material shall be decontaminated as soon as possible by a qualified person and shall not be re-used unless the non-fixed radioactive contamination does not exceed the levels specified in Table IV, and the radiation level resulting from the fixed contamination on surfaces after decontamination is less than 5 μSv/h (0,5 mrem/h).

(7) An overpack, container or vehicle dedicated to the transport of low specific activity material or surface contaminated objects under exclusive use shall be excepted from paragraphs (2) and (6) above solely with regard to its internal surface and only for as long as it remains under that specific exclusive use.

Requirements and controls for transport of excepted packages

3713 (1) Excepted packages shall be subject only to the following provisions:

(a) In sections II, III and V, only the provisions specified in:

(i) paragraphs (2) to (6) of this marginal, as applicable, and marginal 3770 and

(ii) the general provisions for all packagings and packages specified in marginal 3732;

(b) If the excepted package contains fissile material, the provisions of marginal 3703.

(c) The provision of marginal 2705 (1).

3713 *(cont'd)*

(2) The radiation level at any point on the external surface of an excepted package shall not exceed 5 μSv/h (0,5 mrem/h).

(3) The non-fixed radioactive contamination on any external surface of an excepted package shall not exceed the limits specified in Table IV.

(4) Radioactive material which is enclosed in or forms a component part of an instrument or other manufactured article, with activity not exceeeding the item and package limits specified in columns 2 and 3 respectively in Table V, may be transported in an excepted package provided that:

(a) the radiation level at 10 cm from any point on the external surface of any unpackaged instrument or article is not greater than 0,1 mSv/h (10 mrem/h), and

(b) each instrument or article (except radioluminescent time-pieces or devices) bears the marking 'Radioactive'.

TABLE V

Activity limits for excepted packages

Physical state of contents	Instruments and articles		Material
	Item limits	Package limits	Package limits
Solids			
— special form	10^{-2} A_1	A_1	10^{-3} A_1
— other forms	10^{-2} A_2	A_2	10^{-3} A_1
Liquids	10^{-3} A_2	10^{-1} A_2	10^{-4} A_2
Gases			
— tritium	2×10^{-2} A_2	2×10^{-1} A_2	2×10^{-2} A_2
— special form	10^{-3} A_1	10^{-2} A_1	10^{-3} A_1
— other forms	10^{-3} A_2	10^{-2} A_2	10^{-3} A_2

Note: For mixtures of radionuclides, see marginal 3701 (3) to (5).

(5) Radioactive material in forms other than as specified in paragraph (4) above, with an activity not exceeding the limit specified in column 4 of Table V, may be transported in an excepted package provided that:

(a) the package retains its contents under conditions likely to be encountered in routine transport, and

(b) the package bears the marking 'Radioactive' on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package.

(6) A manufactured article in which the sole radioactive material is unirradiated natural uranium, unirradiated depleted uranium or unirradiated natural thorium may be transported as an excepted package provided that the outer surface of the uranium or thorium is enclosed in an inactive sheath made of metal or some other substantial material.

Requirements and controls for transport of LSA material and SCO in industrial packages or unpackaged

3714 (1) The quantity of LSA material or SCO in a single industrial package (IP-1, IP-2 or IP-3) or object or collection of objects, whichever is appropriate, shall be so restricted that the external radiation level at 3 m from the unshielded material or object or collection of objects does not exceed 10 mSv/h (1 000 mrem/h).

(2) LSA material and SCO which is or contains fissile material shall meet the applicable provisions of marginals 2714 (2) and (3) and 3741.

3714 *(cont'd)*

(3) Packages, including tanks or containers, containing LSA material or SCO shall be subject to the provisions of marginal 3712 (1) and (2).

(4) LSA material and SCO in groups LSA-I and SCO-I may be transported unpackaged under the following conditions:

(a) All unpackaged material other than ores containing only naturally occurring radionuclides shall be transported in such a manner that under conditions likely to be encountered in routine transport there will be no escape of the contents from the vehicle nor will there be any loss of shielding.

(b) Each vehicle shall be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than ten times the applicable level specified in marginal 2700 (2).

(c) For SCO-I where it is suspected that non-fixed contamination exists on inaccessible surfaces in excess of the values specified in marginal 2700 (2), measures shall be taken to ensure that the radioactive material is not released into the vehicle.

(5) LSA material and SCO, except as otherwise specified in paragraph (4) above, shall be packaged in accordance with the package integrity levels specified in table VI in such a manner that, under conditions likely to be encountered in routine transport, there will be no escape of contents from packages, nor will there be any loss of shielding afforded by the packaging. LSA-IImaterial, LSA-III material and SCO-II shall not be transported unpackaged.

TABLE VI

Industrial package provisions for LSA material and SCO

Contents	Industrial package type (1)	
	Exclusive use	Not under exclusive use
LSA-I (2)		
— Solid	IP-1	IP-1
— Liquid	IP-1	IP-2
LSA-II		
— Solid	IP-2	IP-2
— Liquid and gas	IP-2	IP-3
LSA-III	IP-2	IP-3
SCO-I (2)	IP-1	IP-1
SCO-II	IP-2	IP-2

(1) See marginal 2700 (2).
(2) Under the conditions specified in paragraph (4) above, LSA-material and SCO-I may be transported unpackaged.

(6) The total activity of LSA material and SCO in any single vehicle shall not exceed the limits shown in table VII.

TABLE VII

Vehicle activity limits for LSA material and SCO in industrial packages or unpackaged

Nature of material	Activity limit for vehicle
LSA-I	No limit
LSA-II and LSA-III non-combustible solids	No limit
LSA-II and LSA-III combustible solids, and all liquids and gases	$100 \times A_2$
SCO	$100 \times A_2$

Determination of transport index (TI)

3715 (1) The transport index (TI) based on radiation exposure control for a package, overpack, tank, container, or for unpackaged LSA-I or SCO-I, shall be the number derived in accordance with the following procedure:

(a) Determine the maximum radiation level at a distance of 1 m from the external surfaces of the package, overpack, tank, container, or unpackaged LSA-I and SCO-I. Where the radiation level is determined in units of millisievert per hour (mSv/h), the value determined shall be multiplied by 100. Where the radiation level is determined in units of millirem per hour (mrem/h), the value determine is not changed.

For uranium and thorium ores and concentrates, the maximum radiation dose rate at any point 1 m from the external surface of the load may be taken as:

0,4 mSv/h (40 mrem/h) for the ores and physical concentrates or uranium and thorium;

0,3 mSv/h (30 mrem/h) for chemical concentrates of thorium;

0,02 mSv/h (2 mrem/h) for chemical concentrates of uranium, other than uranium hexafluoride.

(b) For tanks, containers and unpackaged LSA-I and SCO-I, the value determined in step (a) above shall be multiplied by the appropriate factor from Table VIII.

(c) The figure obtained in steps (a) and (b) above shall be rounded up to the first decimal place (e.g. 1.13 becomes 1,2), except that a value of 0,05 or less may be considered as zero.

TABLE VIII

Multiplication factors for large dimension loads

Size of load (largest cross-sectional area of the load being measures)	Multiplication factor
Size of load < 1 m^2	1
1 m^2 < size of load $\leq$ 5 m^2	2
5 m^2 < size of load $\leq$ 20 m^2	3
20 m^2 < size of load	10

(2) The transport index (TI) based on nuclear criticality control shall be obtained by dividing the number 50 by the value of N derived using the procedures specified in marginal 3741 (i.e. Transport Index = 50/N).

The value of the transport index for nuclear criticality control may be zero, provided that an unlimited number of packages is subcritical (i.e. N is effectively equal to infinity).

(3) The transport index for each consignment shall be determined in accordance with Table IX.

TABLE IX

Determination of transport index

Item	Contents	Method of determining Transport Index (TI)
Packages	Non-fissile material	TI for radiation exposure control
	Fissile material	The larger of the TI for radiation exposure control or the TI for nuclear criticality control
Non-rigid Overpacks	Packages	Sum of TIs of all packages contained

3715 *(cont'd)*

Item	Contents	Method of determining Transport Index (TI)
Rigid Overpacks	Packages	The sum of the TIs of all packages contained, or, for the original consignor either the TI for radiation exposure control or the sum of the TIs of all the packages
Containers	Packages or Overpacks	Sum of the TIs of all packages and overpacks contained
	LSA material or SCO	Either the sum of the TIs or the larger of the TI for radiation exposure control or the TI for nuclear criticality control
Containers under exclusive use	Packages or Overpacks	Either the sum of the TIs or the larger of the TI for radiation exposure control or the TI for nuclear criticality control
Tanks	Non-fissile material	TI for radiation exposure control
	Fissile material	The larger of the TI for radiation exposure control or the TI for nuclear criticality control
Unpackaged	LSA-I and SCO-I	The TI for radiation exposure control

Additional provisions for overpacks

3716 The following additional provisions shall be apply to overpacks:

(a) Packages of fissile material for which the transport index for nuclear criticality control is 0 and packages of non-fissile radioactive material may be combined together in an overpack for transport, provided that each package contained therein meets the applicable provision of this Appendix.

(b) Packages of fissile material for which the transport index for nuclear criticality control exceeds 0 shall not be carried in an overpack.

(c) Only the original consignor of the packages contained within the overpacks shall be permitted to use the method of direct measurement of radiation level to determine the transport index of a rigid overpack.

Limits on transport index and radiation level for packages and overpacks

3717 (1) Except for consignments under exclusive use, the transport index of any individual package or overpack shall not exceed 10.

(2) Except for packages or overpacks transported under exclusive use under the conditions specified in marginal 2713 (1) (a), the maximum radiation level at any point on any external surface of a package or overpack shall not exceed 2 mSv/h (200 mrem/h).

(3) The maximum radiation level at any point on any external surface of a package transported under exclusive use shall not exceed 10 mSv/h (1 000 mrem/h).

Categories

3718 Packages and overpacks shall be assigned to either category I-WHITE, II-YELLOW or III-YELLOW in accordance with the conditions specified in tables X and XI, as applicable, and with the following provisions:

(a) For a package, both the transport index and the surface radiation level conditions shall be taken into account in determining which is the appropriate category. Where the transport index satisfied the condition for one category but the surface radiation level satisfies the condition for a different category, the package shall be assigned to the higher category of the two. For this purpose, category I-WHITE shall be regarded as the lowest category;

(b) The transport index shall be determined following the procedures specified in marginal 3715 and subject to the limitation of marginal 3716 (c);

(c) If the transport index is greater than 10, the package or overpack shall be transpored under exclusive use;

(d) If the surface radiation level is greater than 2 mSv/h (200 mrem/h), the package or overpack shall be transported under exclusive use and under the provisions of marginal 2713 (1) (a);

(e) A package transported under a special arrangement shall be assigned to category III-YELLOW;

(f) An overpack which contains packages transported under special arrangement shall be assigned to category III-YELLOW.

TABLE X

Categories of packages

Conditions		
Transport Index	Maximum radiation level any point on external surface	Category
0 (1)	Not more than 0,005 mSv/h (0,5 mrem/h)	I-WHITE
More than 0 but not more than 1 (1)	More than 0,005 mSv/h (0,5 mrem/h) but not more than 0,5 mSv/h (50 mrem/h)	II-YELLOW
More than 1 but not more than 10	More than 0,5 mSv/h (50 mrem/h) but not more than 2 mSv/h (200 mrem/h)	III-YELLOW
More than 10	More than 2 mSv/h (200 mrem/h) but not more than 10 mSv/h (1 000 mrem/h)	III-YELLOW and also under exclusive use

(1) If the measured TI is not greater than 0,05, the value quoted may be zero in accordance with marginal 3715 (1) (c).

TABLE XI

Categories of overpacks including containers when used as overpacks

Transport Index	Category
0	I-WHITE
Greater than 0 but less than or equal to 1	II-YELLOW
Greater than 1	III-YELLOW

Notification of competent authorities

3719 (1) Before the first shipment of any package requiring competent authority approval, the consignor shall ensure that copies of each applicable competent authority certificate applying to that package design have been submitted to the competent authority of each country through or into which the consignment is to be transported.

The consignor is not required to await an acknowledgement from the competent authority, nor is the competent authority required to make such acknowledgement of receipt of the certificate.

(2) For each shipment listed in (a), (b) or (c) below, the consignor shall notify the competent authority of each country through or into which the consignment is to be transported. This notification shall be in the hands of each competent authority prior to the commencement of the shipment, and preferably at least 7 days in advance.

(a) Type B(U) packages containing radioactive material with an activity greater than 3×10^3 A_1 or 3×10^3 A_2, as appropriate, or 1 000 TBq (20 kCi), whichever is the lower;

(b) Type B(M) packages;

(c) Transport under special arrangement.

(3) The consignment notification shall include:

(a) Sufficient information to enable the identification of the package including all applicable certificate numbers and identification marks;

(b) Information on the date of shipment, the expected date of arrival and proposed routeing;

(c) The name of the radioactive material or nuclide;

(d) A description of the physical and chemical form of the radioactive material, or whether it is special form radioactive material, and

(e) The maximum activity of the radioactive contents during transport expressed in units of becquerel (Bq) [and, if desired, curie (Ci)] with an appropriate SI prefix [see marginal 2001 (1)]. For fissile material, the total mass of fissile material in units of gram (g), or multiples thereof, may be used in place of activity.

(4) The consignor is not required to send a separate notification if the required information has been included in the application for shipment approval. [See marginal 3757 (3)].

Possession of certificates and operating instructions

(5) The consignor shall have in his possession a copy of each certificate required under Section III of this Appendix, and a copy of the instructions with regard to the proper closing of the package and other preparations for shipment before making any shipment under the terms of the certificates.

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3729

Section III

Provisions for radioactive material, for packaging and packages and test procedures

Note: The provisions in section III are the same as those prescribed in the 1985 Edition of IAEA Regulations for the safe transport of radioactive material and the 1988 Supplement. The paragraph numbers mentioned under marginals 3730 to 3742 are the numbers of the applicable paragraphs of the 1985 Edition.

3730 Provisions for LSA-III material

paragraph 501.

3731 Provisions for special form radioactive material
paragraphs 502-504.

3732 General provisions for all packaging and packages
paragraphs 505-514.

3733 Provisions for industrial packages type 1 (IP-1)
paragraph 518.

3734 Additional provisions for industrial packages type 2 (IP-2)
paragraph 519.

3735 Additional provisions for industrial packages type 3 (IP-3)
paragraph 520.

3736 Alternative provisions for tanks and containers to qualify as IP-2 and IP-3
paragraphs 521-523.

3737 Provisions for Type A packages
paragraphs 524-540.

3738 Provisions for Type B packages
paragraphs 541-548.

3739 Provisions for Type B (U) packages
paragraphs 549-556.

3740 Provisions for Type B (M) packages
paragraphs 557-558.

3741 Provisions for packages containing fissile material
paragraphs 559-568.

3742 Test procedures
paragraphs 601-633.

3743-3749

Section IV

Approval and administrative provisions

Note: Where the provisions in Section IV are the same as those prescribed in the 1985 Edition of the IAEA Regulations for the Safe Transport of Radioactive Material (as Amended 1990) the numbers mentioned under marginals 3761 to 3764 are the numbers of the applicable paragraphs of the 1985 Edition.

General

3750 Competent authority approval shall be required for the following:

(a) Special form radioactive material (see marginal 3751);

(b) All packages containing fissile material (see marginals 3754 and 3755);

3750 *(cont'd)*

(c) Type B packages — Type B(U) and Type B(M) (see marginals 3752, 3753 and 3755);

(d) Special arrangements (see marginal 3758);

(e) Certain shipments (see marginal 3757);

(f) Calculation of unlisted A_1 and A_2 values [see marginal 3701 (1)].

Approval of special form radioactive material

3751 (1) The design for special form radioactive material shall require unilateral approval. An application for approval shall include;

(a) A detailed description of the radioactive material or,if a capsule, the contents; particular reference shall be made to both physical and chemical states;

(b) A detailed statement of the design of any capsule to be used;

(c) A statement of the tests which have been done and their results, or evidence based on calculative methods to show that the radioactive material is capable of meeting the performance standards, or other evidence that the special form radioactive material meets the applicable provisions of this Appendix;

(d) Evidence of a quality assurance programme.

(2) The competent authority shall issue an approval certificate stating that the approved design meets the provisions for special form radioactive material and shall allocate to that design an identification mark. The certificate shall specify the details of the special form radioactive material.

Approval of package designs

Approval of Type B(U) package designs

3752 (1) Any design of Type B(U) package originating in a Member State shall be approved by the competent authority of this State; if the State where the package has been designed is not a Member State carriage is possible on condition that;

(a) a certificate has been supplied by this State, proving that the package satisfies the technical provisions of this Directive, and that this certificate is countersigned by the competent authority of the first Member State reached by the consignment;

(b) if no certificate has been supplied, the package design is approved by the competent authority of the first Member State reached by the consignment.

Any design of Type B(U) package for fissile material, which is also subject to marginal 3741 shall require multilateral approval.

(2) An application for approval shall include:

(a) A detailed description of the proposed radioactive contents with particular reference to their physical and chemical states and the nature of the radiation emitted;

(b) A detailed statement of the design, including complete engineering drawings and schedules of materials and methods of construction to be used;

(c) A statement of the tests which have been done and their results, or evidence based on calculative methods or other evidence that the design is adequate to meet the applicable provisions;

(d) The proposed operating and maintenance instructions for the use of the packaging;

(e) If the package is designed to have a maximum normal operating pressure in excess of 100 kPa (1,0 bar) gauge, the application for approval shall, in particular, state, in respect of the materials of construction of the containment system, the specifications, the samples to be taken, and the tests to be made;

3752 *(cont'd)*

(f) Where the proposed radioactive contents are irradiated fuel, the applicant shall state and justify any assumption in the safety analysis relating to the characteristics of the fuel;

(g) Any special stowage provisions necessary to ensure the safe dissipation of heat from the package; consideration shall be given to the various modes of transport to be used and type of vehicle or container;

(h) A reproducible illustration not larger than 21 cm × 30 cm showing the make-up of the package, and

(i) Evidence of a quality assurance programme.

(3) The competent authority shall issue an approval certificate stating that the design meets the provisions for Type B(U) packages.

Approval of Type B (M) package designs

3753 (1) Each Type B(M) package design, including those for fissile material which are also subject to marginal 3754 shall require multilateral approval.

(2) An application for approval of a Type B(M) package design shall include, in addition to the information required in marginal 3752 (2) for Type B(U) packages:

(a) A list of the specific provisions for Type B(U) packages specified in marginals 3738 and 3739 with which the package does not conform;

(b) Any proposed supplementary operational controls to be applied during transport not routinely provided for in this Appendix, but which are necessary to ensure the safety of the package or to compensate for the deficiencies listed in above, such as human intervention for temperature or pressure measurements or for periodic venting, taking into account the possibility of unexpected delay;

(c) Particulars of any restrictions on the mode of transport and any special loading, carriage, unloading or handling procedures, and

(d) The maximum and minimum ambient conditions (temperature, solar radiation) expected to be encountered during transport and which have been taken into account in the design.

(3) The competent authority shall issue an approval certificate stating that the design meets the applicable provisions for Type B(M) packages.

Approval of package designs for fissile material

3754 (1) Each package design for fissile material shall require multilateral approval.

(2) An application for approval shall include all information necessary to satisfy the competent authority that the design meets the provisions of marginal 3741 and evidence of a quality assurance programme.

(3) The competent authority shall issue an approval certificate stating that the design meets the applicable provisions of marginal 3741.

Transitional arrangements

3755 Type B(U) and Type B(M) packages and packagings containing fissile material which do not fully conform to the provisions of this Appendix but which nevertheless could be used in accordance with the provisions of ADR applicable on 31 December 1989 for the corresponding material of Class 7 may still be used under the following conditions for the carriage of this material:

(a) multilateral approval shall be required on the expiry of the unilateral approval, and

(b) a serial number according to the provisions of marginal 2705 (3) shall be assigned to and marked on the outside of each packaging.

3755 *(cont'd)* Changes in the design of the packaging or in the nature or quantity of the authorised radioactive contents which, as determined by the competent authority, would significantly affect safety shall meet the provisions of this Appendix.

Notification and registration of serial numbers

3756 The competent authority of the country of origin of design approval shall be informed of the serial number of each packaging manufactured to a design approved under marginals 3752, 3753 (1), 3754 (1) and 3755. The competent authority shall maintain a register of such serial numbers.

Approval of shipments

3757 (1) Except as allowed in paragraph (2) below, multilateral approval shall be required for:

(a) The shipment of Type B(M) packages especially designed to allow controlled intermittent venting;

(b) The shipment of Type B(M) packages containing radioactive material with an activity greater than 3×10^3 A_1 or 3×10^3 A_2, as appropriate, or 1 000 TBq (20 kCi), whichever is the lower;

(c) The shipment of packages containing fissile material if the sum of the transport indexes of the individual packages exceeds 50 as provided in marginal 2712 (4).

(2) A competent authority may authorize transport into or through its country without shipment approval, by a specific provision in its design approval (see marginal 3759).

(3) An application for shipment approval shall include:

(a) The period of time, related to the shipment for which the approval is sought;

(b) The actual radioactive contents, the expected modes of transport, the type of vehicle and the probable or proposed route, and

(c) The details of how the special precautions and special administrative or operational controls, referred to in the package design approval certificates issued under marginals 3752 (3), 3753 (3) and 3754 (3) are to be put into effect.

(4) Upon approval of the shipment, the competent authority shall issue an approval certificate.

Approval of shipment under special arrangements

3758 (1) Each consignment shipped under special arrangement shall require multilateral approval.

(2) An application for approval of a shipment under special arrangement shall include all the information necessary to satisfy the competent authority that the overall level of safety in transport is at least equivalent to that which would be provided if all the applicable provisions of this Appendix had been met. The application shall include:

(a) A statement of the respects in which, and of the reasons why, the consignment cannot be made in full accordance with the applicable provisions of this Appendix, and

(b) A statement of any special precautions or special administrative or operational controls which are to be employed during transport to compensate for the failure to meet the applicable provisions of this Appendix.

(3) Upon approval of a shipment under special arrangement, the competent authority shall issue an approval certificate.

Competent authority approval certificates

3759 Four types of approval certificates may be issued: special form radioactive material, special arrangement, shipment and package design. The package design and shipment approval certificates may be combined into a single certificate.

Competent authority identification marks

3760 (1) Each approval certificate issued by a competent authority shall be assigned an identification mark. The mark shall be of the following generalized type:

Symbol of nationality of country/number/type code:

(a) The symbol of nationality represents the distinguishing sign for motor vehicles in international traffic in the Vienna Convention on Road Traffic (1968).

(b) The number shall be assigned by the competent authority, and shall be unique and specific with regard to the particular design or shipment. The shipment approval identification mark shall be clearly related to the design approval identification mark.

(c) The following type codes shall be used in the order listed to indicate the types of approval certificates issued:

AF	Type A package design for fissile material
B(U)	Type B(U) package design; B(U)F if for fissile material
B(M)	Type B(M) package design; B(M)F if for fissile material
IF	Industrial package design for fissile material
S	Special form radioactive material
T	Shipment
X	Special arrangement.

(d) For package design approval certificates, other than those issued under the provisions of marginal 3755, the symbol '-85' [1] shall be added to the type code of the package design.

(2) These type codes shall be applied as follows:

(a) Each certificate and each package shall bear the appropriate identification mark, comprising the symbols prescribed in paragraph (1) above, except that, for packages, only the applicable design type codes including, if applicable, the symbol '-85' [2] shall appear following the second stroke, that is, the 'T' or 'X' shall not appear in the identification marking on the package. Where the design approval and shipment approval are combined, the applicable type codes do not need to be repeated. For example:

A/132/B(M)F-85:	A Type B(M) package design approved for fissile material, requiring multilateral approval, for which the competent authority of Austria has assigned the design number 132 (to be marked on both the package and on the package design approval certificate);
A/132/B(M)F-85T:	The shipment approval issued for a package bearing the identification mark elaborated above (to be marked on the certificate only);
A/137/X-85:	A special arrangement approval issued by the competent authority of Austria, to which the number 137 has been assigned (to be marked on the certificate only);
A/139/IF-85:	An industrial package design for fissile material approved by the competent authority of Austria, to which package design number 139 has been assigned (to be marked on both the package and on the package design approval certificate).

(1) This symbol denotes that the package design satisfies the provisions of the Regulations for the Safe Transport of Radioactive Material, Safety Series No 6, 1985 Edition.

(2) ANSI N 14.1 — 1982 published in 1982 and obtainable from the American National Standards Institute, 10430 Broadway, New York, NY 10018.

3760 *(cont'd)*

(b) Where multilateral approval is effected by validation, only the identification mark issued by the country of origin of the design or shipment shall be used. Where multilateral approval is effected by issue of certificates by successive countries, each certificate shall bear the appropriate mark and the package whose design was so approved shall bear all appropriate identification marks. For example:

A/132/B(M)F-85

CH/28/B(M)F-85

would be the identification mark of a package which was originally approved by Austria and was subsequently approved, by separate certificate, by Switzerland. Additional identification marks would be displayed in a similar manner on the package.

(c) The revision of a certificate shall be indicated by a parenthetical expression following the identification mark on the certificate. For example, A/132/B(M)F-85 (Rev.2) would indicate revision 2 of the Austrian package design approval certificate; or A/132/B(M)F-85 (Rev.0) would indicate the original issue of the Austrian package design approval certificate. For original issues, the parenthetical entry is optional and other words such as 'Original issue' may also be used in place of 'Rev.0'. Certificate revision numbers may only be issued by the country issuing the original approval certificate.

(d) Additional symbols (as may be necessitated by national requirements) may be added in brackets to the end of the identification mark; for example, A/132/B(M)F-85 (SP503).

(e) It is not necessary to alter the identification mark on the packaging each time that a revision to the design certificate is made. Such re-marking shall be made only in those cases where the revision to the package design certificate involves a change in the letter type codes for the package design following the second stroke.

Contents of approval certificates

(see introductory note to this section)

3761 Special form radioactive material approval certificates

paragraph 726

3762 Special arrangements approval certificates

paragraph 727

3763 Shipment approval certificates

paragraph 728

3764 Package design approval certificates

paragraph 729

Validation of certificates

3765 Multilateral approval may be by validation of the original certificate issued by the competent authority of the country of origin of the design or shipment.

Such validation may take the form of an endorsement on the original certificate or the issue of a separate endorsement, annex, supplement, etc., by the competent authority of the country through or into which the shipment is made.

General provision for quality assurance programme

3766 Quality assurance programmes shall be established for the design, manufacture, testing, documentation, use, maintenance and inspection of all packages and for transport and in-transit storage operations to ensure compliance with the relevant provisions of this Appendix. Where competent authority approval for design or shipment is required, such approval shall take into account and be contingent upon the adequacy of the quality assurance programme. Certification that the design specification has been fully implemented shall be available to the competent authority. The manufacturer, consignor, or user of any package design shall be prepared to provide facilities for competent authority inspection of the packaging during construction and use and to demonstrate to any relevant competent authority that:

(a) The construction methods and materials used for the construction of the packaging are in accordance with the approved design specifications, and

(b) All packagings manufactured to an approved design are periodically inspected and, as necessary, repaired and maintained in good condition so that they continue to comply with all relevant provisions and specifications, even after repeated use.

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3769

SECTION V

Radioactive material having other hazardous properties

3770 (1) Radioactive material having other hazardous properties shall be packaged:

(a) in accordance with the provisions for Class 7, and

(b) unless carried as a Type A or Type B package, also in accordance with the provisions of the appropriate class.

(2) Pyrophoric radioactive material shall be packaged in Type A or Type B packages and shall also be suitably inerted.

(3) For radioactive material in excepted packages having other hazardous properties, see marginal 2002 (12) and (13).

(4) Packagings for uranium hexafluoride shall be designed, constructed and used in accordance with the provisions of marginal 3771.

Provisions for the packaging and transport of uranium hexafluoride

3771 (1) Packagings for uranium hexafluoride shall be designed as pressure vessels and manufactured from an appropriate carbon steel or other appropriate alloy steel.

(2) (a) The packagings and their service equipment shall be designed for working temperatures of at least – 40 °C up to 121 °C and for a working pressure of 1,4 MPa (14 bar).

(b) The packagings and their service and structural equipment shall be so designed as to prevent any leakage or permanent deformation when they are subjected for five minutes to a hydraulic test pressure of 2,8 MPa (28 bar).

(c) The packagings and their structural equipment (if this is permanently attached to the packaging) shall be so designed as to withstand an external gauge pressure of 150 kPa (1,5 bar) without permanent deformation.

(d) The packagings and their service equipment shall be so designed as to remain leakproof so that the limit specified in paragraph (4) (f) is observed.

(e) Pressure relief valves are not permitted and the number of openings shall be as few as possible.

(f) Packagings with a capacity of more than 450 l and their service and structural equipment (if this is permanently attached to the packaging) shall be so designed that they remain leakproof when they are subjected to the drop test specified in marginal 3742.

3771 *(cont'd)*

(3) After manufacture, the inside of the pressure bearing parts shall be thoroughly cleaned of grease, oil, scale, slag and other foreign matter by an appropriate procedure.

(4) (a) Every manufactured packaging and its service and structural equipment shall, either jointly or separately, undergo an inspection initially before being put into service and periodically thereafter. These inspections shall be performed and certified by agreement with the competent authority.

(b) The initial inspection shall consist of a check of the design characteristics, the strength test, the leakproofness test, the water capacity test and a check of satisfactory operation of the service equipment.

(c) The periodic inspections shall consist of a visual inspection, the strength test, the leakproofness test and a check of satisfactory operation of the service equipment. The interval for periodic inspections shall be not more than five years. Packagings which have not been inspected within this five-year period shall be examined before transport in accordance with a programme approved by the competent authority. They shall not be refilled before completion of the full programme for periodic inspections.

(d) The check of design characteristics shall demonstrate compliance with the design type specifications and the manufacturing programme.

(e) The strength test before first being put into service shall be conducted by means of a hydraulic test with an internal pressure of 2,8 MPa (28 bar). For the periodic inspections, any other equivalent non-destructive examination procedure recognized by the competent authority may be applied.

(f) The leakproofness test shall be performed in accordance with a procedure which is capable of indicating leakages in the containment system with a sensitivity of 0,1 Pa.l/s (10^{-6} bar.l/s).

(g) The water capacity of the packagings shall be established with an accuracy of ± 0,25 % at a reference temperature of 15 °C. The volume shall be stated on the plate described in paragraph (6).

(5) With the exception of packagings for less than 10 kg of uranium hexafluoride, the competent authority of the country of origin shall, for every design type of uranium hexafluoride package, confirm that it complies with the provisions of this marginal and issue an approval. This approval may be part of the approval for a Type B package and/or for a package with fissile contents in accordance with Section IV of this Appendix.

(6) A plate made of non-corroding metal shall be durably attached to every packaging in a readily accessible place. The method of attaching the plate must not impair the strength of the packaging. The following particulars, at least, shall be marked on the plate by stamping or by any other equivalent method:

— approval number;

— manufacturer's serial number;

— maximum working pressure (gauge pressure) 1,4 MPa (14 bar);

— test pressure (gauge pressure) 2,8 MPa (28 bar);

— contents: uranium hexafluoride;

— capacity in litres;

— maximum permissible filling mass of uranium hexafluoride;

— tare mass;

— date (month, year) of the initial test and the most recent periodic test;

— stamp of the expert who performed the test.

(7) (a) The uranium hexafluoride must be in solid form when transported.

(b) The degree of filling shall only be such that the capacity is not more than 95 % filled at 121 °C.

(c) The cleaning of packagings shall be performed only by a suitable procedure.

(d) The execution of repairs is permissible only in accordance with design and manufacturing programmes laid down in writing. Repair programmes require the prior approval of the competent authority.

3771 *(cont'd)*

(e) Uncleaned empty packagings shall be as tightly closed, during transport and intermediate storage, as when full.

(f) For maintenance, a programme approved by the competent authority shall be operated.

(8) Packagings constructed in accordance with the United States Standard ANSI N/14.1 — 1982 [1], or equivalent, may be used, with the consent of the competent authority concerned, if the tests specified in these standards have been performed by the expert named therein and continue to be performed and certified in agreement with the competent authority in accordance with paragraph (4) (c).

3772-3799

APPENDIX A.8

3800-3899 Reserved

APPENDIX A.9

1. Provisions relating to danger labels

Note: For packages, see also marginal 2007.

3900 (1) Labels Nos 1, 1.4, 1.5, 1.6, 01, 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 05, 6.1, 6.2, 7A, 7B, 7C, 8 and 9 shall be diamond-shaped and measure 100 × 100 mm. They have a black line 5 mm inside the edge and running parallel to it. If the size of the package so requires, the dimensions of the labels may be reduced, provided that they remain clearly visible [see also marginal 2224 (6)]. Label No 7D and other labels to be affixed to vehicles, to tanks of more than 3 m^3 or to large containers shall measure not less than 250 × 250 mm.

(2) Labels Nos 10, 11 and 12 shall be rectangular, of standard format A5 (148 × 210 mm). If the size of the package so requires, the dimensions of the labels may be reduced, provided that they remain clearly visible.

(3) An inscription, in figures or letters, concerning the nature of the danger may be placed on the lower part of the labels.

(4) Wording on danger labels shall be clearly legible and indelible.

3901 (1) Danger labels must be affixed on packages and fixed tanks in a suitable manner and be clearly visible. Only where the state of the outside of a package does not permit this should labels be stuck on cards or tablets securely attached to the package. Indelible danger markings corresponding exactly to the prescribed models may be used instead of labels.

(2) It is the consignor's duty to affix the labels.

(3) In addition to the danger labels prescribed under this Directive, danger labels conforming to the requirements of other modes of transport may be affixed to packages, containers, tank-containers and batteries of receptacles containing dangerous goods which are transported for part of a journey by road and which must be labelled in accordance with the provisions of those requirements.

[1] ANSI N 14.1 — 1982 published in 1982 and obtainable from the American National Standards Institute, 10430 Broadway, New York, NY 10018.

2. Explanation of symbols

3902 The danger labels prescribed for substances and articles of Classes 1 to 9 (see plates at the end) have the following meanings:

No 1	(black on orange background: bomb blast in upper half; appropriate division number and compatibility group letter in lower half; small figure 1 in bottom corner):	liable to explosion, divisions 1.1, 1.2 and 1.3;
No 1.4	(black on orange background: division number '1.4' filling most of the upper half; appropriate compatibility group letter in the lower half; small figure 1 in bottom corner):	liable to explosion, division 1.4;
No 1.5	(black on orange background: division number '1.5' filling most of the upper half; compatibility group letter 'D' in the lower half; small figure 1 in bottom corner):	liable to explosion, division 1.5;
No 1.6	(black on orange background: division number '1.6' filling most of the upper half; compatibility group letter 'N' in the lower half; small figure '1' in bottom corner);	liable to explosion, division 1.6;
No 01	(black on orange background, bomb blast in upper half):	liable to explosion;
No 2	(gas cylinder, black or white, on green background, small figure '2' in bottom corner):	non-flammable non-toxic gas;
No 3	(black or white flame on red ground):	danger of fire (flammable liquid);
No 4.1	(black flame on ground of equidistant alternate red and white vertical stripes):	danger of fire (flammable solid);
No 4.2	(black flame on white ground, lower triangle of label red):	substance liable to spontaneous ignition;
No 4.3	(black or white flame on blue ground):	danger of emission of flammable gases on contact with water;
No 5.1	(flame over a circle, black on yellow background, small figure '5.1' in bottom corner):	oxidizing substance
No 5.2	(flame over a circle, black on yellow background, small figure '5.2' in bottom corner):	organic peroxide, risk of fire;
No 05	(flame over a circle, black on yellow background):	fire-intensifying risk;
No 6.1	(death's head on cross-bones, black on white ground):	toxic substance: to be kept apart from foodstuffs and other articles for consumption in vehicles and at loading, unloading or transloading points;

3902 *(cont'd)*	No 6.2	(symbol of three crescents superimposed on a circle):	infectious: to be kept apart in vehicles and at loading, unloading or transloading points, from foodstuffs, other articles of consumption and animal feedstuffs;
	No 7A	(stylized trefoil, inscription RADIOACTIVE followed by a vertical stripe in the lower half, with the following text: Contents ... Activity ... small figure 7 in bottom corner; black symbol and inscriptions on white background; red vertical stripe):	radioactive material in packages of Category I-WHITE; in the event of damage to the packages, danger to health by ingestion or inhalation of, or contact with, spilled contents;
	No 7B	(as above, but with two red vertical stripes in the lower half and the following text: Contents ... Activity ... Transport index ... (in the rectangular black bordered box); small figure 7 in bottom corner; black symbol and inscriptions; upper half of background: yellow; lower half of background: white; red vertical stripes):	radioactive material in packages of Category II-YELLOW; packages to be kept away from packages bearing the inscription 'FOTO' (see marginal 2711); in the event of damage to packages, danger to health by ingestion or inhalation of, or contact with spilled contents, and risk of external radiation at a distance;
	No 7C	(as above, but with three red vertical stripes in the lower half):	radioactive material in packages of Category III-YELLOW; packages to be kept away from packages bearing the inscription 'FOTO' (see marginal 2711); in the event of damage to packages, danger to health by ingestion or inhalation of, or contact with, spilled contents, and risk of external radiation at a distance;
	No 7D	(stylized trefoil, inscription RADIOACTIVE, and figure 7; black symbol and inscriptions; upper half of background: yellow, lower half of background: white. The use of the word 'RADIOACTIVE' in the lower half is optional to allow the alternative use of this label to display the appropriate substance identification number for the consignment):	radioactive material presenting the dangers described under 7A, 7B or 7C;
	No 8	(liquid dripping from a test-tube on to a plate and from another test-tube on to a hand; black on white ground, lower triangle of label black with a white border):	corrosive substance;
	No 9	(white background with 7 black vertical stripes in the upper half and small figure 9, underlined, in the bottom corner):	miscellaneous substances and articles which, during transport, present dangers other than those covered by the other classes;
	No 10	(black open umbrella and six black drops of water, on white or suitable contrasting ground):	keep dry;

3902 *(cont'd)*	No 11	(two black arrows on white or suitable contrasting ground):	this side up: label to affixed, with arrows pointing upwards;
	No 12	(black wine glass on white or suitable contrasting background):	fragile, or handle with care.

3. Transitional provisions

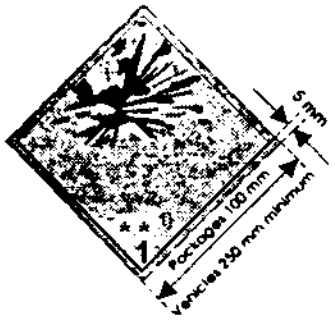
3903 The danger labels which until 31 December 1987 conformed to models Nos 7A, 7B, 7C, 10, 11 and 12 may be used until stocks are exhausted.

3904-
3999

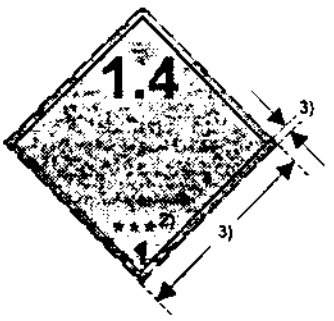
Danger labels

For explanation, see Appendix A.9 (marginal 3902)

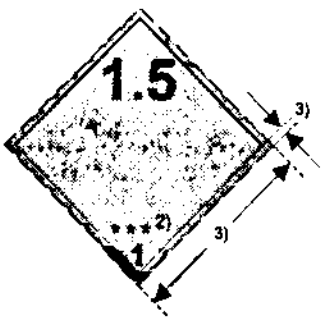
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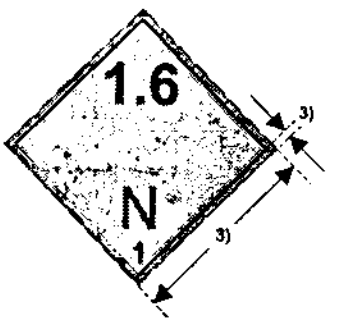
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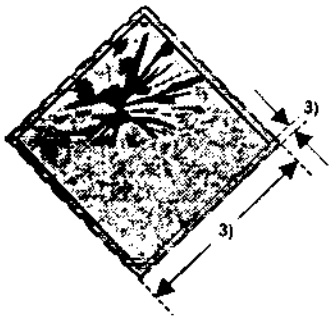
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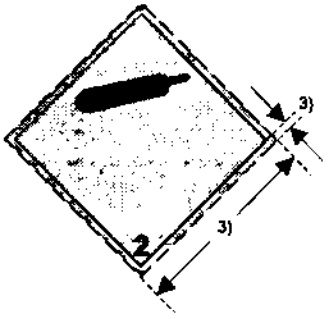
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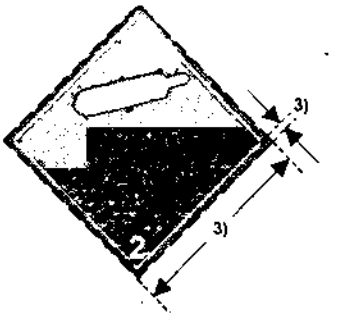
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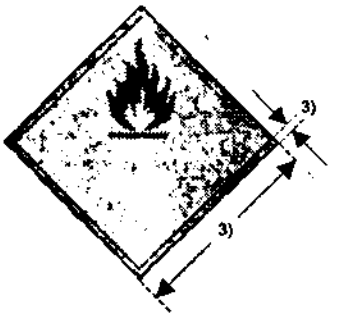
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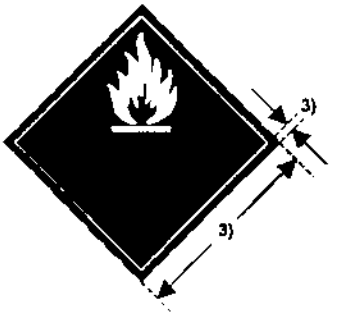
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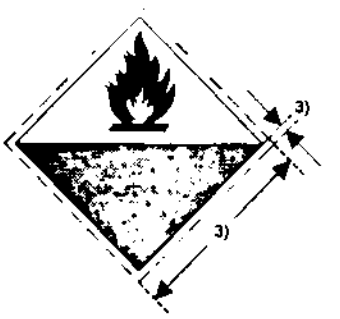
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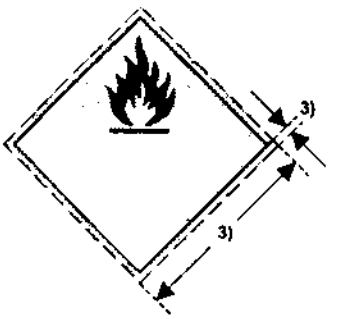
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No 4.2



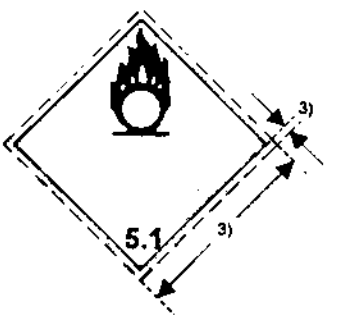
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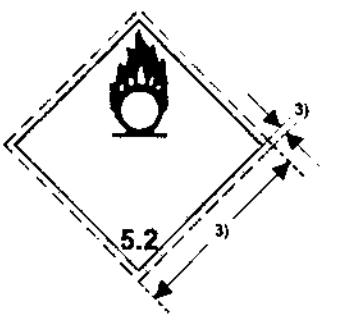
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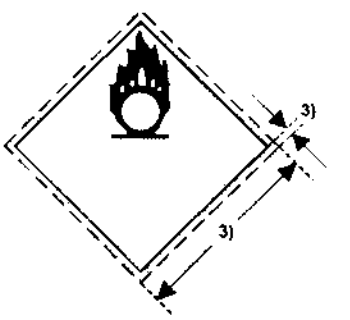
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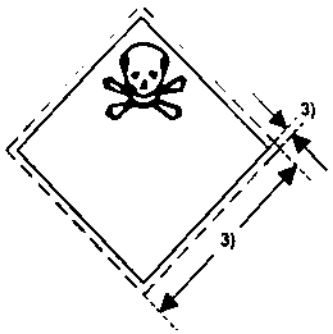
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No 05



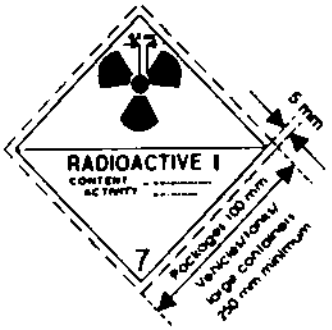
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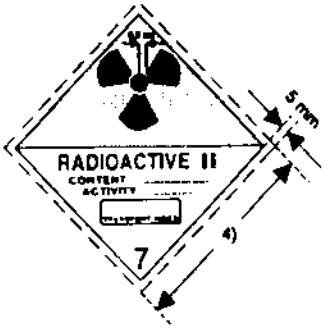
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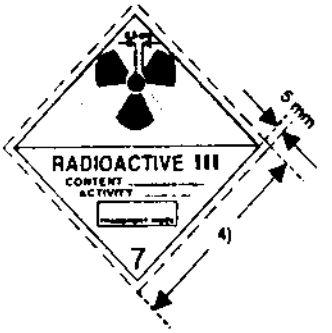
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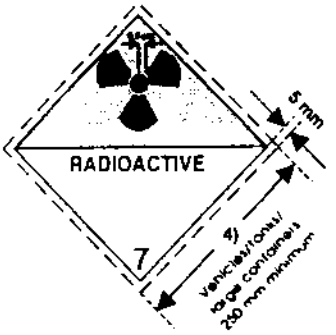
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No 7C



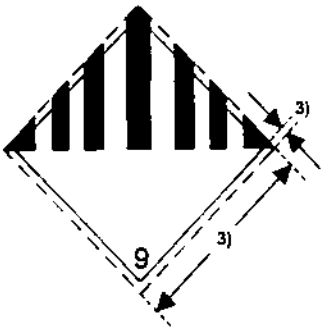
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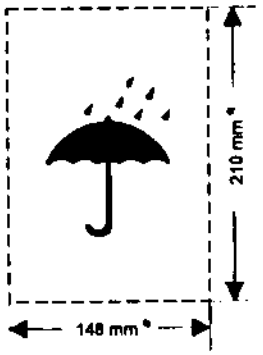
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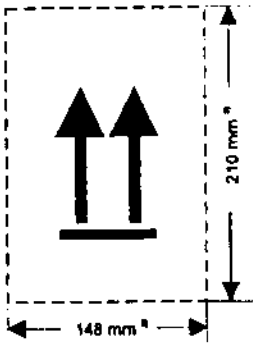
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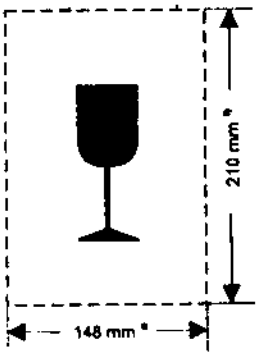
No 10



No 11



No 12



(1) Indication of the appropriate division number and compatibility group letter.
(2) Indication of the appropriate compatibility group letter.
(3) For dimensions, see label No 1.
(4) For dimensions, see label 7A.
(5) The dimensions of the labels to be affixed to packages may be reduced to format A7 (74 × 105 mm).

ANNEX B

Provisions concerning transport equipment and transport operations

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Plan of the Annex

10 000 (1) This Annex comprises:

(a) General provisions applicable to the carriage of dangerous substances of all classes (Part I);

(b) Special provisions applicable to the carriage of dangerous substances of Classes 1 to 9 (Part II);

(c) Appendices as follows:

— Apendix B.1a concerning fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles;

— Apendix B.1b concerning tank-containers;

— Apendix B.1c concerning fixed tanks and demountable tanks made of reinforced plastics;

— Apendix B.1d relating to requirements concerning the materials and construction of fixed welded tanks, of demountable welded tanks, and of welded shells of tank-containers, intended for the carriage of deeply-refrigerated liquefied gases of Class 2 or for which a test pressure of not less than 1 Mpa (10 bar) is required;

— Apendix B.2 containing uniform provisions concerning the construction of vehicles intended for the carriage of dangerous goods including provisions for their type approval where appropriate;

— Apendix B.3 containing a model certificate of approval for vehicles;

— Apendix B.5 containing the list of substances covered by marginal 10 500 (2);

— Apendix B.6 containing a model driver's training certificate.

(2) The general provisions of Part I and the special provisions of Part II are divided into sections with the following headings:

General This section describes the scope of this Annex and includes the provisions concerning permitted exemptions and definitions;

Section 1 Mode of carriage of goods (this section contains the provisions concerning method of dispatch, restrictions on forwarding, full loads and the possibility of carriage of goods in bulk, in containers or in tanks);

Section 2 Special requirements to be fulfilled by the means of transport and its equipment;

Section 3 General Service provisions;

Section 4 Special provisions concerning loading, unloading and handling (this section contains also the prohibitions on mixed loading);

Section 5 Special provisions concerning the operation of vehicles;

Section 6 Transitional provisions, derogations and provisions peculiar to certain countries.

Applicability of other regulations, national or international

10 001 (1) If the vehicle carrying out a transport operation subject to the provisions of this Directive is conveyed over a section of the journey otherwise than by road haulage, any national or international regulations which govern the carriage of dangerous goods on that section by the mode of transport used for conveying the road vehicle shall alone be applicable to that section of the journey.

(2) In cases where a transport operation subject to the provisions of this Directive is likewise subject over the whole or a part of the road journey to the provisions of an international convention which regulates the carriage of dangerous goods by a mode of transport other than road carriage by virtue of clauses extending the applicability of that convention to certain motor-vehicle services, then the provisions of that international convention shall apply over the journey in question concurrently with those of this Directive which are not incompatible with them; the other clauses of this Directive shall not apply over the journey in question.

Applicability of the provisions of Part I of this Annex

10 002 Where provisions of Part II or of the Appendices to this Annex conflict with provisions of Part I, those provisions of Part I shall not apply.

Nevertheless

(a) the provisions of marginals 10 010 to 10 013 shall take precedence over those of Part II;

(b) the provisions of marginal 10 403 shall take precedence over the prohibitions on mixed loading prescribed in the sections 4 of Part II.

10 003-
10 009

PART I

GENERAL PROVISIONS APPLICABLE TO THE CARRIAGE OF DANGEROUS SUBSTANCES OF ALL CLASSES

(See, however, marginal 10 002)

General

Scope of this Annex

10 010 Annex A exempts, from the provisions of the present Annex, carriage performed under the conditions (of packaging, mass, etc.) laid down in marginals 2201a, 2301a, 2401a, 2471a, 2501a, 2551a, 2601a, 2801a and 2901a.

10 011 Table specifying the limited quantities of dangerous substances in packages which may be carried in one transport unit without application of the provisions of this Annex relating to:

— special requirements to be fulfilled by the means of transport and its equipment (all sections 2 of Parts I and II), subject, however, to compliance with the provisions of marginals 10 240 (1) (a) and 21 212;

— vehicle crews (marginals XX 311 of Parts I and II);

— special training of drivers (marginal 10 315):

— carriage of passengers (marginal 10 325);

— instructions in writing (marginals XX 385 of Parts I and II);

— places of loading and unloading (marginals XX 407 of Part II); and

— special provisions concerning the operation of vehicles (all sections 5 of Parts I and II).

Classes	Substances	Maximum total quantity per transport unit (gross mass)							
	Multipliers for calculating total quantities exempted for a load which includes several substances each of which is affected by different mass limits (see note 1 below)	A	B	C	D	E	F	G	unlimited
		200	50	20	10	3	2	1	
		5 kg	20 kg	50 kg	100 kg	333 kg	500 kg	1 000 kg	
1, 2 [only the gases classified under (a) and (b)], 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8 and 9	Empty packagings (including receptacles, excluding tanks)								×
1	1°, 3°, 5°-7°, 9°, 10°, 12°,13°, 15°, 17°-19°, 21°-23°, 25°, 27°, 30°-32°, 34°, 48° (UN-Nos. 0331 and 0332)			×					
	2°, 4°, 8°, 11°, 24°	×							
	26°, 29°, 33°		×						
	35° to 43°						×		
	46°, 47°								×
	48° (UN-No 0482)	×							

10 011
(cont'd)

Classes	Substances Multipliers for calculating total quantities exempted for a load which includes several substances each of which is affected by different mass limits (see note 1 below)	Maximum total quantity per transport unit (gross mass) A 200 5 kg	B 50 20 kg	C 20 50 kg	D 10 100 kg	E 3 333 kg	F 2 500 kg	G 1 1 000 kg	un-limited
2	Cyanogen chloride of 3° (ct) Phosgene of 3° (at), fluorine of 1° (at) 1° (a) and (b), 2° (a) and (b) Other substances and empty packagings having contained a gas classified (at), (bt) (c) or (ct)	×		×		×		×	
3	6°, 12°, 13° and substances of '(a)' of 11°, 14° to 28° and 41° to 47°, 57° Substances of (b) of 11° and 14° to 28° and 41° to 57° 1° (a), 2° (a) and (b), 3° (b), 4° (a) and (b), 5° (a), and 7° (b) 31° (c) and 34° (c) Other substances	×			×	×	×	×	
4.1.	1° (b) and 2° (c) 6° (c) and 11° (c) 21° to 26° 35°, 36°, 45°, 46° 37° to 40° and 47° to 50° Other substances	×(1)	×(1)	×(1) ×		×			×
4.2.	1° (c) Substances classified under (b) Substances classified under (c)					×		×	×
4.3.	11° (a), 13° (a), 14° (a) and 16° (a) to 18° (a) 11° (b) to 17° (b) 11° (c) to 15° (c)	×				×		×	
5.1.	Substances classified under (a) Substances classified under (b) Substances classified under (c) 5°		×	×	×		×		
5.2.	5°, 6°, 15°, 16° 7° to 10°, 17° to 20°		×(1)	×(1)					
6.1.	Substances classified under (c) Substances classified under (b) Other substances (exept 1° and 2°)	×		×	×				
6.2.	2° Substances of (b)		×		×				
7	Material of marginal 2704, schedules 1° to 4°								×
8	6°, 14° and substances classified under (a) Substances classified under (b) Substances classified under (c)		×		×		×		
9	Substances or articles classified under 1° (b), 4° (c) or 5° Substances or articles classified under 1° (c), 6°, 7° or 13° (b) 11° (c) and 12° (c)			×	×			×	

(1) Excluding the mass of the refrigerating appliance if any.

10 011 *(cont'd)*

Notes 1: The maximum quantities shown in the above table represent a degree of danger which may, from a highly simplified standpoint, be considered as equivalent for each of the substances listed. This danger level shall not be exceeded even where a load not affected by any prohibition on mixed loading includes more than one dangerous substance.

Where the same exemption limit applies to the substances concerned, their respective masses are added and the total must not exceed that limit. Where, however, different exemption limits apply to the substances, the maximum quantities allowed for each shall be calculated as follows:

(a) The total actual mass of each substance referred to in any one column of the table shall be multiplied by the factor shown at the head of the column;

(b) The products so obtained are added together and their total shall not exceed 1 000.

Up to that figure, the difference divided by the factor corresponding to some other substance gives the exemption limit still not taken up.

Example of these calculations

Classes	Substances	Maximum quantity						
		5 kg	20 kg	50 kg	100 kg	333 kg	500 kg	1 000 kg
2	2° (a)							100
3	33° (c)						50	
4.1	4° (c)			2				
6.1	16° (b)			3				
6.1	16° (c)				25			
Total of quantities carried				5	25		50	100
Multiplier factor		200	50	20	10	3	2	1
Product (factor x quantity)				100	250		100	100
Total of products				100	+ 250 = 550		+ 100	+ 100

Since the total of the products is less than 1 000, the case set out above leaves available within the exemption limit 1 000 – 550 = 450, which could be used to make up the load with, for example, gas cylinders of Class 2, 11° (a) (limit 333 kg) up to a value of 450 : 3 = 150 kg.

These multiplications or divisions can be avoided by using the mass tables below.

Maximum mass of each of two different substances shown in columns A to G of the above table which may be loaded together on a transport unit without exceeding the exemption limits (in kg):

10 011
(cont'd)

— Columns A *et seq.*

A	A
1	4
2	3
3	2
4	1
5	0

A and B	
1	16
2	12
3	8
4	4
5	0

A and C	
1	40
2	30
3	20
4	10
5	0

A and D	
1	80
2	60
3	40
4	20
5	0

A and E	
1	266
2	200
3	133
4	66
5	0

A and F	
1	400
2	300
3	200
4	100
5	0

A and G	
1	800
2	600
3	400
4	200
5	0

— Columns B *et seq.*

B	B
2	18
4	16
6	14
8	12
10	10
12	8
14	6
16	4
18	2
20	0

B and C	
2	45
4	40
6	35
8	30
10	25
12	20
14	15
16	10
18	5
20	0

B and D	
2	90
4	80
6	70
8	60
10	50
12	40
14	30
16	20
18	10
20	0

B and E	
2	300
4	266
6	233
8	200
10	166
12	133
14	100
16	66
18	33
20	0

B and F	
2	450
4	400
6	350
8	300
10	250
12	200
14	150
16	100
18	50
20	0

B and G	
2	900
4	800
6	700
8	600
10	500
12	400
14	300
16	200
18	100
20	0

— Columns C *et seq.*

C	C
5	45
10	40
15	35
20	30
25	25
30	20
35	15
40	10
45	5
50	0

C and D	
5	90
10	80
15	70
20	60
25	50
30	40
35	30
40	20
45	10
50	0

C and E	
5	300
10	266
15	233
20	200
25	166
30	133
35	100
40	66
45	33
50	0

C and F	
5	450
10	400
15	350
20	300
25	250
30	200
35	150
40	100
45	50
50	0

C and G	
5	900
10	800
15	700
20	600
25	500
30	400
35	300
40	200
45	100
50	0

— Columns D *et seq.*

D	D
10	90
20	80
30	70
40	60
50	50
60	40
70	30
80	20
90	10
100	0

D and E	
10	300
20	266
30	233
40	200
50	166
60	133
70	100
80	66
90	33
100	0

D and F	
10	450
20	400
30	350
40	300
50	250
60	200
70	150
80	100
90	50
100	0

D and G	
10	900
20	800
30	700
40	600
50	500
60	400
70	300
80	200
90	100
100	0

10 011 *(cont'd)*

— Columns E *et seq.*

E	E
25	308
50	283
75	258
100	233
125	208
150	183
175	158
200	133
225	108
250	83
275	58
300	33
325	8
333	0

E and F	
25	462
50	425
75	387
100	350
125	312
150	271
175	237
200	200
225	162
250	125
275	87
300	50
325	12
333	0

E and G	
25	925
50	850
75	775
100	700
125	625
150	550
175	475
200	400
225	325
250	250
275	175
300	100
325	25
333	0

— Columns F and G

F	F
50	450
100	400
150	350
200	300
250	250
300	200
350	150
400	100
450	50
500	0

F and G	
50	900
100	800
150	700
200	600
250	500
300	400
350	300
400	200
450	100
500	0

If, on taking into account the mass of the first substance to be loaded (as shown in one of the columns of a quick reference table), the maximum quantity for the second substance is not reached (in the other column of the same table) the mass remaining available may be used for a third substance. To ascertain the permissible mass of that substance, reference should be made to the quick-reference table which is headed by the column letters corresponding to the second and third substances. If the maximum quantity for the third substance is not used up either, the same procedure may be followed in regard to loading one or more other substances.

In the left-hand column of each table, an intermediate higher value for a quantity actually loaded (e.g. in the B and D table, 9 between 8 and 10) may be rounded down to the lower value shown (in this case 8). In the right-hand column, on the other hand, an intermediate value for a quantity actually loaded (e.g. in the same table, 55 instead of 60) must be rounded up to the higher value shown (in this case 60).

2: For the purposes of this marginal and its table, the masses of liquids or gases contained in the ordinary fixed tanks of means of transport for their propulsion or for the operation of their specialized equipment (refrigerating appliances, for example) or for ensuring their safety shall not be taken into account.

10 012 (1) In the case of exemptions provided for in marginal 10 011, the transport document prescribed by marginal 2002 (3) shall bear the following inscription after the particulars specified in chapter B of the special requirements for each class of Annex A:

'Load not exceeding the exemption limits prescribed in marginal 10 011.'

(2) Where consignments from more than one consignor are carried in the same transport unit, the transport documents accompanying these consignments need not bear the inscription mentioned in paragraph (1).

10 013 Derogations from the provisions of this Annex may be made in the case of emergency transport to save human life.

Definitions

10 014 (1) For the purposes of this Annex:

— the term *'competent authority'* means the authority designated as such in each country and in each specific case by the Government;

— the term *'fragile package'* means a package containing a fragile receptacle (i.e. a receptacle made of glass, porcelain, stoneware or similar materials) which is not enclosed in a packaging with complete sides protecting it effectively against shock [see also Annex A, marginal 2001 (7)];

— the term *'gas'* means a gas or vapour;

— the term *'dangerous substances'*, when used alone, means the substances and articles designated as being substances and articles of this Directive;

— the term *'RID'* signifies Regulations concerning the international carriage of dangerous goods by rail, which are Annex I of COTIF — Convention concerning international carriage by rail, Appendix B — Uniform rules concerning the contract for international carriage of goods by rail (CIM);

— the term *'carriage in bulk'* means the carriage of a solid substance without packaging;

— the term *'container'* means an article of transport equipment (lift van, demountable tank or other similar structure):

- of a permanent character and accordingly strong enough to be suitable for repeated use;
- specially designed to facilitate the carriage of goods, by one or more means of transport, without breakage of load;
- fitted with devices permitting its ready handling, particularly when being transloaded from one means of transport to another;
- so designed as to be easy to fill and empty, and having an internal volume of not less than 1 m^3.

The term *'container'* does not cover conventional packagings or IBCs, or vehicles, or tank-containers; for Class 7 only, the term 'container' is defined in marginal 2700 (2).

— The term *'large container'* means a container having an internal volume of more than 3 m^3;

— the term *'small container'* means a container having an internal volume of not less than 1 m^3 and not more than 3 m^3;

— the term *'tank-container'* means an article of transport equipment conforming to the definition of the term 'container' given above and built to contain liquid, gaseous, powdery or granular substances but having a capacity of more than 0,45 m^3;

— the term *'battery of receptacles'* or *'battery of tanks'* means an assembly of several receptacles, as defined in marginal 2212 (1)(b), or of tanks as defined in marginal 2212 (1)(c), interconnected by manifold and permanently mounted in a frame;

— the term *'demountable tank'* means a tank, other than a fixed tank, a tank-container or a battery of receptacles, which has a capacity of over 1 000 litres, is not designed for the carriage of goods without breakage of load, and normally can only be handled when it is empty;

— the term *'fixed tank'* means a tank which is structurally attached to a vehicle (which then becomes a tank-vehicle) or is an integral part of the frame of such vehicle;

— the term *'tank'* when used alone, means a tank-container or a tank of a capacity exceeding 1 m^3 which may be a fixed tank, a demountable tank or a battery of receptacles. [See, however, a limitation of the meaning of the word 'tank' in the provisions common to the B.1 Appendices, marginal 200 000 (2)];

— the term *'transport unit'* means a motor vehicle without an attached trailer, or a combination consisting of a motor vehicle and an attached trailer;

— the term *'closed vehicle'* means a vehicle having a body capable of being closed;

10 014 (cont'd)

— the term *'open vehicle'* means a vehicle the platform of which has no superstructure or is merely provided with side boards and a tailboard;

— the term *'sheeted vehicle'* means an open vehicle provided with a sheet to protect the load;

— the term *'tank-vehicle'* means a vehicle built to carry liquids, gases, or powdery or granular substances and comprising one or more fixed tanks;

— the term *'battery vehicle'* means a vehicle with a battery of receptacles or a battery of tanks which is covered by the term 'tank vehicle';

— the term *'base vehicle'* means any incomplete motor vehicle or its trailer corresponding to a type approved in accordance with Appendix B.2.

(2) For the purposes of this Annex, tanks [see definition in (1) above] are not placed on the same footing as receptacles, the term 'receptacle' being used in a restrictive sense. Provisions concerning receptacles apply to fixed tanks, batteries of receptacles, demountable tanks and tank-containers only if this is expressly stipulated.

(3) The term 'full load' means any load originating from one sender, for which the use of a vehicle or a large container is exclusively reserved and all operations for loading and unloading are carried out in conformity with the instructions of the sender or consignee (see marginal 10 108).

(4) 'Wastes' are substances, solutions, mixtures or articles for which no direct use is envisaged but which are transported for reprocessing, dumping, elimination by incineration or other methods of disposal.

10 015 (1) Unless expressly stated otherwise, the sign '%' in this Annex represents:

(a) in the case of mixtures of solids or of liquids, and also in the case of solutions and of solids wetted by a liquid: a percentage by mass based on the total mass of the mixture, the solution or the wetted solid;

(b) in the case of mixtures of compressed gases: the proportion of the volume indicated as a percentage of the total volume of the gaseous mixture; in the case of mixtures of liquefied gases and gases dissolved under pressure: the proportion of the mass indicated as a percentage of the total mass of the mixture.

(2) Whenever the mass of a package is mentioned in this Annex, the gross mass is meant unless otherwise stated. The mass of containers or tanks used for the carriage of goods is not included in the gross mass.

(3) Pressures of all kinds relating to tanks (such as test pressure, working pressure, safety-valve opening pressure) are always indicated in gauge pressure (pressure in excess of atmospheric pressure); however, the vapour pressure of substances is always expressed in absolute pressure.

(4) Where this Annex specifies a degree of filling for tanks, the degree of filling is always given for a temperature of the substances of 15 °C unless some other temperature is indicated.

10 016-
10 099

SECTION 1

MODE OF CARRIAGE OF GOODS

10 100-
10 104

Method of dispatch, restrictions on forwarding

10 105 The carriage of certain dangerous goods is subject to the mandatory uses of a particular type of transport or equipment. These special conditions are set out in this Annex, Part II, marginals XX 105.

10 106-
10 107

Full load

10 108 Where the provisions relating to carriage as a 'full load' are applied, the competent authorities may require the vehicle or large container used for such carriage to be loaded at only one point and unloaded at only one point.

10 109-
10 110

Carriage in bulk

10 111 (1) Solid dangerous substances may not be carried in bulk unless this mode of carriage is expressly authorized for such substances by the provisions of Part II of this Annex, and then only under the conditions stipulated by those provisions.

Nevertheless, empty packagings, uncleaned, may be carried in bulk if this mode of carriage is not explicitly prohibited by the requirements of Annex A, Part II.

(2) For carriage in bulk in containers, see marginal 10 118 (2).

Note: See marginal 10 500 for marking and labelling of bulk vehicles

10 112-
10 117

Carriage in containers

Note: The provisions concerning carriage in tank-containers are set out in the marginals headed 'Carriage in tanks'.

10 118 (1) The carriage of packages in containers is authorized.

(2) Substances may not be carried in bulk in containers unless their carriage in bulk is expressly authorized (see marginal 10 111); small containers shall be of the closed type and have complete walls.

(3) Large containers shall meet the requirements concerning the body of the vehicle laid down in this Annex for the load in question; the body of the vehicle need not then satisfy those provisions.

(4) Subject to the provisions of the last phrase in (3) above, the fact that dangerous substances are contained in one or more containers shall not affect the conditions to be met by the vehicle by reason of the nature and quantities of the dangerous substances carried.

Note: See marginal 10 500 for the marking and labelling of containers.

10 119-
10 120

Carriage in tanks

10 121 (1) Dangerous substances may be carried in tanks only if this mode of carriage is expressly authorized for those substances by the provisions on the use of fixed tanks, demountable tanks and batteries of receptacles set out in each section 1 of Appendix B.1a, Part II, and those on the use of tank-containers set out in each section 1 of Appendix B.1b, Part II.

(2) Reinforced-plastics tanks may be used only if their use is expressly authorized in Appendix B.1c, marginal 213 010 (Use). The temperature of the substance carried shall not exceed 50 °C at the time of filling.

Note: See marginal 10 500 for the marking and labelling of vehicles with fixed or demountable tanks.

10 122-
10 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED
BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

10 200-
10 203

Types of vehicle

10 204 (1) A transport unit loaded with dangerous substances may in no case include more than one trailer or semi-trailer.

(2) Special provisions concerning the types of vehicle to be used for the carriage of certain dangerous substances will, where appropriate, be found in Part II of this Annex (see also the marginals dealing with carriage in containers, the carriage of solid substances in bulk, carriage in tanks, and tanks).

(3) Packages comprising packagings made of materials sensitive to moisture shall be loaded on to closed or on to sheeted vehicles.

10 205-
10 219

Vehicles used for the carriage of dangerous goods in fixed or demountable tanks; batteries of receptacles or tank-containers of a capacity greater than 3 000 litres

Notes: (a) The provisions concerning the design, inspection, filling and use of fixed tanks, demountable tanks and batteries of receptacles, and various provisions concerning tank-vehicles and their use, will be found in Appendix B.1a and, so far as the design of fixed tanks, demountable tanks and batteries of receptacles intended for the carriage of deeply refrigerated liquefied gases of Class 2 or requiring a test pressure of not less than 1 MPa (10 bar) is concerned, in Appendix B.1d (for the approval of tank-vehicles, see marginal 10 282).

(b) The provisions concerning the construction, items of equipment, type approval, tests, marking, etc. of tank-containers are to be found in Appendix B.1b and, so far as the construction of tank-containers intended for the carriage of deeply refrigerated liquefied gases of Class 2 or requiring a test pressure of not less than 1 MPa (10 bar) is concerned, in Appendix B.1d.

(c) The provisions concerning the construction of fixed tanks and demountable tanks of reinforced plastics are to be found in Appendix B.1c.

(d) The provisions common to the B.1 Appendices are to be found in marginal 200 000.

(e) For receptacles, see Annex A.

10 220 (1) Rear protection of vehicles: A bumper sufficiently resistant to rear impact shall be fitted over the full width of the tank at the rear of the vehicle. There shall be a clearance of at least 100 mm between the rear wall of the tank and the rear of the bumper (this clearance being measured from the rearmost point of the tank wall or from projecting fittings or accessories in contact with the substance being carried).

Vehicles with a tilting tank for the carriage of powdery or granular substances with rear discharge do not require a bumper if the rear fittings of the tank are provided with a means of protection which protects the tank in the same way as a bumper.

Notes: 1. This provision does not apply to vehicles used for the carriage of dangerous goods in tank-containers.

2. For the protection of tanks against damage by lateral impact or overturning, see marginal 211 127 (4) and (5).

10 220 *(cont'd)* (2) Vehicles carrying liquids having a flash-point of 61 °C or below or flammable substances of Class 2 as defined in marginal 2200 (3) shall, in addition, comply with the requirements of marginals 220 532, 220 533 and 220 534 of Appendix B.2.

Braking

10 221 (1) Motor vehicles (tractors and rigid vehicles) with a maximum mass exceeding 16 tons, and trailers (i.e. full trailers, semi-trailers and centre-axle trailers) with a maximum mass exceeding 10 tons [1], making up the following types of transport unit:

— tank vehicles,

— vehicles carrying demountable tanks or batteries of receptacles,

— vehicles carrying tank-containers with a capacity of more than 3 000 litres, and

— type III transport units [see marginal 11 204 (3)],

first registered after 30 June 1993, shall be fitted with an anti-lock braking system, the performance of which shall meet the provisions of marginals 220 520 and 220 521 of Appendix B.2.

(2) Each transport unit of a type specified in paragraph (1) above, which includes a motor vehicle and/or trailer of a type specified in (1) above, shall be fitted with an endurance braking system meeting the requirements of marginals 220 522 and 220 535 of Appendix B.2. When the transport unit comprises a motor vehicle and a trailer, the requirement applies when the motor vehicle is registered after 30 June 1993.

(3) Each transport unit of a type specified in paragraph (1) above in service after 31 December 1999 shall be equipped with the devices referred to in paragraphs (1) and (2).

10 222-
10 239

Fire-fighting appliances

10 240 (1) Every transport unit carrying dangerous goods shall be equipped with:

(a) at least one portable fire extinguisher of minimum capacity 2 kg dry powder (or equivalent rating for suitable extinguishants) suitable for fighting a fire in the engine or cab of the transport unit, and such that, if it is used to fight a fire involving the load, it does not aggravate the fire and, if possible, controls it; however, if the vehicle is equipped with a fixed fire extinguisher, automatic or easily brought into action for fighting a fire in the engine, the portable extinguisher need not be suitable for fighting a fire in the engine;

(b) in addition to the equipment prescribed under (a) above, at least one portable fire extinguisher of minimum capacity 6 kg dry powder (or equivalent rating for suitable extinguishants) suitable for fighting a tyre/brake fire or one involving the load, and such that, if it is used to fight a fire in the engine or cab of the transport unit, it does not aggravate the fire. Motor vehicles with a permissible maximum laden weight of less than 3,5 tons may be equipped with a portable fire extinguisher of a minimum capacity of 2 kg of powder.

(2) The extinguishing agents contained in the fire extinguishers with which a transport unit is equipped shall be such that they are not liable to release toxic gases into the driver's cab or under the influence of the heat of the fire.

(3) The portable fire extinguishers conforming to the provisions of paragraph (1) above shall be fitted with a seal verifying that they have not been used. In addition, they shall bear a mark of compliance with a standard recognized by a competent authority and an inscription indicating the date when they should next be inspected.

(4) Where a transport unit comprises a trailer and the laden trailer is uncoupled and left on the public highway, at a distance from the drawing vehicle, the trailer shall be equipped with at least one fire extinguisher conforming to the provisions of sub-paragraph (1) (b) of this marginal.

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[1] For semi-trailers and centre-axle trailers, the maximum mass refers to the weight transmitted to the ground by the axle or axles of the semi-trailer or centre-axle trailer, when that trailer is coupled to the drawing vehicle and carrying its maximum load.

10 241-
10 250

Electrical equipment

10 251 The requirements concerning the electrical equipment set out in marginal 220 511 of Appendix B.2 shall apply to every transport unit carrying dangerous substances for which an approval according to marginals 10 282 and 10 283 is required. The requirements in marginal 220 512 to 220 516 of Appendix B.2 shall apply only to the following vehicles:

(a) Transport units carrying tanks (fixed or demountable) or batteries of receptacles transporting either liquids having a flash-point of 61 °C or below, or flammable substances of Class 2 as defined in marginal 2200 (3). Transport units carrying tanks (fixed or demountable) transporting diesel fuel, gas-oil or heating oil light, with the identification number 1202, registered before 1 July 1995 and not conforming to this marginal, may, however, be used;

(b) Transport units intended for the carriage of explosives and having to comply with the requirements set out in marginal 11 204 (3) for transport units of type III.

10 252-
10 259

Miscellaneous equipment

10 260 Every transport unit carrying dangerous goods shall be equipped with:

(a) a tool kit for emergency repairs to the vehicle;

(b) for each vehicle, at least one scotch of a size suited to the weight of the vehicle and to the diameter of the wheels;

(c) two amber lights. These lights shall be independent of the electrical equipment of the vehicle and be so designed that their use cannot cause the goods being carried to ignite; they shall be steady or flashing;

(d) the necessary equipment to take the first safety measures referred to in the safety instructions set out in marginal 10 385.

10 261 (1) Motor vehicles (tractors and rigid vehicles) with a maximum mass exceeding 12 tons, registered for the first time after 1 July 1995, shall be equipped with a speed limitation device in accordance with marginal 220 540 of Appendix B.2.

(2) The requirements of paragraph (1) above are also applicable to vehicles with the same characteristics registered between 1 January 1988 and 1 July 1995, as from 1 July 1996.

10 262-
10 280

Type-approval of vehicles

10 281 At the request of the manufacturer or his duly accredited representative, base vehicles of new motor vehicles and their trailers which are subject to approval according to marginals 10 282 and 10 283, may be type approved by a competent authority in accordance with Appendix B.2. This type-approval shall be accepted as ensuring the conformity of the base vehicle when the approval of the complete vehicle is obtained, provided that no modification of the base vehicle alters its validity.

Approval of vehicles

10 282 (1) Tank-vehicles, vehicles carrying demountable tanks or batteries of receptacles and, where so required under the provisions of Part II of this Annex, other vehicles shall be subject to technical inspection in their country of registration to make sure that they conform to the provisions of this Annex, including those of its appendices, and to the general safety regulations (concerning brakes, lighting, etc.) in force in their country of registration; if these vehicles are trailers or semi-trailers coupled behind a drawing vehicle, the drawing vehicle shall be subject to technical inspection for the same purposes.

(2) A certificate of approval shall be issued by the competent authority of the country of registration for each vehicle whose inspection yields satisfactory results. It shall be drawn up in the language or one of the languages of the country issuing it, and also, if that language is not English, French, or German, in English, French or German, unless agreements concluded between the countries concerned in the transport operation provide otherwise. It shall conform to the model shown in Appendix B.3.

(3) A special certificate of approval issued by the competent authorities of one Member State for a vehicle registered in the territory of that Member State shall be accepted, so long as its validity continues, by the competent authorities of the other Member States.

(4) The validity of a special certificate of approval shall expire not later than one year after the date of the technical inspection of the vehicle preceding the issue of the certificate. However, in the case of tanks subject to compulsory periodic inspection this provision shall not mean that tightness (leakproofness) tests, hydraulic pressure tests or internal inspections of tanks have to be carried out at intervals shorter than those laid down in Appendices B.1a and B.1c.

10 283 Transport units intended for the carriage of tank-containers exceeding 3 000 l capacity shall be subject to an annual technical inspection in their country of registration to ensure that they conform to the general safety regulations concerning brakes, lighting, etc. in force in their country.

A certificate of approval shall be issued by the competent authority of the country of registration for each element of the transport unit whose inspection yields satisfactory results. The date of the last inspection should be specified. The model shown in Appendix B.3 may be used for this certificate.

10 284-
10 299

SECTION 3

GENERAL SERVICE PROVISIONS

10 300-
10 310

Vehicle crews

10 311 Where the relevant provisions of Part II of this Annex require the presence in the vehicle of an assistant, the assistant must be able to take over from the driver.

10 312-
10 314

Special training of drivers

10 315 (1) Drivers of tank-vehicles, drivers of transport units carrying tanks or tank-containers with a total capacity of more than 3 000 litres and/or a permissible maximum weight exceeding 3,5 tonnes and, where so required under the provisions of Part II of this Annex, drivers of other vehicles shall hold a certificate issued by the competent authority or by any organization recognized by that authority stating that they have participated in a training course and passed an examination on the particular requirements that have to be met during the carriage of dangerous goods.

10 315 *(cont'd)*

(2) As from 1 January 1995 drivers of vehicles other than those mentioned under paragraph (1) with a permissible maximum weight exceeding 3,5 tonnes, of the categories C and E referred to in Annex 6 to the Convention on Road Traffic (1968), shall hold a certificate as described under paragraph (1).

(3) By means of appropriate endorsements on his certificate made every five years by the competent authority or by any organization recognized by that authority, a vehicle driver shall be able to show that he has in the year before the date of expiry of his certificate completed a refresher training course and has passed a test approved by that authority.

(4) Training shall be given in the form of courses approved by the competent authority. Its main objectives are to make drivers aware of hazards arising in the carriage of dangerous goods and to give them basic information indispensable for minimizing the likelihood of an incident taking place and, if it does, to enable them to take measures which may prove necessary for their own safety and that of the environment and for limiting the effects of the incident. This training, which shall include individual practical exercices, shall as a basic training for all categories of driver cover:

(a) the general requirements governing the carriage of dangerous goods;

(b) the main types of hazard;

(c) information on environmental protection in control of the transfer of wastes;

(d) preventive and safety measures appropriate to the various types of hazard;

(e) what to do after an accident (first aid, road safety, basic knowledge about the use of protective equipment, etc.);

(f) labelling and marking to indicate danger;

(g) what a driver should and should not do during the carriage of dangerous goods;

(h) the purpose and the method of operation of technical equipment on vehicles;

(i) prohibitions on mixed loading in the same vehicle or container;

(j) precautions to be taken during loading and unloading of dangerous goods;

(k) general information concerning civil liability;

(l) information on multimodal transport operations.

For drivers of vehicles carrying goods in packages, the knowledge required in order to qualify for a training certificate shall also cover:

(m) handling and stowage of packages.

For drivers of vehicles carrying goods in tanks, the knowledge required in order to qualify for a training certificate shall also cover:

(n) the behaviour of vehicles carrying tanks or tank-containers on the road, including movements of the load.

(5) All training certificates conforming to the requirements of this marginal and issued in accordance with the model shown in Appendix B.6 by the competent authority of a Member State or by any organization recognized by that authority shall be accepted during their period of validity by the competent authorities of other Member States.

(6) The certificate shall be prepared in the language or one of the languages of the country of the competent authority which issued the certificate or recognized the issuing organization and, if this language is not English, French or German, also in English, French or German, except where otherwise provided by agreements concluded between the countries concerned with the transport operation.

(7) Certificates drawn up in accordance with the model prescribed in the provisions of this Directive in force as at 31 December 1989 may be used until their date of expiry. However, for the carriage of goods of Class 1 they may only be used if they are valid for Classes 1a, 1b and 1c, and for the carriage of goods of Class 9 they may only be used if they are valid for Classes 3, 6.1 and 8.

10 315 *(cont'd)* (8) Certificates drawn up in accordance with the model prescribed in the provisions of this Directive in force as at 28 January 1992 may be used for the carriage of dangerous goods in tanks or of goods of Class 1 respectively until their date of expiry.

10 316-
10 320

Supervision of vehicles

10 321 Vehicles carrying dangerous goods in the quantities shown in the relevant marginals of Part II shall be supervised or alternatively may be parked, unsupervised, in an isolated position in the open in a secure depot or secure factory premises. If such facilities are not available, the vehicle, after having been properly secured, may be parked in an isolated position meeting the requirements of paragraphs (i), (ii) or (iii) below. The parking facilities permitted in paragraph (ii) shall be used only if those described in paragraph (i) are not available, and those described in paragraph (iii) may be used only if facilities described in paragraphs (i) and (ii) are not available.

(i) A vehicle park supervised by an attendant who has been notified of the nature of the load and the whereabouts of the driver;

(ii) A public or private vehicle park where the vehicle is not likely to suffer damage from other vehicles; or

(iii) A suitable open space separated from the public highway and from dwellings, where the public does not normally pass or assemble.

10 322-
10 324

Carriage of passengers

10 325 Apart from members of the vehicle's crew, no passengers may be carried in transport units carrying dangerous substances.

10 326-
10 339

Use of fire-fighting appliances

10 340 The crew of the vehicle must know how to use the fire-fighting appliances.

10 341-
10 352

Portable lighting apparatus

10 353 (1) A vehicle may not be entered by persons carrying lighting apparatus comprising a flame. In addition, the lighting apparatus used shall not exhibit any metal surface liable to produce sparks.

(2) Closed vehicles carrying liquids having a flash-point of 61 °C or below or flammable substances or articles of Class 2, as defined in marginal 2200 (3), shall not be entered by persons carrying lighting apparatus other than portable lamps so designed and constructed that they cannot ignite any flammable vapours or gases which may have penetrated into the interior of the vehicle.

10 354-
10 377

Empty tanks

10 378 (1) For fixed tanks (tank vehicles), demountable tanks and batteries of receptacles, see marginal 211 177.

(2) For tank-containers, see marginal 212 177.

10 379-
10 380

Documents to be carried on the transport unit

10 381 (1) In addition to the documents required under other regulations, the following documents shall be carried on the transport unit:

(a) the transport documents prescribed in Annex A, marginal 2002 (3), (4) and (9), covering all the dangerous substances carried;

(b) a copy of the main text of the special agreement(s) concluded in accordance with marginals 2010 and 10 602 if transport is carried out on the basis of such agreement(s).

(2) Where the provisions of this Annex require the following documents to be drawn up, they shall likewise be carried on the transport unit:

(a) The special certificate of approval referred to in marginal 10 282 or 10 283 for each transport unit or element thereof;

(b) The driver's training certificate prescribed in marginal 10 315 and reproduced in Appendix B.6;

(c) The instructions prescribed in marginal 10 385, relating to all the dangerous substances carried and;

(d) The permit authorizing the transport operation.

10 382-
10 384

Instructions in writing

10 385 (1) As a precaution against any accident or emergency that may occur or arise during carriage, the driver shall be given instructions in writing specifying concisely:

(a) The nature of the danger inherent in the dangerous substances carried, and the safety measures that need to be taken to avert it;

(b) The action to be taken and treatment to be given in the event of persons coming into contact with the goods carried or with any substances which might escape therefrom;

(c) The measures to be taken in case of fire and, in particular, the fire-fighting appliances or equipment not to be used;

(d) The measures to be taken in case of breakage or deterioration of packagings or of the dangerous substances carried, particularly where such dangerous substances have spilled over the road;

(e) In the case of tank-vehicles or transport units comprising tanks or tank-containers with a total capacity of more than 3 000 litres and/or a permissible maximum weight exceeding 3,5 tonnes carrying substances covered by Appendix B.5, the name of the substance(s), the class, item number(s) and letter(s), and the substance identification and hazard identification numbers in accordance with Appendix B.5;

(f) The measures to be taken to avoid or minimize damage in the event of spillage of substances considered to be pollutant to the aquatic environment in addition to the hazards indicated by the danger labels.

10 385 *(cont'd)* (2) These instructions shall be prepared for each dangerous substance or class of dangerous substances by the manufacturer or the consignor, in a language of the country of origin; where that language is not the same as those of the countries of transit or destination, the instructions shall also be drawn up in the language of those countries. A set of these instructions shall be kept in the driver's cab.

(3) These instructions shall be supplied to the carrier at the latest when the transport order is given, so as to enable him to take all necessary steps to ensure that the employees concerned are aware of these instructions and are capable of carrying them out properly.

10 386-
10 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

10 400

Limitation of the quantities carried

10 401 The fact that dangerous substances are contained in one or more containers shall not affect the weight limitations laid down by this Annex regarding carriage in a single vehicle or in a single transport unit.

10 402

Prohibition of mixed loading on one vehicle

10 403 Unless the contrary is explicitly prescribed by the provisions of the sections 4 of Part II of this Annex, the prohibitions of mixed loading on one vehicle shall not apply to consignments of goods packed together in the manner permitted by the provisions on mixed packing contained in Annex A. Compliance with the prohibitions on mixed loading shall be based on the danger labels of Appendix A.9, which shall be affixed to packages in accordance with the requirements laid down for the various classes in Annex A.

Note: As prescribed in marginal 2002 (4), separate transport documents shall be prepared for consignments which may not be loaded together on the same vehicle.

Prohibition of mixed loading in one container

10 404 The prohibitions of mixed loading on one vehicle shall also be observed within each container.

Prohibition of mixed loading with goods contained in a container

10 405 For the purpose of the application of the prohibitions of mixed loading on one vehicle, no account shall be taken of substances contained in closed containers with complete sides.

10 406-
10 412

Cleaning before loading

10 413 All the provisions in this Annex which relate to the cleaning of vehicles before loading shall also apply to the cleaning of containers.

Handling and stowage

10 414 (1) The various components of a load comprising dangerous substances shall be properly stowed on the vehicle and secured by appropriate means to prevent them from being significantly displaced in relation to each other and to the walls of the vehicle. The load may be protected, for example, by the use of side wall fastening straps, sliding slatboards and adjustable brackets, air bags and anti-slide locking devices. The load is also sufficiently protected within the meaning of the first sentence if each layer of the whole loading space is completely filled with packages.

10 414 (cont'd) (2) All the provisions in this Annex which relate to the loading and unloading of vehicles and to the stowage and handling of substances shall also apply to the loading, stowage and unloading of containers on to and from vehicles.

(3) Packages bearing labels conforming to model No 12 shall be protected against damage that might be cause by other packages.

(4) A driver or a driver's assistant may not open a package containing dangerous substances.

Cleaning after unloading

10 415 (1) If, when a vehicle which has been loaded with packaged dangerous substances is unloaded, some of the contents are found to have escaped, the vehicle shall be cleaned as soon as possible and in any case before reloading.

(2) Vehicles which have been loaded with dangerous substances in bulk shall be properly cleaned before reloading unless the new load consists of the same dangerous substance as the preceding load.

(3) All the provisions of this Annex which relate to the cleaning or decontamination of vehicles shall also apply to the cleaning or decontamination of containers.

Prohibition of smoking

10 416 Smoking shall be prohibited during handling operations in the vicinity of vehicles and inside the vehicles.

Precautions against electrostatic charges

10 417 In the case of substances with a flash-point of 61 °C or below, a good electrical connection from the vehicle chassis to earth shall be established before tanks are filled or emptied. In addition, the rate of filling shall be limited.

10 418

Loading and unloading of dangerous substances in containers

10 419 The provisions of this Annex which relate to the loading and unloading of vehicles and the stowage and handling of dangerous substances shall also apply to the loading and unloading of dangerous substances in containers.

10 420-
10 430

Running the engine during loading or unloading

10 431 Except where the engine has to be used to drive the pumps or other appliances for loading or unloading the vehicle and the laws of the country in which the vehicle is operating permit such use, the engine shall be shut off during loading and unloading operations.

10 432-
10 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES, BATTERIES OF RECEPTACLES AND (TANK-) CONTAINERS

Marking

10 500 (1) Transport units carrying dangerous substances shall display two rectangular reflectorized orange-coloured plates of 40 cm base and not less than 30 cm high, set in a vertical plane. The plates shall have a black border not more than 15 mm wide.

They shall be affixed one at the front and the other at the rear of the transport unit, both perpendicular to the longitudinal axis of the transport unit. They shall be clearly visible. If the size and construction of the vehicle are such that the available surface area is insufficient to affix these orange-coloured plates, their dimensions may be reduced to 300 mm for the base, 120 mm for the height and 10 mm for the black border.

Note: The colour of the orange plates in conditions of normal use should have chromaticity co-ordinates lying within the area on the chromaticity diagram formed by joining the following co-ordinates:

Chromaticity co-ordinates of points at the corners of the area on the chromaticity diagram				
X	0,52	0,52	0,578	0,618
Y	0,38	0,40	0,422	0,38

Luminance factor of reflectorized colour: $\beta > 0{,}12$.

Reference centre E, standard illuminant C, normal incidence 45°, viewed at 0°.

Co-efficient of reflex luminous intensity at an angle of illumination of 5°, viewed at 0,2°: not less than 20 candelas per lux per m^2.

(2) Tank-vehicles or transport units having one or more tanks carrying dangerous goods covered by Appendix B.5, shall in addition display on the sides or each tank or tank compartment, clearly visible and parallel to the longitudinal axis of the vehicle, orange-coloured plates identical with those prescribed in paragraph (1). These orange-coloured plates shall bear the identification numbers prescribed in Appendix B.5 for each of the substances carried in the tank or in a compartment of the tank.

(3) Transport units and containers carrying dangerous solid substances in bulk covered by Appendix B.5 shall in addition display on the sides of each transport unit or container, clearly visible and parallel to the longitudinal axis of the vehicle, orange-coloured plates identical with those prescribed in paragraph (1). These orange-coloured plates shall bear the identification numbers prescribed for each of the substances carried in bulk in the transport unit or in the container.

(4) For containers carrying dangerous solid substances in bulk and for tanks-containers, the plates prescribed in paragraphs (2) and (3) may be replaced by a self-adhesive sheet, by paint or by any other equivalent process, provided the material used for this purpose is weather-resistant and ensures durable marking. In this case, the provisions of the last sentence of paragraph (6), concerning resistance to fire, shall not apply.

(5) For transport units carrying only one of the substances listed in Appendix B.5, the orange-coloured plates prescribed in paragraphs (2) and (3) shall not be necessary provided that those displayed at the front and rear in accordance with paragraph (1) bear the identification nombers prescribed in Appendix B.5.

(6) The identification numbers shall consist of black digits 100 mm high and of 15 mm stroke thickness. The hazard-identification number shall be inscribed in the upper part of the plate and the substance-identification number in the lower part; they shall be separated by a horizontal black line, 15 mm in stroke width, extending from side to side of the plate at mid-height (see Appendix B.5). The identification numbers shall be indelible and shall remain legible after 15 minutes' engulfment in fire.

(7) The above requirements are also applicable to empty fixed or demountable tanks, tank-containers and batteries of receptacles, uncleaned and not degassed and empty bulk vehicles and empty bulk containers, uncleaned.

10 500 (cont'd) (8) Orange-coloured plates which do not relate to dangerous goods carried, or residues thereof, shall be removed or covered. If plates are covered, the covering shall be total and remain effective after 15 minutes' engulfment in fire.

Labelling

(9) If the dangerous substances carried in a container are such that, under Annex A, one or more danger labels have to be affixed to the packages containing them, the same label or labels shall be affixed to the outside of the container containing those substances in packages or in bulk. However, labels Nos 10, 11 and 12 need not be affixed.

(10) Bulk containers, tank-containers and batteries of receptacles shall bear on both sides the labels prescribed in the XX 500 marginals of each class. If these labels are not visible from outside the carrying vehicles, the same labels shall also be affixed on both sides and at the rear of the vehicle.

(11) Bulk vehicles and vehicles with fixed or demountable tanks shall bear on both sides and at the rear the labels prescribed in marginal XX 500 of each class.

(12) The requirements of marginal 10 500 (10) and (11) are also applicable to empty fixed or demountable tanks, tank-containers and batteries or receptacles, uncleaned and not degassed and empty bulk vehicles and empty bulk containers, uncleaned.

(13) Labels which do not relate to dangerous goods being carried, or residues thereof, shall be removed or covered.

10 501-
10 502

Parking in general

10 503 No transport unit carrying dangerous substances may be parked without the parking brakes being applied.

10 504

Parking at night or in poor visibility

10 505 (1) If a vehicle is parked at night or in poor visibility and its lights are not working, the amber lights referred to in marginal 10 260 (c) shall be placed on the road,

— one about 10 m ahead of the vehicle; and

— the other about 10 m to the rear of the vehicle.

(2) The provisions of this marginal shall not apply in the territory of the United Kingdom.

10 506

Parking of a vehicle constituting a special danger

10 507 Without prejudice to the measures prescribed in marginal 10 505 above, if the nature of the dangerous substances carried in the parked vehicle constitutes a source of special danger to road-users (e.g. in the event of substances dangerous to pedestrians, animals or vehicles spilling over the road) and the crew of the vehicle is unable to eliminate the danger quickly, the driver shall alert the nearest competent authorities, or cause them to be alerted, immediately. He shall also, where necessary, take the measures prescribed in the instructions provided for in marginal 10 385.

10 508-
10 598

Other provisions

10 599 In so far as provisions not included in this part or in Part II of this Annex which concern the operation of vehicles carrying dangerous goods are concerned, the relevant measures adopted in this sphere by each Member State on the basis of its domestic legislation and relating to domestic carriage shall apply to international carriage using its territory.

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

10 600-
10 601

Rapid procedure for authorizing derogations for the purpose of trials

10 602 For the purpose of carrying out the trials necessary with a view to amending the provisions of this Annex in order to adapt them to technological and industrial developments, the competent authorities of the Member States may agree directly among themselves to authorize certain transport operations in their territories by temporary derogation from the provisions of this Annex. The period of validity of the temporary derogation shall be not more than five years from the date of its entry into force. The temporary derogation shall automatically come to an end from the date of the entry into force of a corresponding amendment to this annex.

10 603-
10 999

PART II

SPECIAL PROVISIONS APPLICABLE TO THE CARRIAGE OF DANGEROUS SUBSTANCES OF CLASSES 1 TO 9 SUPPLEMENTING OR AMENDING THE REQUIREMENTS OF PART I

CLASS 1

EXPLOSIVE SUBSTANCES AND ARTICLES

General

(Only the general provisions of Part I apply)

11 000-

11 099

SECTION 1

MODE OF CARRIAGE

11 100-

11 107

Full loads

11 108 (1) Substances and articles of Compatibility Group L shall only be carried as a full load.

(2) When substances and articles of divisions 1.1, 1.2 or 1.5 are carried in large containers, such consignments may be carried only as a full load.

11 109-
11 117

Carriage in containers

11 118 Provided that small containers satisfy the requirements prescribed in respect of the body of the vehicle for the transport operation concerned, the body of the vehicle need not satisfy those requirements.

11 119-
11 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

11 200-
11 203

Types of vehicles

11 204 For the purpose of this Annex, transport units authorized to carry substances and articles of Class 1 are classified as follows:

11 204 (1) 'Type I' transport units:

These vehicles shall be either closed or sheeted. The sheet of a sheeted vehicle shall be of impermeable material not readily inflammable. It shall be tautened so as to cover the vehicle on all sides, with an overlap of not less than 20 cm down the sides of the vehicle, and be kept in position by a lockable device.

(2) 'Type II' transport units: whose engines shall use a liquid fuel with a flash point of 55 °C or above.

(a) General

These vehicles shall be either closed or sheeted. The body shall be solidly constructed in such a manner that it adequately protects the goods carried. The loading surface, including the front wall, shall be continuous. If the vehicle is sheeted, the provisions relating to the sheeting on 'Type I' transport units shall be met.

If the transport unit includes a trailer, this trailer shall have a coupling device which is quickly detachable and robust; and it shall be fitted with an effective braking device which acts on all the wheels, is actuated by the drawing vehicle's service-brake control and automatically stops the trailer in the event of breakage of the coupling.

(b) Engine and exhaust system

The engine and the exhaust system shall comply with the requirements of marginals 220 533 and 220 534 of Appendix B.2.

(c) Fuel tank

The fuel tank shall comply with the requirements of marginal 220 532 of Appendix B.2.

(d) Driver's Cab

The material used in the construction of the driver's cab shall comply with the requirements of marginal 220 531(1) of Appendix B.2.

Auxiliary heating appliances shall comply with the requirements of marginal 220 536 of Appendix B.2.

(3) 'Type III' transport units:

which possess all the characteristics of closed vehicles of 'Type II' with bodies which also meet the following provisions:

(a) The body shall be closed and have a continuous surface. It shall be solidly constructed of materials which are not readily inflammable, in such a manner that it adequately protects the goods carried. The materials used for the lining shall be incapable of producing sparks. The insulating and heat resisting properties of the body shall be at least equivalent to those of a partition consisting of a metal outer wall lined with a layer of fire-proofed wood of 10 mm thickness.

(b) All the doors shall be capable of being locked. They shall be so placed and constructed as to overlap the joints.

Special requirements for the use of vehicles of certain types

11 205 (1) Trailers, except semi-trailers, loaded with substances and articles of Class 1, and meeting the specifications required for transport units of Types II and III, may be drawn by motor vehicles which do not meet these specifications.

(2) For carriage in containers the provisions of marginals 10 118(3) and 11 118 shall apply. For free-flowing powdery substances of 2°, 4°, 8°, 26° and 29°, and for fireworks of 9°, 21° and 30°, the floor of a container shall have a non-metallic surface or covering.

11 206-
11 209

Materials to be used in the construction of vehicle bodies

11 210 No materials likely to form dangerous compounds with the substances carried shall be used in the construction of the body [see also marginal 11 204 (3)].

11 211 For carriage in containers the provisions of marginals 10 118(3) and 11 118 shall apply. For free-flowing powdery substances of 2°, 4°, 8°, 26° and 29°, and for fireworks of 9°, 21° and 30°, the floor of a container shall have a non-metallic surface or covering.

11 212-
11 250

Electrical equipment

11 251 (1) The rated voltage of the electric lighting system shall not exceed 24V.

(2) Transport units of Types II and III shall meet the following requirements:

(a) Batteries shall be adequately secured and protected from damage due to collision and shall have their terminals protected by an electrically insulating cover.

(b) The installation of interior lighting in the load-carrying compartment shall be dust-tight (at least IP54 or equivalent) or, in the case of Compatibility Group J, flame-proof Ex d (at least IP65 or equivalent). The switch shall be located on the outside.

11 252-
11 281

Approval of vehicles

11 282 The requirements of marginal 10 282 shall be applicable to Type III transport units.

11 283-
11 299

SECTION 3

GENERAL SERVICE PROVISIONS

11 300-
11 310

Vehicle crews

11 311 (1) A driver's assistant shall be carried on every transport unit. If the national regulations so provide, the competent authority of a Member State may require an approved official to be carried in the vehicle at the carrier's expense.

(2) The first sentence of paragraph (1) does not apply to convoys of more than two vehicles if the drivers of the first and last vehicles of the convoy are accompanied by an assistant.

(3) The presence of a driver's assistant on board shall not be required in the case of articles of 43°, identification No 0336, carried in a type I transport unit.

11 312-
11 314

Special training of drivers

11 315 The provisions of paragraphs (1), (3), (4)(a) to (m) and (5) of marginal 10 315 shall apply to drivers of vehicles carrying substances or articles of Class 1 in excess of the limited quantities specified in marginal 10 011.

11 316-
11 320

Supervision of vehicles

11 321 The requirements of marginal 10 321 shall be applicable only when substances and articles of Class 1 having a total mass of explosive substance of more than 50 kg are carried in a vehicle. In addition, these substances and articles shall be supervised at all times in order to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire. Empty packagings of 51° are exempted.

11 322-
11 353

Prohibition of fire and naked flame

11 354 The use of fire or naked flame shall be prohibited on vehicles carrying substances and articles of Class 1, in their vicinity and during the loading and unloading of these substances and articles.

11 355-
11 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

11 400

Limitation of the quantities carried

11 401 The total net mass in kg of explosive substance (or in the case of explosive articles, the total net mass of explosive substance contained in all the articles combined) which may be carried on one transport unit shall be limited as indicated in the table below (see also marginal 11 403 as regards the prohibition of mixed loading):

Maximum permissible net mass in kg of explosive in Class 1 goods per transport unit

Division	1.1	1.2	1.3		1.4	1.5 and 1.6	
Item Transport Unit	1°-12°	13°-25°	26°-34°	35°-45°	46°, 47°	48°, 49°, 50°	51°
Type I	50	50	50	300 (1)	Unlimited	50	Unlimited
Type II	1 000	3 000	5 000	15 000	Unlimited	5 000	Unlimited
Type III	15 000	15 000	15 000	15 000	Unlimited	15 000	Unlimited

(1) Identification Number 0336: 3 000 kg (4 000 kg for a transport unit with a trailer).

11 402 Where substances and articles of different divisions of Class 1 are loaded on one transport unit in conformity with the prohibitions of mixed loading contained in 11 403, the load as a whole shall be treated as if it belonged to the most dangerous division (in the order 1.1, 1.5, 1.2, 1.3, 1.6, 1.4).

Where substances of 48° are carried in one transport unit together with substances or articles of division 1.2, the entire load shall be treated for carriage as if it belonged to division 1.1

Prohibitions on mixed loading

11 403 (1) Packages bearing a label conforming to models Nos 1, 1.4, 1.5 or 1.6 but which are assigned to different compatibility groups shall not be loaded together on one vehicle, unless mixed loading of the corresponding compatibility groups is authorized in the following table:

Comptability group	B	C	D	E	F	G	H	J	L	N	S
B	×										×
C		×	×	×		×				(2) (3)	×
D		×	×	×		×				(2) (3)	×
E		×	×	×		×				(2) (3)	×
F					×						×
G		×	×	×		×					×
H							×				×
J								×			×
L									(1)		
N		(2) (3)	(2) (3)	(2) (3)						(2)	×
S	×	×	×	×	×	×	×	×		×	×

× = mixed loading authorized.

(1) Packages containing substances and articles of Compatibility Group 1 may be loaded together on one vehicle with packages containing the same type of substances and articles of that compatibility group.

(2) Different types of 1.6N articles may be transported together as 1.6N articles only when it is proven by testing or analogy that there is no additional risk of sympathetic detonation between the articles. Otherwise they should be treated as hazard division 1.1.

(3) When articles of compatibility group N are carried with substances or articles of compatibility groups C, D or E, the articles of compatibility group N should be considered as having the characteristics of compatibility group D.

(2) Packages bearing a label conforming to models Nos 1, 1.4 or 1.5 shall not be loaded together in one vehicle with packages bearing a label conforming to models Nos 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 7A, 7B, 7C, 8 or 9.

11 404

Prohibition of mixed loading with goods contained in a container

11 405 (1) The prohibitions of mixed loading of goods laid down in marginal 11 403 shall apply within each container.

(2) The provisions of marginal 11 403 shall apply as between the dangerous goods contained in a container and the other dangerous goods loaded on the same vehicle, whether or not the latter goods are enclosed in one or more other containers.

11 406

Places of loading and unloading

11 407 (1) The following operations are prohibited:

(a) Loading or unloading substances and articles of Class 1 in a public place in a built-up area without special permission from the competent authorities;

(b) Loading or unloading substances and articles of Class 1 in a public place elsewhere than in a built-up area without prior notice thereof having been given to the competent authorities, unless these operations are urgently necessary for reasons of safety.

(2) If, for any reason, handling operations have to be carried out in a public place, then substances and articles of different kinds shall be separated according to the labels.

11 408-
11 409

Precautions with respect to articles of consumption

11 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

(2) Empty packagings, uncleaned, bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

11 411-
11 412

Cleaning before loading

11 413 Before substances and articles of Class 1 are loaded, the loading surface of the vehicle shall be thoroughly cleaned.

11 414-
11 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF VEHICLES AND CONTAINERS

Marking and labelling

Labelling

11 500 (1) In addition to the provisions of marginal 10 500, transport units carrying packages or articles bearing labels conforming to models Nos 1, 1.4, 1.5 or 1.6 shall bear a similar label on both sides and at the rear. Compatibility groups shall not be indicated on labels if the transport unit is carrying substances and articles belonging to several compatibility groups.

(2) A transport unit carrying substances or articles of different divisions shall bear only labels conforming to the model of the most dangerous division, in the order: 1.1. (most dangerous), 1.5, 1.2, 1.3, 1.6, 1.4 (least dangerous). When substances of 48° are carried with substances or articles of division 1.2, the transport unit shall be labelled as division 1.1.

11 500 (cont'd) (3) Transport units carrying substances or articles of the following items and identification numbers shall in addition bear labels conforming to model No 6.1:

4° Nos 0076 and 0143

21° No 0018

26° No 0077

30° No 0019

43° No 0301

(4) Transport units carrying articles of the following items and identification numbers shall in addition bear labels conforming to model No 8:

21° Nos 0015 and 0018

30° Nos 0016 and 0019

43° No 0301 and 0303

(5) The provisions of paragraphs (1) to (4) shall not apply to transport units carrying containers providing the containers are labelled in accordance with the requirements of marginal 10 500 (9).

11 501-
11 508

Halts for operational requirements

11 509 When vehicles carrying substances and articles of Class 1 are obliged to stop for loading or unloading operations in a public place, a distance of at least 50 m shall be maintained between the stationary vehicles.

11 510-
11 519

Convoys

11 520 (1) When vehicles carrying substances and articles of Class 1 travel in convoy, a distance of not less than 50 m shall be maintained between each transport unit and the next.

(2) The competent authority may lay down rules for the order or composition of convoys.

11 521-
11 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

11 600-
20 999

CLASS 2

GASES: COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE

General

(Only the general provisions of Part I apply)

21 000-
21 099

SECTION 1

MODE OF CARRIAGE

21 100-
21 117

Carriage in containers

21 118 The carriage in small containers of packages containing gases of 7° (a) and 8° (a) is prohibited.

21 119-
21 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

21 200-
21 211

Ventilation

21 212 If packages containing gases of 1° to 6° and 9° (c) are carried in a closed vehicle, the vehicle shall be provided with adequate ventilation.

21 213-
21 259

Special equipment

21 260 When compressed gases or liquefied gases harmful to the respiratory organs or entailing a risk of poisoning and identified by the letter 't' in the list of substances are being carried, the crew of the vehicle shall be provided with gas masks (respirators) of a type appropriate to the gases being carried.

21 261-
21 299

SECTION 3

GENERAL SERVICE PROVISIONS

21 300-
21 320

Supervision of vehicles

21 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below in quantities exceeding those specified:

— Boron trifluoride and fluorine of 1° (at); the substances of 3° (at), of 3° (bt) other than ethyl chloride and of 3° (ct); hydrogen chloride of 5° (at); and the deeply-refrigerated liquefied gases of 7° (a) and 8° (a): 1 000 kg;

— The substances of 3° (b); ethyl chloride of 3° (bt); vinyl chloride of 3° (c); the substances of 4° (b); and the deeply-refrigerated liquefied gases of 7° (b) and 8° (b): 10 000 kg.

21 322-
21 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

21 400-
21 402

Prohibition of mixed loading on one vehicle

21 403 Packages bearing a label conforming to models Nos 2, 3 or 6.1 shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

21 404-
21 406

Places of loading and unloading

21 407 (1) The following operations are prohibited:

(a) Loading or unloading the following substances in a public place in a built-up area without special permission from the competent authorities: hydrogen bromide, chlorine, nitrogen dioxide, sulphur dioxide or phosgene [3° (at)]; hydrogen sulphide [3° (bt)]; and hydrogen chloride [5° (at)];

(b) Loading or unloading the substances listed under (a) above in a public place elsewhere than in a built-up area without prior notice having been given to the competent authorities, unless the said operations are justified for serious reasons of safety.

The permission and the notice provided from in (a) and (b) above respectively shall not be required if the substances are contained in cylinders, receptacles, 'assemblies of cylinders' or receptacles conforming to marginal 2207 having a capacity not exceeding 1 000 litres as described in marginal 2212 (1) (a), (b), (d) or (e).

(2) If for any reason handling operations have to be carried out in a public place, then:

— Substances and articles of different kinds shall be separated according to the labels; and

— Packages fitted with means of handling shall be kept flat while being handled.

21 408-
21 413

Handling and stowage

21 414 (1) Packages shall not be thrown or subjected to impact.

(2) Receptacles shall be so stowed in the vehicle that they cannot overturn or fall and that the following requirements are met:

(a) The cylinders referred to in marginal 2212 (1)(a) shall be laid parallel to or at right angles to the longitudinal axis of the vehicle; however, those situated near the forward transverse wall shall be laid at right angles to the said axis.

Short cylinders of large diameter (about 30 cm and over) may be stowed longitudinally with their valve-protecting devices directed towards the middle of the vehicle.

Cylinders which are sufficiently stable or are carried in suitable devices effectively preventing them from overturning may be placed upright.

Cylinders which are laid flat shall be securely and appropriately wedged, attached or secured so that they cannot shift.

(b) Receptacles containing gases of 7° (a) or 8° (a) shall always be placed in the position for which they were designed and be protected against any possibility of being damaged by other packages.

21 415-
21 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES, BATTERIES OF RECEPTACLES AND (TANK-) CONTAINERS

Marking and labelling of vehicles

Labelling

21 500 (1) Vehicles with fixed or demountable tanks, tank-containers and batteries of receptacles containing or having contained (empty, uncleaned) substances of Class 2 other than those listed in Table 2 of this marginal shall bear the label(s) indicated in Table 1 below:

TABLE 1

Substances and articles	Label model Nos
Classified under (a)	2
Classified under (at)	6.1
Classified under (b)	3
Classified under (bt)	6.1 + 3
Classified under (c)	3
Classified under (ct)	6.1 + 3

(2) Vehicles with fixed or demountable tanks, tank-containers, or batteries of receptacles, (cont'd) containing or having contained (empty, uncleaned) substances listed in Table 2 below shall bear the label(s) indicated.

21 500 *(cont'd)*

TABLE 2

Item No	Substances	Label model Nos
1°a)	Oxygen	2 + 05
2°a)	Mixtures with more than 25 % oxygen by volume	2 + 05
3°at)	Chlorine, hydrogen bromide, phosgene	6,1 + 8
3°at)	Nitrogen dioxide	6,1 + 05
5°a)	Nitrous oxide	2 + 05
5°at)	Hydrogen chloride	6,1 + 8
7°a)	Hydrogen oxide, oxygen	2 + 05
8°a)	Mixtures with more than 32 % nitrous oxide by mass, air, Mixtures containing more than 20 % oxygen by mass	2 + 05

21 501-
21 508

Halts of limited duration for service requirements

21 509 In the carriage of dangerous substances of Class 2 other than those of 1° (a) and (at), 2° (a), 7° (a), 8° (a), and 10°, halts for service requirements shall so far as possible not be made near inhabited places or places of resort. A halt near such a place may not be prolonged except with the agreement of the competent authorities.

21 510-
21 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

21 600-
30 999

CLASS 3

INFLAMMABLE LIQUIDS

General

(Only the general provisions of Part I apply)

31 000-
31 099

SECTION 1

MODE OF CARRIAGE

(Only the general provisions of Part I apply)

31 100-
31 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

(Only the general provisions of Part I apply)

31 200-
31 299

SECTION 3

GENERAL SERVICE PROVISIONS

31 300-
31 320

Supervision of vehicles

31 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below in quantities exceeding those specified:

— Substances of 1° to 5° (a) and (b), 7° (b), 21° to 26° and slightly toxic substances of 41° to 57°: 10 000 kg

— Substances of 6° and 11° to 19°, 27°, 28°, and toxic or very toxic substances of 41° to 57°: 5 000 kg

31 322-
31 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

31 400-
31 402

Prohibition of mixed loading on one vehicle

31 403 Packages bearing a label conforming to model No 3 shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

31 404-
31 409

Precautions with respect to articles of consumption

31 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

(2) Empty receptacles, uncleaned, bearing labels conforming to models No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

31 411-
31 414

Cleaning after unloading

31 415 If any substances of 6° and 11° to 19°, 27°, 28°, 32° and the toxic or very toxic substances of 41° to 57° have leaked and been spilled in a vehicle, it may not be re-used until after it has been thoroughly cleaned and, if necessary, decontaminated. Any other goods and articles carried in the same vehicle shall be examined for possible contamination.

31 416-
31 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES AND (TANK-) CONTAINERS

Marking and labelling

Labelling

31 500 Vehicles with fixed or demountable tanks and tank-containers containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 3.

Those containing or having contained the substances of this Class listed in marginal 2312 (3) to (5) shall also bear labels in accordance with that marginal.

31 501-
31 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

31 600-
40 999

CLASS 4.1

FLAMMABLE SOLIDS

General

(Only the general provisions of Part I apply)

41 000-
41 099

SECTION 1

MODE OF CARRIAGE

41 100-
41 104

Method of dispatch and restrictions on forwarding

41 105 (1) Substances of 5° and 15° may be carried only in tank-vehicles, demountable tanks and tank-containers.

41 105 *(cont'd)*

(2) Substances of 26° shall be shielded from direct sunlight and heat during carriage.

(3) Substances of 41° to 50° shall be forwarded so that the control temperatures indicated in marginal 2400 (20), given for listed substances in marginal 2401 and for non-listed substances in the approved conditions of carriage [see marginal 2400 (16)], are not exceeded.

(4) Maintenance of the prescribed temperature is essential for the safe carriage of many self-reactive substances. In general, there shall be:

— thorough inspection of the transport unit prior to loading;

— instructions to the carrier about the operation of the refrigeration system, including a list of the suppliers of coolant available en route;

— procedures to be followed in the event of loss of control;

— regular monitoring of operating temperatures; and

— provision of a back-up refrigeration system or spare parts.

(5) Any control and temperature sensing devices in the refrigeration system shall be readily accessible and all electrical connections weather-proof. The temperature of the air space within the transport unit shall be measured by two independent sensors and the output shall be so recorded that temperature changes are readily detectable. The temperature shall be checked every four to six hours and logged. When substances having a control temperature of less than + 25 °C are carried, the transport unit shall be equipped with visible and audible alarms, powered independently of the refrigeration system, set to operate at or below the control temperature.

(6) If the control temperature is exceeded during carriage, an alert procedure shall be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g. by adding liquid or solid coolant). There shall also be frequent checking of the temperature and preparations for implementation of the emergency procedures. If the emergency temperature (see also marginals 2400 (20) and 2401) is reached, the emergency procedures shall be set in operation.

(7) The suitability of a particular means of temperature control for carriage depends on a number of factors. Amongst those to be considered are:

— the control temperature(s) of the substance(s) to be carried;

— the difference between the control temperature and the anticipated ambient temperature conditions;

— the effectiveness of the thermal insulation;

— the duration of carriage; and

— allowance of a safety margin for delays.

(8) Suitable methods for preventing the control temperature being exceeded are, in order of increasing capability:

(a) thermal insulation; provided that the initial temperature of the self-reactive substance(s) is sufficiently below the control temperature;

(b) thermal insulation and coolant system; provided that:

— an adequate quantity of non-flammable coolant (e.g. liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for delay, is carried or the possibility of replenishment is assured;

— liquid oxygen or air is not used as coolant;

— there is a uniform cooling effect even when most of the coolant has been consumed; and

— the need to ventilate the transport unit before entering is clearly indicated by a warning on the door(s);

41 105 *(cont'd)*

(c) thermal insulation and single mechanical refrigeration; provided that flameproof electrical fittings are used within the coolant compartment to prevent ignition of flammable vapours from the self-reactive substances;

(d) thermal insulation and combined mechanical refrigeration system and coolant system; provided that:

— the two systems are independent of one another; and

— the requirements (b) and (c) are met;

(e) thermal insulation and dual mechanical refrigeration system provided that:

— apart from the integral power supply unit, the two systems are independent of one another;

— each system alone is capable of maintaining adequate temperature control; and

— flameproof electrical fittings are used within the coolant compartment to prevent ignition of flammable vapours from the self-reactive substances.

(9) For substances of 41° and 42°, one of the following methods of temperature control described in paragraph (8) shall be used:

— method (c) when the maximum ambient temperature to be expected during carriage does not exceed the control temperature by more than 10 °C; or

— method (d) or (e).

For substances of 43° to 50°, one of the following methods shall be used:

— method (a) when the maximum ambient temperature to be expected during carriage is at least 10 °C below the control temperature;

— method (b) when the maximum ambient temperature to be expected during carriage does not exceed the control temperature by more than 30 °C; or

— method (c), (d) or (e).

41 106-
41 110

Carriage in bulk

41 111 (1) Substances listed by name under 6° (c) with the exception of naphthalene, 11° (c), 12° (c), 13° (c) and 14° (c) and solid wastes classified under (c) of the above-mentioned items may be carried in bulk in closed or sheeted vehicles.

Naphthalene of 6° (c) may be carried in bulk in closed vehicles with a metal body or in vehicles covered with a non-combustible sheet and having a metal body or having floor and walls protected from the load.

(2)* Waste of 4° (c) may be carried in bulk in open but sheeted vehicles with adequate ventilation. Suitable measures shall be taken to ensure that none of the contents, particularly liquid components, can escape.

41 112-
41 117

Carriage in containers

41 118 Small containers used for the carriage in bulk of substances mentioned in marginal 41 111 shall meet the requirements for vehicles in that marginal.

41 119-
41 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

41 200-
41 203

Types of vehicle

41 204 Substances of 31° to 40° shall be loaded in closed or sheeted vehicles.

Where, under the provisions of 41 105, substances are required to be carried in insulated, refrigerated or mechanically-refrigerated vehicles, those vehicles shall satisfy the provisions of 41 248. Substances of 41° to 50° contained in protective packagings filled with a coolant shall be loaded in closed or sheeted vehicles. If the vehicles used are closed they shall be adequately ventilated. Sheeted vehicles shall be fitted with side boards and a tail-board. The sheets of these vehicles shall be of an impermeable and non-combustible material.

41 205-
41 247

Insulated, refrigerated and mechanically-refrigerated vehicles

41 248 Insulated, refrigerated and mechanically-refrigerated vehicles used in accordance with the provisions of 41 105 shall conform to the following conditions:

(a) the vehicle shall be such and so equipped as regards its insulation and means of refrigeration (see marginal 41 105) that the maximum temperature prescribed in 41 105 is not exceeded. The overall heat transfer coefficient shall be not more than 0,4 $W/m^2 K$;

(b) the vehicle shall be so equipped that vapours from the substances or the coolant carried cannot penetrate into the driver's cab;

(c) a suitable device shall be provided enabling the temperature prevailing in the loading space to be determined at any time from the cab;

(d) the loading space shall be provided with vents or ventilating valves if there is any risk of a dangerous excess pressure arising therein. Care shall be taken where necessary to ensure that refrigeration is not impaired by the vents or ventilating valves;

(e) the refrigerant shall not be flammable; and

(f) the refrigerating appliance of a mechanically-refrigerated vehicle shall be capable of operating independently of the engine used to propel the vehicle.

41 249-
41 299

SECTION 3

GENERAL SERVICE PROVISIONS

41 300-
41 320

Supervision of vehicles

41 321 The provisions of 10 321 shall apply to the dangerous goods listed below in quantities exceeding those specified:

— substances of 21° to 25°:	1 000 kg
— substances of 26°:	100 kg
— substances of 31°, 32°, 43° and 44°:	1 000 kg
— substances of 33°, 34°, 45° and 46°:	2 000 kg
— substances of 35°, 36°, 47° and 48°:	5 000 kg
— substances of 41° and 42°:	500 kg.

41 321 *(cont'd)* In addition, vehicles carrying more than 500 kg of substances of 41° and 42° shall be subject at all times to supervision to prevent any malicious act and to alert the driver and competent authorities in the event of loss or fire.

41 322-
41 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

41 400

Limitation of the quantity carried

41 401 (1) A transport unit shall carry not more than:

— 5 000 kg of substances of 31° and 32° if its loading space is ventilated at the top and the transport unit is insulated with heat-resistant material [see marginal 11 204 (3) (a)] or 1 000 kg of substances of 31° and 32° if the transport unit does not meet these requirements;

— 10 000 kg of substances of 33° and 34°;

— 20 000 kg of substances of 35°, 36°, 37°, 38°, 39° and 40°;

— 1 000 kg of substances of 41° and 42° or 5 000 kg if insulated with heat-resistant material;

— 5 000 kg of substances of 43° and 44° or 10 000 kg if insulated with heat-resistant material; and

— 20 000 kg of substances of 45°, 46°, 47°, 48°, 49° and 50°.

(2) When substances of this Class are carried together in one transport unit, the limits given in paragraph (1) shall not be exceeded and the total contents shall not exceed 20 000 kg.

41 402 The provisions of marginals 10 500 and 41 204 shall not apply to the carriage of substances listed in or covered by 31° to 34° and 41° to 44° provided that the substance is packaged in accordance with packing method OP1A, OP1B, OP2A or OP2B, as required, and the quantity per transport unit is limited to 10 kg.

Prohibition on mixed loading on one vehicle

41 403 (1) Packages bearing a label conforming to model No 4.1 shall not be loaded together on one vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

(2) Packages bearing labels conforming to models Nos 4.1 and 01 shall not be loaded together in the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6, 2, 3, 4.2, 4.3, 5.1, 5.2, 6.1, 7A, 7B, 7C, 8 or 9.

41 404-
41 409

Precautions with respect to foodstuffs, articles of consumption and animal feeds

41 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

(2) Empty uncleaned packagings bearing labels conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

41 411-
41 413

Handling and stowage

41 414 (1) Packages containing substances of 26° shall be stored only in cool, well-ventilated places away from heat sources.

(2) Packages containing substances of 41° to 50° shall not be placed on top of other goods; in addition, they shall be so stowed as to be readily accessible.

(3) For packages containing substances of 41° to 50°, the specified control temperature shall be maintained during the whole transport operation, including loading and unloading, as well as any intermediate stops [see marginal 41 105(2)].

(4) Packages shall be loaded so that a free circulation of air within the loading space provides a uniform temperature of the load. If the contents of one vehicle or large container exceed 5 000 kg of flammable solids, the load shall be divided into stacks of not more than 5 000 kg separated by air spaces of at least 0,05 m.

41 415-
41 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES AND (TANK-) CONTAINERS

Marking and labelling

Labelling

41 500 Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 4.1.

Those containing or having contained the substances of this Class listed in marginal 2412 (3) shall also bear labels in accordance with that marginal.

41 501-
41 508

Halts of limited duration for service requirements

41 509 During the carriage of substances of 31°, 32°, 41° and 42°, stops for service requirements shall as far as possible not be made near inhabited places or frequented places. A longer stop near such places is permissible only with the consent of the competent authorities. The same rule shall apply if a transport unit is loaded with more than 2 000 kg of substances of 33°, 34°, 43° and 44°.

41 510-
41 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

41 600-
41 999

CLASS 4.2

SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

General

(Only the general provisions of Part I apply)

42 000-
42 099

SECTION 1

MODE OF CARRIAGE

42 100-
42 104

Method of dispatch and restrictions on forwarding

42 105 Phosphorus of 22° may be carried only in tank-vehicles, demountable tanks and tank-containers.

42 106-
42 110

Carriage in bulk

42 111 Substances of 1° (c), 2° (c), 3°, borings, shavings, turnings and cuttings of ferrous metals of 12° (c), spent iron oxide and spent iron sponge of 16° (c) and solid wastes classified under (c) of the above-mentioned items, may be carried in bulk.

These substances shall, however, be carried in closed or sheeted vehicles with a metal body.

42 112-
42 117

Carriage in containers

42 118 Small containers used for the carriage in bulk of substances mentioned in marginal 42 111 shall meet the requirements for vehicles in that marginal.

42 119-
42 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

42 200-
42 203

Types of vehicle

42 204 Packages containing substances of Class 4.2 shall be carried in closed or sheeted vehicles.

42 205-
42 299

SECTION 3

GENERAL SERVICE PROVISIONS

42 300-
42 320

Supervision of vehicles

42 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below when their quantity exceeds the mass indicated:

— Substances classified under (a) of the various items and substances of 22°: 10 000 kg.

42 322-
42 377

Empty tanks

42 378 For tanks which have contained phosphorus of 11° (a) and 22°, see also marginals 211 470 (2) and 212 470 (2).

42 379-
42 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

42 400-
42 402

Prohibition of mixed loading on one vehicle

42 403 Packages bearing a label conforming to model No 4.2 shall not be loaded together on one vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

42 404-
42 409

Precautions with respect to foodstuffs, articles of consumption and animal feeds

42 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

(2) Uncleaned empty packagings bearing a label conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

42 411-
42 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATIONS OF (TANK-)VEHICLES AND (TANK-)CONTAINERS

Marking and labelling

Labelling

42 500 Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 4.2.

Those containing or having contained the substances of this Class listed in marginal 2442 (3) to (5) shall also bear labels in accordance with that marginal.

42 501-
42 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

42 600-
42 999

CLASS 4.3

SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

General

(Only the general provisions of Part I apply)

43 000-
43 099

SECTION 1

MODE OF CARRIAGE

43 100-
43 110

Carriage in bulk

43 111 (1) Substances of 11° (c), 12° (c), 13° (c), 14° (c), 17° (b) and 20° (c) may be carried in bulk in specially equipped vehicles. The openings used for loading and unloading shall be capable of being closed hermetically.

(2) Aluminium dross of 13° (b) may be carried in bulk in well-ventilated sheeted vehicles.

(3) Aluminium dross of 13° (c), ferrosilicon of 15° (c), calcium silicide in pieces of 12° (b) and substances of 12° (c) in pieces may also be carried in bulk in sheeted or closed vehicles.

43 112-
43 117

Carriage in containers

43 118 Small containers used for the carriage in bulk of substances mentioned in marginal 43 111 shall meet the requirements for vehicles in that marginal.

43 119-
43 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

43 200-
43 203

Types of vehicle

43 204 Packages containing substances of Class 4.3 shall be loaded in closed or sheeted vehicles.

43 205-
43 299

SECTION 3

GENERAL SERVICE PROVISIONS

43 300-
43 320

Supervision of vehicles

43 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below when their quantity exceeds the mass indicated:

— Substances classified under (a) of the various items: 10 000 kg.

43 322-
43 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

43 400-
43 402

Prohibition of mixed loading on one vehicle

43 403 Packages bearing a label conforming to model No 4.3 shall not be loaded together on one vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

43 404-
43 409

Precautions with respect to foodstuffs, articles of consumption and animal feeds

43 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

(2) Empty packagings, uncleaned, bearing labels conforming to model No 6.1 shall be kept separate from foodstuffs, articles of consumption and animal feeds in vehicles and at places of loading, unloading and transloading.

43 411-
43 413

Handling and stowage

43 414 While packages are being handled, special measures shall be taken to prevent them from coming into contact with water.

43 415-
43 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION (TANK-)VEHICLES AND (TANK-)CONTAINERS

Marking and labelling

Labelling

43 500 Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 4.3.

Those containing or having contained the substances of this Class listed in marginal 2482 (3) to (7) shall also bear labels in accordance with that marginal.

43 501-
43 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

43 600-
50 999

CLASS 5.1

OXIDIZING SUBSTANCES

General

(Only the general provisions of Part I apply)

51 000-
51 099

SECTION 1

MODE OF CARRIAGE

51 100-
51 104

Method of dispatch and restrictions on forwarding

51 105 Ammonium nitrate of 20° may be carried only in tank-vehicles, demountable tanks and tankcontainers.

51 106-
51 110

Carriage in bulk

51 111 (1) Substances of 11° to 13°, 16°, 18°, 19°, 21°, 22° (c) and solid wastes, classified under the above-mentioned items may be carried in bulk as a full load.

(2) Substances of 11° to 13°, 16°, 18°, 19°, 21°, 22° (c) and solid wastes classified under the above-mentioned items shall be carried in closed vehicles or sheeted vehicles covered with an impermeable non-combustible sheet. Vehicles shall be so constructed either that the substance cannot come into contact with wood or any other combustible material or that the entire surface of the floor and walls, if combustible, has been provided with an impermeable and incombustible surfacing or treated with substances rendering the wood difficult to ignite.

51 112-
51 117

Carriage in containers

51 118 (1) With the exception of fragile packages within the meaning of marginal 10 014 (1) and packages containing hydrogen peroxide or solutions of hydrogen peroxide of 1° (a) or tetranitromethane of 2°, packages containing substances listed in this Class may be carried in small containers.

(2) Containers intended for the carriage in bulk of substances of 11° to 13°, 16°, 18° and 19° shall be made of metal, be leakproof, be covered with a lid or an impermeable sheet resistant to combustion, and be so constructed that the substances in the containers cannot come into contact with wood or any other combustible material.

(3) Containers intended for the carriage in bulk of substances of 21° and 22° (c) shall be covered with a lid or an impermeable non-combustible sheet and be so constructed either that the substance in the containers cannot come into contact with wood or any other combustible material or that the entire surface of the floor and walls, if made of wood, has been provided with an impermeable surfacing resistant to combustion or has been coated with sodium silicate or a similar substance.

51 119-
51 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

51 200-
51 203

Types of vehicle

51 204 Flexible IBCs containing substances of 11° to 13° and 16° (b) shall be carried in closed or sheeted vehicles. The sheet shall be of an impermeable and non-combustible material. Steps shall be taken to ensure that, if a leakage occurs, the substances contained in the vehicle cannot come into contact with wood or any other combustible material.

51 205-
51 219

Vehicles used for the carriage of dangerous goods in fixed or demountable tanks, or tank-containers of a capacity greater than 3 000 litres

51 220 For carriage of liquids of 1° (a):

(1) The provisions of marginals 220 531(2), 220 532 and 220 533 of Appendix B.2 shall apply;

(2) No wood, unless covered with metal or with a suitable synthetic material, shall be used in the construction of any part of the vehicle situated to the rear of the shield prescribed in marginal 220 531 (2).

(3) Vehicles shall carry a tank placed as securely as possible, and having a capacity of about 30 litres of water. An anti-freeze preparation which does not attack the skin or the mucous membranes and does not react chemically with the load shall be added to the water.

51 221-
51 299

SECTION 3

GENERAL SERVICE PROVISIONS

51 300-
51 320

Supervision of vehicles

51 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below when their quantity exceeds the mass indicated:

— Substances of 5° and substances classified under (a) of all other items: 10 000 kg.

51 322-
51 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

51 400-
51 402

Prohibition of mixed loading on one vehicle

51 403 Packages bearing a label conforming to model No 5.1 shall not be loaded together on one vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

51 404-
51 409

Precautions with respect to foodstuffs, articles of consumption and animal feeds

51 410 (1) Packages bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds, in vehicles and at places of loading, unloading and transloading.

(2) Empty uncleaned packagings bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds, in vehicles and at places of loading, unloading and transloading.

51 411-
51 413

Handling and stowage

51 414 The use of readily flammable materials for stowing packages in vehicles is prohibited.

51 415-
51 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATIONS OF (TANK-)VEHICLES AND (TANK-)CONTAINERS

Marking and labelling

Labelling

51 500 Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 5.1.

Those containing or having contained the substances of this Class listed in marginal 2512(3) shall also bear labels in accordance with that marginal.

51 501-
51 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

51 600-
51 999

CLASS 5.2

ORGANIC PEROXIDES

General

(Only the general provisions of Part I apply)

52 000-
52 099

SECTION 1

MODE OF CARRIAGE

52 100-
52 104

Method of dispatch and restrictions on forwarding

52 105 (1) Substances of 11° to 20° shall be forwarded in such manner that the control temperatures indicated in marginal 2550 (16) to (19), given for substances listed in marginal 2551 and for non-listed substances in the approved conditions of carriage [see marginal 2550 (8)], are never exceeded.

(2) Maintenance of the prescribed temperature is essential for the safe carriage of many organic peroxides. In general, there shall be:

— thorough inspection of the transport unit prior to loading;

— instructions to the carrier about the operation of the refrigeration system including a list of the suppliers of coolant available en route;

— procedures to be followed in the event of loss of control;

— regular monitoring of operating temperatures; and

— provision of a back-up refrigeration system or spare parts.

(3) Any control and temperature sensing devices in the refrigeration system shall be readily accessible and all electrical connections shall be weather-proof. The temperature of the air inside the transport unit shall be measured by two independent sensors and the output shall be recorded so that any change in temperature is readily detectable. The temperature shall be checked every four to six hours and logged. When substances having a control temperature of less than +25 °C are carried, the transport unit shall be equipped with visible and audible alarms, powered independently of the refrigeration system and set to operate at or below the control temperature.

(4) If the control temperature is exceeded during carriage, an alert procedure shall be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g. by adding liquid or solid coolant). There shall also be frequent checking of the temperature and preparations for implementation of the emergency procedures. If the emergency temperature [see also marginals 2550 (17) and 2551] is reached, the emergency procedures shall be set in operation.

(5) The means of temperature control chosen for the transport operation depends on a number of factors. Amongst those to be considered are:

— the control temperature(s) of the substance(s) to be carried;

— the difference between the control temperature and the expected ambient temperature;

— the effectiveness of the thermal insulation;

— the duration of the transport operation; and

— the safety margin to be allowed for delays en route.

(6) Suitable methods to prevent the control temperature from being exceeded are listed below, in ascending order of effectiveness:

(a) thermal insulation; provided that the initial temperature of the organic peroxide(s) is sufficiently below the control temperature;

52 105 *(cont'd)*

(b) thermal insulation and coolant system; provided that:

— an adequate quantity of non-flammable coolant (e.g. liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for possible delay, is carried or a menas of replenishment is assured;

— liquid oxygen or air is not used as coolant;

— there is a uniform cooling effect even when most of the coolant has been consumed; and

— the need to ventilate the transport unit before entering is clearly indicated by a warning on the door(s);

(c) thermal insulation and single mechanical refrigeration; provided that flameproof electrical fittings are used within the coolant compartment to prevent ignition of flammable vapours from the organic peroxides;

(d) thermal insulation and combined mechanical refrigeration system and coolant system; provided that:

— the two systems are independent of one another; and

— the requirements in (b) and (c) are met;

(e) thermal insulation and dual mechanical refrigeration system; provided that:

— apart from the integral power supply unit, the two systems are independent of one another;

— each system alone is capable of maintaining adequate temperature control; and

— flameproof electrical fittings are used within the coolant compartment to prevent ignition of flammable vapours from the organic peroxides.

(7) For substances of 11° and 12°, one of the following methods of temperature control described in paragraph (6) shall be used:

— method (c) when the maximum ambient temperature to be expected during carriage does not exceed the control temperature by more than 10 °C; otherwise

— (d) or (e).

For substances of 13° to 20°, one of the following methods shall be used:

— method (a) when the maximum ambient temperature to be expected during carriage is at least 10 °C below the control temperature;

— method (b) when the maximum ambient temperature to be expected during carriage does not exceed the control temperature by more than 30 °C; otherwise

— method (c), (d) or (e).

52 106-
52 117

Carriage in containers

52 118 Fragile packages within the meaning of marginal 10 014 (1), as well as packages containing substances of 1° or 2°, shall not be carried in small containers.

52 119-
52 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

52 200-
52 203

Types of vehicle

52 204 Substances of 1° to 10° shall be loaded in closed or sheeted vehicles.

52 204 *(cont'd)* Where, under the provisions of 52 105, substances are required to be carried in insulated, refrigerated or mechanically-refrigerated vehicles, those vehicles shall satisfy the provisions of 52 248. Substances of 11° to 20° contained in protective packagings filled with a coolant shall be loaded in closed or sheeted vehicles. If the vehicles used are closed they shall be adequately ventilated. Sheeted vehicles shall be fitted with side boards and a tail-board. The sheets of these vehicles shall be of an impermeable and non-combustible material.

52 205-
52 247

Insulated, refrigerated and mechanically-refrigerated vehicles

52 248 Insulated, refrigerated and mechanically-refrigerated vehicles used in accordance with the provisions of 52 105 shall conform to the following conditions:

(a) the vehicle shall be such and so equipped as regards its insulation and means of refrigeration (see marginal 52 105) that the maximum temperature prescribed in 52 105 is not exceeded. The overall heat transfer coefficient shall be not more than 0,4 W/m^2 K;

(b) the vehicle shall be so equipped that vapours from the substances or the coolant carried cannot penetrate into the driver's cab;

(c) a suitable device shall be provided enabling the temperature prevailing in the loading space to be determined at any time from the cab;

(d) the loading space shall be provided with vents or ventilating valves if there is any risk of a dangerous excess pressure arising therein. Care shall be taken where necessary to ensure that refrigeration is not impaired by the vents or ventilating valves;

(e) the refrigerant shall not be flammable; and

(f) the refrigerating appliance of a mechanically refrigerated vehicle shall be capable of operating independently of the engine used to propel the vehicle.

52 249-
52 299

SECTION 3

GENERAL SERVICE PROVISIONS

52 300-
52 320

Supervision of vehicles

52 321 The provisions of 10 321 shall apply to the dangerous goods listed below when their quantity exceeds the mass indicated:

— substances of 1°, 2°, 13° and 14°: 1 000 kg

— substances of 3°, 4°, 15° and 16°: 2 000 kg

— substances of 5°, 6°, 17° and 18°: 5 000 kg

— substances of 11° and 12°: 500 kg

In addition, vehicles carrying more than 500 kg of substances of 11° and 12° shall be subject at all times to supervision to prevent any malicious act and to alert the driver and competent authorities in the event of loss or fire.

52 322-
52 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

52 400

Limitation of the quantities carried

52 401 (1) A transport unit shall not carry more than:

— 5 000 kg of substances of 1° and 2° if its loading space is ventilated at the top and the transport unit is insulated with heat-resistant material [see marginal 11 204 (3)(a)], or 1 000 kg of substances of 1° and 2° if the transport unit does not meet these requirements;

— 10 000 kg of substances of 3° and 4°;

— 20 000 kg of substances of 5°, 6°, 7°, 8°, 9° and 10°;

— 1 000 kg of substances of 11° and 12°, or 5 000 kg if insulated with heat-resistant material;

— 5 000 kg of substances of 13° and 14°, or 10 000 kg if insulated with heat-resistant material; and

— 20 000 kg of substances of 15°, 16°, 17°, 18°, 19° and 20°.

(2) When substances of this Class are loaded together in one transport unit, the limits given in paragraph (1) shall not be exceeded and the total contents shall not exceed 20 000 kg.

52 402 The provisions of marginals 10 500 and 52 204 shall not apply to the carriage of substances listed in or covered by 1° to 4° and 11° to 14° provided that the substance is packaged in accordance with packing method OP1A, OP1B, OP2A or OP2B, as required, and the quantity per transport unit is limited to 10 kg.

Prohibition of mixed loading on one vehicle

52 403 (1) Packages bearing a label conforming to model No 5.2 shall not be loaded together in the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

(2) Packages bearing labels conforming to models Nos 5.2 and 01 shall not be loaded together in the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6, 2, 3, 4.1, 4.2, 4.3, 5.1, 6.1, 7A, 7B, 7C, 8 or 9.

52 404-
52 412

Cleaning before loading

52 413 Vehicles intended for the carriage of packages containing substances of Class 5.2 shall be carefully cleaned.

Handling and stowage

52 414 (1) The use of readily flammable materials for stowing packages in vehicles is prohibited.

52 414 (cont'd)

(2) Packages containing substances of 11° to 20° shall be so stowed as to be readily accessible.

(3) For packages containing substances of 11° to 20°, the control temperature shall be maintained during the whole transport operation, including loading and unloading, as well as any intermediate stops [see marginal 52 105(1)].

(4) Packages shall be loaded so that a free circulation of air within the loading space provides a uniform temperature of the load. If the contents of a vehicle or large container exceed 5 000 kg of organic peroxide, the load shall be divided into stacks of not more than 5 000 kg separated by air spaces of at least 0,05 m.

52 415-
52 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES AND (TANK-) CONTAINERS

Marking and labelling

Labelling

52 500 Vehicles with fixed or demountable tanks and tank-containers, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 5.2.

Those containing or having contained the substances of this Class listed in marginal 2559 (3) to (4) shall also bear labels in accordance with that marginal.

52 501-
52 508

Halts of limited duration for service requirements

52 509 During the carriage of substances of 1°, 2°, 11° and 12° halts for service requirements shall so far as possible not be made in residential or urban areas. A halt near such a place may not be prolonged except with the agreement of the competent authorities. The same rule shall apply if a transport unit is loaded with more than 2 000 kg of substances of 3°, 4°, 13° and 14°.

52 510-
52 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

52 600-
59 999

CLASS 6.1

TOXIC SUBSTANCES

General

(Only the general provisions of Part I apply)

61 000-
61 099

SECTION 1

MODE OF CARRIAGE

61 100-
61 110

Carriage in bulk

61 111 (1) Substances of 60° (c) and 3243 solids containing toxic liquid of 65° (b) may be carried in bulk as a full load.

(2) Substances of 60° (c) and 3243 solids containing toxic liquid of 65° (b) shall in such case be carried in sheeted, open vehicles. Vehicles containing 3243 solids containing toxic liquid of 65° (b) in bulk shall be leakproof or rendered leakproof, for example by means of a suitable and sufficiently stout inner lining.

(3) Solid wastes containing substances of 60° (c) may be carried under the same conditions as the substances themselves. Other solid wastes classified under the letter (c) of the various items may be carried in bulk only under the conditions of marginal 61 118.

61 112-
61 117

Carriage in containers

61 118 Containers intended for the carriage in bulk of solid wastes classified under (c) of the various items and 3243 solids containing toxic liquid of 65° (b) shall have complete walls and be sheeted or have a cover.

Containers containing 3243 solids containing toxic liquid of 65° (b) in bulk shall be leakproof or rendered leakproof, for example by means of a suitable and sufficiently stout inner lining.

61 119-
61 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

61 200-
61 259

Special equipment

61 260 Whenever motor fuel anti-knock mixtures of 31° (a) or receptacles having contained them are carried, the driver shall, when he is given the transport document, at the same time be given a portable equipment box fitted with a handle and containing:

— three copies of the written instructions specifying the action to be taken in the event of an accident or incident occurring during carriage (see marginal 61 385);

— two pairs of gloves and two pairs of boots made of rubber or some suitable plastics material;

— two respirators with an activated-charcoal cartridge of 500 cm^3 capacity;

61 260 (cont'd)
— a bottle (made of bakelite, for example) containing 2 kg of potassium permanganate and bearing the inscription 'dissolve in water before use';
— six fibreboard notices bearing the inscription 'DANGER — volatile poison spilled. Do not approach without respirator' in the language or languages of each of the countries in whose territory carriage takes place.
— this equipment box shall be kept in the driver's cab in a place where it can easily be found by the decontamination team.

61 261-
61 299

SECTION 3

GENERAL SERVICE PROVISIONS

61 300-
61 301

Action to be taken in the event of accident

61 302 (See marginal 61 385)

Precautions with respect to articles of consumption

61 303 (See marginal 61 410)

61 304-
61 320

Supervision of vehicles

61 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below in quantities exceeding those specified:
— substances of 1° to 5° and substances classified under (a) of all items: 1 000 kg
— substances classified under (b) of all items: 5 000 kg.

61 322-
61 384

Instructions in writing

61 385 Where motor fuel anti-knock mixtures of 31° (a), or receptacles which have contained them, are carried, the text of the written instructions shall specify, *inter alia*, the following:

(A) Precautions to be observed

The substance being carried is highly toxic. In the event of leakage from one of the receptacles the following precautions should be taken:

1. Avoid:
   (a) contact with the skin;
   (b) inhalation of vapours;
   (c) introduction of the liquid into the mouth.

61 385 *(cont'd)*

2. When drums which are torn open or damaged or wetted with liquid are being handled, the use of the following is compulsory:

(a) respirators;

(b) gloves made of rubber or some suitable plastics material;

(c) boots made of rubber or some suitable plastics material.

In the event of a serious accident involving obstruction of the public highway, it is essential that persons arriving to clear the site should be warned of the danger incurred.

(B) Action to be taken

All practicable steps, including the use of the notices referred to in marginal 61 260, shall be taken to keep persons at a distance of not less than 15 metres from the site of the accident; the notices contained in the equipment box shall be set up round the enclosure and onlookers shall be kept away.

The respirators, gloves and boots will enable one person to approach the load and verify its condition.

Should any of the drums be torn open, the following should be done:

(a) additional respirators, gloves and boots with which to equip the workmen should be procured urgently;

(b) drums still intact should be set aside;

(c) the liquid spilled on the vehicle or on the ground should be neutralized by copious swilling with an aqueous solution of potassium permanganate (a neutralizing agent a bottle of which is kept in the equipment box); the solution is easily prepared by stirring 0,5 kg of permanganate with 15 litres of water in a bucket; swilling should be carried out several times, because it takes 2 kg of potassium permanganate to neutralize completely 1 kg of the substance being carried.

Where practicable, the best way to decontaminate the area is to pour petrol over the spilled fluid and ignite it.

(C) Important notice

In case of accident, one of the first steps which must be taken is to notify by telegram or telephone ... (insert here the address and telephone numbers of the establishments to be notified in each of the countries in whose territory carriage is to take place).

A vehicle which has been contaminated with the substance carried shall not be put back into service until it has been decontaminated under the supervision of a competent person. Any wooden parts of the vehicle which have been attacked by the substance carried shall be removed and burnt.

61 386-
61 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

61 400-
61 402

Prohibition of mixed loading on one vehicle

61 403 Packages bearing a label conforming to model No 6.1 shall not be loaded together on one vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

61 404-
61 406

Places of loading and unloading

61 407 (1) The following operations are prohibited:

(a) loading or unloading substances of 1° to 5° and any substance classified under (a) of other items in a public place in a built-up area without special permission from the competent authorities;

(b) loading or unloading the said substances in a public place elsewhere than in a built-up area without prior notice having been given to the competent authorities, unless the said operations are justified for serious reasons of safety.

(2) If, for any reason, handling operations have to be carried out in a public place, then substances and articles of different kinds shall be separated according to the labels.

61 408-
61 409

Precautions with respect to articles of consumption

61 410 Substances of Class 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading or transloading.

61 411-
61 414

Cleaning after unloading

61 415 (1) A vehicle which has been contaminated with substances of 31° (a) or with a mixture thereof shall not be put back into service until it has been decontaminated under the supervision of a competent person. Any wooden parts of the vehicle which have been attacked by substances of 31° (a) shall be removed and burnt.

(2) If substances in this Class have leaked and been spilled in a vehicle, it may not be reused until after it has been thoroughly cleaned and, if necessary, decontaminated. All other goods and articles carried in the same vehicle shall be examined for possible contamination.

61 416-
61 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF VEHICLES (TANK-VEHICLES) AND CONTAINERS (TANK-CONTAINERS)

Marking and labelling

Marking

61 500 (1) Whenever substances of 31° (a) are carried, the vehicle shall display on each side a warning notice to the effect that, if any liquid escapes, the greatest caution must be exercised and that the vehicle must not be approached without respirator, gloves and boots of rubber or some suitable plastics material.

Labelling

(2) Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 6.1.

Those containing or having contained (empty, uncleaned) the substances of this Class listed in marginal 2612 (3) to (10) shall also bear labels in accordance with that marginal.

61 501-
61 508

Halts of limited duration for service requirements

61 509 Halts for service requirements shall so far as possible not be made in residential or urban areas. A halt near such a place may not be prolonged except with the agreement of the competent authorities.

61 510-
61 514

Protection against the action of the sun

61 515 During the period April to October inclusive, when a vehicle carrying hydrogen cyanide of 1° is stationary, the packages shall, if the legislation of the country in which the vehicle is halted so requires, be effectively protected against the action of the sun, e.g. by means of sheets placed not less than 20 cm above the load.

61 516-
61 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

61 600-
61 999

CLASS 6.2

INFECTIOUS SUBSTANCES

General

(Only the general provisions of Part I apply)

62 000-
62 099

SECTION 1

MODE OF CARRIAGE

62 100-
62 104

62 105 Packages containing substances of this Class shall be carried in closed or covered vehicles.

62 106-
62 117

Carriage in containers

62 118 (1) Packages containing substances of this Class may be carried in small containers.

(2) The mixed loading prohibitions of marginal 62 403 shall also apply to the contents of small containers.

62 119-
62 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

62 200-
62 239

Fire-fighting appliances

62 240 The provisions of marginal 10 240 (1) (b), (3) and (4), shall not apply.

62 241-
62 299

SECTION 3

GENERAL SERVICE PROVISIONS

62 300-
62 301

Action to be taken in the event of accident

62 302 (See marginal 62 385)

Precautions with respect to articles of consumption

62 303 (See marginal 62 410)

62 304-
62 320

Supervision of vehicles

62 321 The provisions of marginal 10 321 shall apply to all substances of 1°, whatever their mass. They shall also apply to substances of 2° whose quantity exceeds a mass of 100 kg. However, the provisions of marginal 10 321 need not be applied where the loaded compartment is locked and the packages carried are otherwise protected against any illicit unloading.

62 322-
62 352

62 353 The provisions of marginal 10 353 shall not apply.

62 354-
62 384

Instructions in writing

62 385 (1) The instructions in writing shall also include:

(a) the provision that, in the cases provided for marginal 10 385 (1) (d) the local health or veterinary authorities shall be informed;

(b) information as to how the substance(s) are to be absorbed and contained, and how the dangers of the substance(s) of Class 6.2 are to be eliminated on the spot, e.g. suitable disinfectants;

(c) information on suitable protective equipment for the driver.

62 386-
62 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

62 400-
62 402

Prohibition of mixed loading on one vehicle

62 403 (1) Packages bearing a label conforming to model No 6.2 shall not be loaded together in the same vehicle with foodstuffs, other articles of consumption and animal feeds.

(2) Packages bearing a label conforming to model No 6.2 shall not be loaded together in the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

62 404-
62 409

Precaution with respect to articles of consumption

62 410 Substances of class 6.2 shall not be loaded together in the same vehicle with foodstuffs, other articles of consumption and animal feeds [see 62 403(1)]. They shall be kept apart from foodstuffs, other articles of consumption and animal feeds at places of loading, unloading or transloading.

62 411

62 412 Substances of item 4° shall be carried in tanks or in specially equipped vehicles in a manner which avoids risks to humans, animals and the environment, e.g. by loading in bags or by airtight connections.

62 413

Handling and storage

62 414 (1) Packages containing substances of this Class shall be so stowed that they are readily accessible.

(2) When packages of this Class are to be carried at ambient temperature of not more than 15 °C or refrigerated, the temperature shall be maintained when unloading or during storage.

(3) Packages of this Class shall be stored only in cool places away from sources of heat.

Cleaning after unloading

62 415 If substances of this Class have leaked and been spilled in a vehicle, it may not be reused until after it has been thoroughly cleaned and, if necessary, disinfected. All goods and articles carried in such a vehicle shall be checked for possible contamination. The wooden parts of the vehicle which have come into contact with the substances of items 1° and 2° shall be removed and burnt.

62 416-
62 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF VEHICLES (TANK-VEHICLES) AND CONTAINERS (TANK-CONTAINERS)

Marking and labelling

Labelling

62 500 Vehicles with fixed tanks or demountable tanks, specially equipped vehicles and tank-containers containing or having contained (empty, uncleaned) substances of 4°, shall bear labels conforming to model No 6.2.

62 501-
62 508

Halts of limited duration for service requirements

62 509 Halts of vehicles carrying substances of 1° and 2° for service, requirements shall so far as possible not be made in residential or urban areas. A halt near such a place may not be prolonged except with the agreement of the competent authorities.

62 510-
62 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

62 600-
70 999

CLASS 7

RADIOACTIVE MATERIAL

General

Carriage

71 000 For details see the relevant schedule in marginal 2704.

71 001-
71 099

SECTION 1

MODE OF CARRIAGE

Provisions

71 100 For details see the relevant schedule in marginal 2704.

71 101-
71 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

Provisions

71 200 For details see the relevant schedule in marginal 2704.

71 201-
71 299

SECTION 3

GENERAL SERVICE PROVISIONS

Provisions

71 300 For details see the relevant schedule in marginal 2704.

71 301-
71 320

Supervision of vehicles

71 321 The provisions of marginal 10 321 shall apply to all material, in whatever mass.

In addition, these goods shall be subject at all times to supervision to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire.

However, the provisions of marginal 10 321 need not be applied where:

(a) The loaded compartment is locked and the packages carried are otherwise protected against illicit unloading; and

(b) The dose rate does not exceed 5 μSv/h (0,5 mrem/h) at any accessible point on the outer surface of the vehicle.

In addition, these goods shall be subject at all times to supervision to prevent any malicious act and to alert the driver and the competent authorities in the event of loss or fire.

71 322-
71 324

Carriage of passengers

71 325 The provisions of marginal 10 325 shall not apply to transport units carrying only radioactive material of schedules 1 to 4.

71 326-
71 352

Portable lighting apparatus

71 353 The provisions of marginal 10 353 shall not apply provided there is no subsidiary risk.

71 354-
71 384

Instructions in writing

71 385 The provisions of marginal 10 385 shall not apply to transport units carrying only radioactive material of schedules 1 to 4.

71 386-
71 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

Provisions

71 400 For details see the relevant schedule in marginal 2704.

71 401-
71 402

Prohibition of mixed loading on one vehicle

71 403 Packages bearing a label conforming to models Nos 7A, 7B or 7C shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

71 404-
71 414

Cleaning after unloading

71 415 For decontamination requirements, see marginal 3712.

71 416-
71 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-)VEHICLES AND (TANK-)CONTAINERS

Marking and labelling

Labelling

71 500 (1) In addition to the requirements of marginal 10 500, every vehicle carrying radioactive material shall bear on the outside of each side wall and of the rear wall a label conforming to model No 7D.

However, these requirements shall not apply to vehicles carrying only the radioactive material referred to in schedules 1 to 4 of marginal 2704.

In addition to the provisions of marginal 10 500 (1) concerning the reduction in size of the orange-coloured plate, the label conforming to model No 7D may also be reduced to 100 mm for each side.

(2) The labels prescribed in marginal 10 500 (9) shall be affixed to all four sides of the container.

71 500 *(cont'd)* (3) The labels and the orange-coloured plates as prescribed in Class 7 shall be affixed to all four sides of tha tank container. If these labels or plates are not visible from outside the vehicle, the same labels and plates shall be affixed to the sides and the rear of the vehicle.

71 501-
71 506

Parking of a vehicle constituting a special danger

71 507 In addition to marginal 10 507, see Appendix A.7 marginal 3712. These requirements shall, however, not apply to vehicles carrying only radioactive material of schedules 1 to 4 of marginal 2704.

71 508-
71 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

71 600-
80 999

CLASS 8

CORROSIVE SUBSTANCES

General

(Only the general provisions of Part I apply)

81 000-
81 099

SECTION 1

MODE OF CARRIAGE

81 100-
81 110

Carriage in bulk

81 111 (1) Lead sulphate of 1° (b), substances of 13° (b) and 3244 solids with corrosive liquid of 65 (b) may be carried in bulk as a full load. The body of the vehicle shall be equipped with a suitable and sufficiently stout inner lining. If the vehicle is sheeted the sheet shall be so placed that it cannot touch the load. Vehicles containing substances of 65° (b) (identification number 3244) shall be leakproof or rendered leakproof, for example by the means of a suitable and sufficiently stout inner lining.

(2) Solid wastes containing substances of 13° may be carried under the same conditions as the substances themselves. Other solid wastes classified under the letter (c) of the various items may only be carried in bulk under the conditions of marginal 81 118.

81 112-
81 117

Carriage in containers

81 118 Containers intended for the carriage in bulk of lead sulphate of 1° (b), substances of 13° (b), 3244 solids containing corrosive liquid of 65° (b) or solid wastes classified under (c) of the various items shall have complete walls and a suitable lining and be sheeted or have a cover.

Containers containing 3244 solids containing corrosive liquid of 65° (b) in bulk shall be leakproof or rendered leakproof, for example by the means of a suitable and sufficiently stout inner lining.

81 119-
81 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

(Only the general provisions of Part I apply)

81 200-
81 299

SECTION 3

GENERAL SERVICE PROVISIONS

81 300-
81 320

Supervision of vehicles

81 321 The provisions of marginal 10 321 shall apply to the substances listed below in quantities exceeding those specified:

— Substances classified under (a) of all items: 10 000 kg

— Bromine of 14°: 1 000 kg

81 322-
81 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

81 400-
81 402

Prohibition of mixed loading on one vehicle

81 403 Packages bearing a label conforming to model No 8 shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

81 404-
81 409

Precautions with respect to articles of consumption

81 410 Packages bearing labels conforming to model No 6.1 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading or transloading.

81 411-
81 412

Cleaning before loading

81 413 Vehicles intended to carry packages containing substances of 2° (a) 2., 3° (a), 4°, 73° or 74° shall be carefully cleaned and in particular be free of all combustible waste (straw, hay, paper, etc.).

81 414

Cleaning after unloading

81 415 If substances from packages bearing labels conforming to model No 6.1 have leaked and been spilled in a vehicle, it may not be reused until after it has been thoroughly cleaned and, if necessary, decontaminated. All other goods and articles carried in the same vehicle shall be examined for possible contamination.

81 416-
81 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF VEHICLES (TANK-VEHICLES) AND CONTAINERS (TANK-CONTAINERS)

Marking and labelling

Labelling

81 500 Vehicles with fixed or demountable tanks or tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk, containing or having contained (empty, uncleaned) substances of this Class shall bear labels conforming to model No 8.

Those containing or having contained (empty, uncleaned) the substances of this Class listed in marginal 2812 (3) to (10) shall also bear labels in accordance with that marginal.

81 501-
81 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

81 600-
90 999

CLASS 9

MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

General

(Only the general provisions of Part I apply)

91 000-
91 099

SECTION 1

MODE OF CARRIAGE

91 100-
91 104

Method of dispatch and restrictions on forwarding

91 105 Packages containing substances of this Class shall be carried in closed or covered vehicles.

91 106-
91 110

Carriage in bulk

91 111 Substances of 4° (c) and 12° (c) may be carried in bulk in open but sheeted vehicles with adequate ventilation.

91 112-
91 117

Carriage in containers

91 118 Substances of 4° (c) and 12° (c) may also be packed without inner packaging in small containers of the closed type with complete walls.

91 119-
91 199

SECTION 2

SPECIAL REQUIREMENTS TO BE FULFILLED BY THE MEANS OF TRANSPORT AND ITS EQUIPMENT

(Only the general provisions of Part I apply)

91 200-
91 299

SECTION 3

GENERAL SERVICE PROVISIONS

91 300-
91 320

Supervision of vehicles

91 321 The provisions of marginal 10 321 shall apply to the dangerous goods listed below in quantities exceeding those specified:

— substances classified under (b) of all items: 5 000 kg

— substances classified under 13°(b): 1 000 kg

91 322-
91 384

Instructions in writing

91 385 (1) For the carriage of substances of 2° (b) or apparatus of 3°, the text of the written instructions must give the indication that highly toxic dioxins may form in the event of fire.

(2) For substances of 11° and 12°, the instructions in writing shall also include, the measures to be taken to avoid or minimize damage in the event of spillage of these substances which are considered to be pollutant to the aquatic environment.

(3) For substances of 13°, the instructions in writing shall also include:

(a) the provision that, in the case of damage to or leakage from a package containing substances of 13°, the local health or veterinary authorities shall be informed;

(b) information as to how the substance(s) is/are to be absorbed and contained, and how the dangers of the substance(s) of 13° are to be eliminated on the spot, e.g. suitable disinfectants;

(c) information on suitable protective equipment for the driver.

91 386-
91 399

SECTION 4

SPECIAL PROVISIONS CONCERNING LOADING, UNLOADING AND HANDLING

91 400-
91 402

Prohibition of mixed loading on one vehicle

91 403 Packages bearing a label conforming to model No 9 shall not be loaded together on the same vehicle with packages bearing a label conforming to models Nos 1, 1.4, 1.5, 1.6 or 01.

91 404-
91 406

Places of loading and unloading

91 407 (1) The following operations are prohibited:

(a) loading or unloading substances classified under (b) of the various items in a public place in a built-up area without special permission from the competent authorities;

(b) loading or unloading substances classified under (b) of the various items in a public place elsewhere than in a built up area without prior notice having been given to the competent authorities, unless these operations are urgently necessary for reasons of safety.

(2) If for any reason handling operations have to be carried out in a public place, then substances and articles of different kinds shall be separated according to the labels.

91 408-
91 409

Precautions with respect to articles of consumption

91 410 Packages bearing a label conforming to model No 9 shall be kept apart from foodstuffs, other articles of consumption and animal feeds in vehicles and at places of loading, unloading or transloading.

91 411-
91 413

Handling and storage

91 414 (1) Packages containing substances of 13° shall be so stowed that they are readily accessible.

(2) When packages containing substances of 13° are to be carried refrigerated, the functioning of the cooling chain shall be ensured when unloading or during storage.

(3) Packages containing substances of 13° shall only be stored in cool places away from sources of heat.

Cleaning after unloading

91 415 (1) If substances and articles of Class 9, 1° to 12° have been spilled or leaked in a vehicle, it may not be re-used until after it has been thoroughly cleaned and, if necessary, decontaminated. All other goods carried in the same vehicle shall be examined for possible contamination.

(2) If a substance of 13° has escaped and has contaminated a vehicle, this vehicle may be reused only after it has been thoroughly cleaned and, if necessary, disinfected. All goods and articles carried in such a vehicle shall be checked for possible contamination. The wooden parts of the vehicle which have come into contact with the substances of 13° shall be removed and burnt.

91 416-
91 499

SECTION 5

SPECIAL PROVISIONS CONCERNING THE OPERATION OF (TANK-) VEHICLES AND (TANK-) CONTAINERS

Marking and labelling

Marking

91 500 (1) Small containers containing expandable polymers of 4° (c) shall bear the marking: 'Keep away from any source of ignition'. This marking shall be in the official language of the country of departure, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

Labelling

(2) Vehicles with fixed or demountable tanks and tank-containers, as well as vehicles and containers for the carriage of dangerous solid substances in bulk containing or having contained (tanks, containers for bulk and vehicles for bulk empty, uncleaned) substances of this Class, with the exception of substances of 4° (c), shall bear labels conforming to model No 9.

Those containing or having contained substances of this Class listed in marginal 2912(4) to (6) shall also bear labels in accordance with that marginal.

91 501-
91 599

SECTION 6

TRANSITIONAL PROVISIONS, DEROGATIONS, AND PROVISIONS PECULIAR TO CERTAIN COUNTRIES

(Only the general provisions of Part I apply)

91 600-
199 999

PART III

APPENDICES TO ANNEX B

APPENDICES B.1:

PROVISIONS CONCERNING TANKS

Provisions common to the B.1 appendices

200 000 (1) The scope of application of the various B.1 Appendices is as follows:

(a) Appendix B.1a applies to tanks other than tank-containers;

(b) Appendix B.1b applies to tank-containers;

(c) Appendix B.1c applies to tanks, other than batteries of receptacles and tank-containers, made of reinforced plastics;

(d) Appendix B.1d is concerned with the materials and construction of fixed welded tanks, of demountable welded tanks, ans of welded shells of tank-containers, intended for a carriage of deeply-refrigerated liquefied gases of Class 2, or for which a test pressure of not less thank 1 MPa (10 bar) is required.

Note: For receptacles, see the relevant requirements of Annex A (Packages).

(2) By derogation from the definition given in marginal 10 014, the term 'tank' when used alone in Appendix B.1a and Appendix B.1c does not cover tank-containers. However, some of the requirements of Appendix B.1a may be made applicable to tank-containers by the provisions of Annex B and Appendix B.1b.

(3) It is recalled that marginal 10 121 (1) prohibits the carriage of dangerous substances in tanks except where such carriage is expressly authorized under each Section 1 of Part II in Appendices B.1a or B.1b and Section 1 of Appendix B.1c.

200 001-
210 999

APPENDIX B.1a

PROVISIONS CONCERNING FIXED TANKS (TANK-VEHICLES) DEMOUNTABLE TANKS AND BATTERIES OF RECEPTACLES

Note: Part I sets out the requirements applicable to fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles intended for the carriage of substances of any class. Part II contains special requirements supplementing or modifying the requirements of Part I.

PART I

REQUIREMENTS APPLICABLE TO ALL CLASSES

211 000-
211 099

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Note: In accordance with the provisions of marginal 10 121 (1), the carriage of dangerous substances in fixed or demountable tanks or batteries of receptacles is permitted only where this mode of carriage is expressly authorized for such substances in each Section 1 of Part II of this Appendix.

211 100 These requirements shall apply to fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles used for the carriage of liquid, gaseous powdery or granular substances.

211 101 (1) In addition to the vehicle proper, or the units of running gear used in its stead, a tank-vehicle comprises one or more shells, their items of equipment and the fittings for attaching them to the vehicle or to the running-gear units.

(2) When attached to the carrier vehicle, the demountable tank or battery of receptacles shall meet the requirements precribed for tank-vehicles.

211 102 In the following requirements:

(1) (a) *'shell'* means the tank proper (including the openings and their closures);

(b) *'service equiment of the shell'*, means the filling, discharge, venting, safety, heating and heat-insulating devices and the measuring instruments;

(c) *'structural equipment'* means the internal or external reinforcing, fastening, protective or stabilizing members external to the shell.

(2) (a) *'calculation pressure'* means a theoretical pressure at least equal to the test pressure which, according to the degree of danger exhibited by the substance being carried, may to a greater or lesser degree exceed the working pressure. It is used solely to determine the thickness of the walls of the shell, independently of any external or internal reinforcing device;

(b) *'test pressure'* means the highest effective pressure which arises in the shell during the pressure test;

(c) *'filling pressure'* means the maximum pressure actually built up in the shell when it is being filled under pressure;

(d) *'discharge pressure'* means the maximum pressure actually built up in the shell when it is being discharged under pressure;

(e) *'maximum working pressure (gauge pressure)'* means the highest of the following three pressures:

(i) the highest effective pressure allowed in the shell during filling ('maximum filling pressure allowed');

(ii) the highest effective pressure allowed in the shell discharge ('maximum discharge pressure allowed');
and

(iii) the effective gauge pressure to which the shell is subjected by its contents (including such extraneous gases as it may contain) at the maximum working temperature.

Unless the special requirements for each class provide otherwise, the numerical value of this working pressure (gauge pressure) shall not be lower than the vapour pressure (absolute pressure) of the filling substances at 50 °C.

For shells equipped with safety valves (with or without bursting disc), the maximum working pressure (gauge pressure) shall however be equal to be prescribed opening pressure of such safety valves.

(3) *'Leakproofness test'* means the test which consists in subjetting the shell to an effective internal pressure equal to the maximum working pressure, but not less than 20 kPa (0,2 bar) (gauge pressure), by a procedure approved by the competent authority. For shells equipped with venting systems and a safety device to prevent the contents spilling out if the shell overturns, the pressure for the leakproofness test shall be equal to the static pressure of the filling substance.

211 103-
211 119

SECTION 2

CONSTRUCTION

211 120 Shells shall be designed and constructed in accordance with the provisions of a technical code recognized by the competent authority, but the following minimum requirements shall be met:

(1) Shells shall be made of suitable metallic materials which unlesss other temperature ranges are prescribed in the various classes, shall be resistant to brittle fracture and to stress corrosion cracking between – 20 °C and + 50 °C.

(2) For welded shells only materials of faultless weldability and whose adequate impact strength at an ambient temperature of – 20 °C can be guaranteed, particularly in the weld seams and the zones adjacent thereto, shall be used.

(3) Welds shall be skilfully made and shall afford the fullest safety. For the execution and checking of weld beads, see also marginal 211 127 (8). Shells whose minimum wall thicknesses have been determined in accordance with 211 127 (2) to (6) shall be checked by the methods described in the definition of the weld coefficient 0,8.

(4) The materials of shells, or of their protective linings in contact with the contents, shall not contain substances liable to react dangerously with the contents, to form dangerous compounds, or substantially to weaken the material.

(5) The protective lining shall be so designed that its leakproofness remains intact whatever the deformation liable to occur in normal conditions of carriage [211 127(1)].

(6) It contact between the substance carried and the material used for the construction of the shell entails a progressive decrease in the thickness of the walls, this thickness shall be increased at manufacture by an appropriate amount. This additional thickness to allow for corrosion shall not be taken into consideration in calculating the thickness of the shell walls.

211 121 (1) Shells, their attachments and their service and structural equipment shall be designed to withstand without loss of contents (other than quantities of gas escaping through any degassing vents):

— static and dynamic stresses in normal conditions of carriage;

— prescribed minimum stresses as defined in marginals 211 125 and 211 127.

(2) In the case of vehicles in which the shell constitutes a stressed self-supporting member, the shell shall be designed to withstand the stresses thus imposed in addition to stresses from other sources.

211 122 The pressure on which the wall thickness of the shell is based shall not be less than the calculation pressure, but the stresses referred to in marginal 211 121 shall also be taken into account.

211 123 Unless specially prescribed otherwise in the various classes, the following particulars shall be taken into account in the design of shells:

(1) Gravity-discharge shells intended for the carriage of substances having a vapour pressure not exceeding 110 kPa (1,1 bar) (absolute pressure) at 50 °C shall be designed for a calculation pressure of twice the static pressure of the substance to be carried but not less than twice the static pressure of water.

(2) Pressure-filled or pressure-discharge shells intended for the carriage of substances having a vapour pressure not exceeding 110 kPa (1,1 bar) (absolute pressure) at 50 °C shall be designed for a calculation pressure equal to 1,3 times the filling or discharge pressure.

211 123 *(cont'd)* (3) Shells intended for the carriage of substances having a vapour pressure of more than 110 kPa (1,1 bar) but not more than 175 kPa (1,75 bar) (absolute pressure) at 50 °C shall, whatever their filling or discharge system, be designed for a calculation pressure of not less than 150 kPa (1,5 bar) gauge pressure or 1,3 times the filling or discharge pressure, whichever is the higher.

(4) Shells intended for the carriage of substances having a vapour pressure of more dan 175 kPa (1,75 bar) (absolute pressure) at 50 °C shall, whatever their filling or discharge system, be designed for a calculation pressure equal to 1,3 times the filling or discharge pressure but not less than 400 kPa (4 bar) gauge pressure.

211 124 Tanks intended to contain certains dangerous substances shall be provided with special protection. This may take the form of additional thickness of the shell (such additional thickness being determined in the light of the dangers inherent in the substance concerned: see the relevant classe(s) or of a protective device.

211 125 At the test pressure, the stress σ (sigma) at the most severely stressed point of the shell shall not exceed the material-dependent limits prescribed below. Allowance shall be made for any weakening due to the welds. In addition, in choosing the material and determining wall thickness, the maximum and minimum filling and working temperatures should be taken into account.

(1) For the metals and alloys, the stress σ at the test pressure shall be lower than the smaller of the values given by the following formulae:

$\sigma \leq 0{,}75\ Re$ or $\sigma \leq 0{,}5\ Rm$

where

Re = apparent yield stress, or 0,2 % or, in the case of austenitic steels, 1 %

Rm = minimum tensile strength.

Ratios of Re/Rm exceeding 0,85 are not allowed for steels used in the construction of welded tanks.

The values of Re and Rm to be used shall be specified minimum values according to material standards. If no material standard exists for the metal or alloy in question, the values of Re and Rm used shall be approved by the competent authority or by a body designated by that authority.

When austenitic steels are used, the specified minimum values according to the material standards may be exceeded by up to 15 % if these higher values are attested in the inspection certificate.

The values specified in the certificate shall be taken as a basis in determining the Re/Rm ratio in each case.

(2) When the maximum working temperature of the shell does not exceed 50 °C, the values of Re and Rm at 20 °C may be used; when the working temperature exceeds 50 °C, the values at this maximum working temperature (calculation temperature) shall be used.

(3) For steel, the elongation at fracture in % shall be not less than

$$\frac{10\,000}{\text{determined tensile strength in N/mm}^2}$$

but in any case it shall be not less than 16 % for fine-grained steels and not less than 20 % for other steels. For aluminium alloys the elongation at fracture shall be not less than 12 % (1).

(1) In the case of sheet metal the axis of the tensile test piece shall be at right angles to the direction of rolling. The permanent elongation at fracture (l = 5d) shall be measured on a test piece of circular cross section in which the gauge length 1 is equal to five times the diameter d; if test pieces of rectangular section are used, the gauge length shall be calculated by the formula $l = 5{,}65\sqrt{F_o}$ where F_o, is the initial cross-sectional area of the test piece.

211 126 Shells intended for the carriage of liquids having a flash-point of 61 °C, or below or for the carriage of flammable gases, shall be linked to the classics by means of at least one good electrical connection. Any metal contact capable of causing electrochemical corrosion shall be avoided. Shells shall be provided with at least one earth clearly marked with the symbol '⏚', capable of being electrically connected.

211 127 Shells and their fastenings shall withstand the stresses specified in paragraph (1) below, and the wall thicknesses of shell shall be at least as determined in accordance with paragraphs (2) to (6).

(1) The shells and their fastenings shall be capable of absorbing, under the maximum permissible load, the forces exerted by:

— in the direction of travel: twice the total mass;

— at right angles to the direction of travel: the total mass;

— vertically upwards: the total mass;

— vertically downwards: twice the total mass.

Under the stresses defined above, the stress at the most severely stressed point of the shell and its fastenings shall not exceed the value σ defined in marginal 211 125.

(2) The thickness of the cylindrical wall of the shell and of the ends and cover plates shall be at least equal to that obtained by the following formulae:

$$e = \frac{P_{MPa} \times D}{2 \times \sigma \times \lambda} \text{ mm} \qquad \left(e = \frac{P_{bar} \times D}{20 \times \sigma \times \lambda} \text{ mm} \right)$$

where

P_{MPa} = calculation pressure in MPa;

P_{bar} = calculation pressure in bar;

D = internal diameter of shell in mm;

σ = permissible stress, as defined in marginal 211 125 (1), (a) and (b), and (2); in N/mm²; and

λ = a coefficient, not exceeding 1, allowing for any weakening due to welds.

The thickness shall in no case be less than that defined in paragraphs (3) to (5) below.

(3) The walls, ends and cover plates of shells of circular cross-section not more than 1,80 m in diameter (1), other than those referred to in paragraph (5), shall not be less than 5 mm thick if of mild steel (2), or of equivalent thickness if of another metal. Where the diameter is more than 1,80 m (1) this thickness shall be increased to 6 mm except in the case of shells intended for the carriage of powdery or granular substances, if the shell is of mild steel (2), or to an equivalent thickness if the shell is of another metal. 'Equivalent thickness' means the thickness obtained by the following formula:

$$e_1 = \frac{21{,}4 \times e_0 \text{ (3)}}{\sqrt[3]{Rm_1 \times A_1}}$$

(1) For shells not of circular cross-section, for example box-shaped or elliptical shells, the indicated diameters shall correspond to those calculated on the basis of a circular cross-section of the same area. For such shapes of cross-section the radius of convexity of the shell wall shall not exceed 2 000 mm at the sides or 3 000 mm at the top and bottom.

(2) 'Mild steel' means a steel having a minimum breaking strength between 360 and 410 N/mm².

(3) This formula is derived from the general formula:

$$e_1 = e_0 \sqrt[3]{\frac{Rm_0 \times A_0}{Rm_1 \times A_1}}$$

where

Rm_0 = 360;

A_0 = 27 for the mild steel of reference;

Rm_1 = minimum tensile strength of the metal chosen, in N/mm²; and

A_1 = minimum elongation of the metal chosen on fracture under tensile stress, in %.

211 127 *(cont'd)*

(4) Where protection of the shell against damage through lateral impact or overturning is provided, the competent authority may allow the aforesaid minimum thicknesses to be reduced in proportion to the protection provided; however, the said thicknesses shall not be less than 3 mm in the case of mild steel (1), or than an equivalent thickness in the case of other materials, for shells not more than 1,80 m in diameter (2). For shells with a diameter exceeding 1,80 m (2) the aforesaid minimum thickness shall be increased to 4 mm in the case of mild steel (1) and the equivalent thickness in the case of other metal 'Equivalent thickness' means the thickness obtained by the following formula:

$$e_1 = \frac{21{,}4 \times e_0 \ (3)}{\sqrt[3]{Rm_1 \times A_1}}$$

(5) For tanks built after 1 January 1990, there is protection against damage as referred to in paragraph (4) when the following measures or equivalent measures are adopted:

(a) For shells intended for the carriage of powdery or granular substances, the protection against damage shall satisfy the competent authority.

(b) For shells intended for the carriage of other substances, there is protection against damage when:

1. for shells with a circular or elliptical cross-section having a maximum radius of curvature of 2 m, the shell is equipped with strengthening members comprising partitions, surge plates or external or internal rings, so placed that at least one of the following conditions is met:

   — Distance between two adjacent strengthening elements $\leq$ 1,75 m.

   — Volume contained between two partitions or surge plates $\leq$ 7 500 l.

   The vertical cross-section of a ring, with the associated coupling, shall have a section modulus of at least 10 cm^3.

   External rings shall not have projecting edges with a radius of less than 2,5 mm.

   Partitions ans surge plates shall conform to the requirements of paragraph (7).

   The thickness of the partitions and surge plates shall in no case be less than that of the shell.

2. For shells with double walls, the space between being evacuated of air, the aggregate thickness of the outer metal wall and the shell wall corresponds to the wall thickness prescribed in paragraph (3), and the thickness of the wall of the shell itself is not less than the minimum thickness prescribed in paragraph (4).

3. For shells made with double walls having an intermediate layer of solid materials at least 50 mm thick, the outer wall has a thickness of at least 0,5 mm of mild steel (1) or at least 2 mm of a plastic material reinforced with glass fibre. Solid foam (with an impact absorption capacity like that, for example, of polyurethane foam) may be used as the intermediate layer of solid material.

4. Shells of forms other than in 1., especially box-shaped tanks, are provided, all round the mid-point of their vertical height and over at least 30 % of their height with an additional protection designed in such a way as to offer specific resilience at least equal to that of a shell constructed in mild steel of a thickness of 5 mm (for a shell diameter not exceeding 1,80 m) or 6 mm (for a shell diameter exceeding 1,80 m).

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(1) 'Mild steel' means a steel having a minimum breaking strength between 360 and 410 N/mm^2.

(2) For shells not of circular cross-section, for example box-shaped or elliptical shells, the indicated diameters shall correspond to those calculated on the basis of a circular cross-section of the same area. For such shapes of cross-section the radius of convexity of the shell wall shall not exceed 2 000 mm at the sides or 3 000 mm at the top and bottom.

(3) This formula is derived from the general formula:

$$e_1 = e_0 \sqrt[3]{\frac{Rm_0 \times A_0}{Rm_1 \times A_1}}$$

where

Rm_0 = 360;

A_0 = 27 for the mild steel of reference;

Rm_1 = minimum tensile strength of the metal chosen, in N/mm^2; and

A_1 = minimum elongation of the metal chosen on fracture under tensile stress, in %.

211 127 *(cont'd)*

The additional protection shall be applied in a durable manner to the outside of the shell. This requirement shall be considered to have been met without further proof of the specific resilience when the additional protection involves the welding of a plate of the same material as the shell to the area to be strengthened, so that the minimum wall thickness is in accordance with paragraph (3).

This protection is dependent upon the possible stresses exerted on mild steel shells in the event of an accident, where the ends and walls have a thickness of at least 5 mm for the diameter not exceeding 1,80 m or at least 6 mm for a diameter not exceeding 1,80 m. If another metal is used, the equivalent thickness shall be obtained in accordance with the formula in paragraph (3).

For demountable tanks this protection is not required when they are protected in all sides by the drop sides of the carrier vehicles.

(6) The thickness of tank shells designed in accordance with marginal 211 123 (1) which either are of not more than 5 000 litres capacity or are divided into leak-proof compartments of not more than 5 000 litres unit capacity may be adjusted to a level which, unless prescribed otherwise in the various classes, shall however not be less than the appropriate value shown in the following table:

Maximum radius of curvature of shell (m)	Capacity of shell or shell compartement (m^3)	Minimum thickness (mm) mild steel
≤ 2	≤ 5,0	3
2-3	≤ 3,5	3
	> 3,5 but ≤ 5,0	4

Where a metal other than mild steel is used, the thickness shall be determined by the equivalence formula given in paragraph (3). The thickness of the partitions and surge-plates shall in no case be less than that of the shell.

(7) Surge-plates and partitions shall be dished, wiith a depth of dish of not less than 10 cm, or shall be corrugated, profiled or otherwise reinforced to give equivalent strength. The area of the surge-plate shall be at least 70 % of the cross-sectional area of the tank in which the surge-plate is fitted.

(8) The manufacturer's qualification for performing welding operations shall be one recognized by the competent authority. Welding shall be performed by skilled welders using a welding process whose effectiveness (including any heat treatments required) has been demonstrated by test. Non-destructive tests shall be carried out by radiography or by ultrasound and must confirm that the quality of the welding is appropriate to the stresses.

In determining the thickness of the shell walls in accordance with paragraph (2), the following values of the coefficient λ (lambda) should be adopted for the welds:

0,8: where the weld beads are so far as possible inspected visually on both faces and are subjected to a non-destructive spot check with particular attention to connexions;

0,9: where all longitudinal beads throughout their length, all connexions, 25 % of circular beads, and welds for the assembly of large-diameter items of requirement are subjected to non-destructive checks. Beads shall be checked visually on both sides as far as possible;

211 127 *(cont'd)* 1,0: where all beads are subjected to non-destructive checks and are so far as possible inspected visually on both sides. A weld test-piece shall be taken.

Where the competent authority has doubts regarding the quality of weld beads, it may require additional checks.

(9) Measures shall be taken to protect shells against the risk of deformation as a result of a negative internal pressure.

Unless otherwise prescribed in the special provisions fot the individual classes, these shells may have valves to avoid an unacceptable negative internal pressure, without intervening bursting discs.

(10) The thermal insulation shall be so designed as not to hinder access to, or the operation of, filling and discharge devices and safety valves.

Stability

211 128 The overall width of the ground-level bearing surface (distance between the outer points of contact with the ground of the right-hand tyre and the left-hand tyre of the same axle) shall be at least equal to 90 % of the height of the centre of gravity of the laden tank-vehicle. In an articulated vehicle the mass on the axles of the load-carrying unit of the laden semi-trailer shall not exceed 60 % of the nominal total laden mass of the complete articulated vehicle.

Protection of upper fittings

211 129 The fittings and accessories mounted on the upper part of the shell shall be protected against damage caused by overturning. This protection may take the form of strengthening rings, protective canopies or transverse or longitudinal members so shaped that effective protection is given.

SECTION 3

ITEMS OF EQUIPMENT

211 130 . The items of equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during carriage or handling.

They shall exhibit a suitable degree of safety comparable to that of the shells themselves, and shall in particular:

— be compatible with the substances carried; and

— meet the requirements of marginal 211 121.

As many operating parts as possible shall be served by the smallest possible number of apertures in the shell wall.

The leakproofness of the service equipment shall be ensured even in the event of over-turning of the tank-vehicles, demountable tanks ans batteries of receptacles. The gaskets shall be made of a material compatible with the substance carried and shall be replaced as soon as their effectiveness is impaired, for example as a result of ageing. Gaskets ensuring the leakproofness of fitting requiring manipulation during normal use of tank-vehicles, demountable tanks and batteries of receptacles, shall be so designed and arranged that manipulation of the fittings incorporating them does not damage them.

211 131 Every bottom-discharge shell, and in the case of compartmented bottom-discharge shells every compartment, shall be equipped with the two mutually independent shut-off devices, the first being an internal stop-valve (1) fixed directly to the shell and the second being a sluice-valve or other equivalent device, mounted in series, one at each end of the discharge pipe-socket. The bottom discharge of shells intended for the carriage of powdery or granular substances may be constituted by external piping with a stop-valve if it is made of a malleable metallic material. In addition, the openings of the shells shall be capable of being closed by means of screw-threaded plugs, blank flanges or other equally effective devices. The internal stop-valve shall be operable from above or from below. If possible, the setting — open or closed — of the internal stop-valve shall be capable of being verified from the ground in both cases. The controls of the internal stop-valve shall be so designed as to prevent any inadvertent opening through impact or unconsidered action. The internal shut-off device must continue to be effective in the event of damage to the external control.

The position and/or direction of closure of the sluice-valves must be clearly apparent.

In order to avoid any loss of contents in the event of damage to the external filling and discharge fittings (pipes, lateral shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external stresses or shall be so designed as to withstand them. The filling and discharge devices (including flanges or threaded plugs) and protective caps (if any) shall be capable of being secured against any inadvertent opening.

The shell or each of its compartments shall be provided with the opening large enough to permit inspection.

211 132 Shells intended for the carriage of substances for which all the openings are required to be above the surface level of the liquid may be equipped, in the lower part of the body, with a cleaning aperture (fist-hole). This aperture must be capable of being sealed by a flange so closed as to be leakproof and whose design must be approved by the competent authority or by a body designated by that authority.

211 133 Shells intended for the carriage of liquids having a vapour pressure of not more than 110 kPa (1,1 bar) (absolute) at 50 °C shall have a venting system and a safety device to prevent the contents from spilling out if the shell overturns; otherwise they must conform to the requirements of marginal 211 134 or 211 135.

211 134 Shells intended for the carriage of liquids having a vapour pressure of more than 110 kPa (1,1 bar) but not exceeding 175 kPa (1,75 bar) (absolute) at 50 °C shall have a safety valve set at not less than 150 kPa (1,5 bar) (gauge pressure) and which must be fully open at a pressure not exceeding the test pressure, otherwise they must conform to the requirements of marginal 211 135.

211 135 Shells intended for the carriage of liquids having a vapour pressure of more than 175 kPa (1,75 bar) but not exceeding 300 kPa (3 bar) (absolute) at 50 °C shall have a safety valve set at not less than 300 kPa (3 bar) gauge pressure and which must be fully open at a pressure not exceeding the test pressure; otherwise they must be hermetically closed (2).

211 136 No movable parts such as covers, closures, etc., which are liable to come into frictional or percussive contact with alluminium shells intended for the carriage of flammable liquids having a flash-point of or below 61 °C or for the carriage of flammable gases may be made of unprotected corrodible steel.

211 137-
211 139

(1) However, in the case of shells intended for the carriage of certain crystallizable or highly viscous substances, deeply refrigerated liquefied gases and shells fitted with an ebonite or thermoplastic coating, the internal stop valve may be replaced by an external stop valve provided with additional protection.

(2) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 4

TYPE APPROVAL

211 140 The competent authority or a body designated by that authority shall issue in respect of each new type of tank a certificate attesting that the prototype tank, including the shell fastenings which it has surveyed, is suitable for the purpose for which it is intended and meets the construction requirements of section 2, the equipment requirements of section 3 and the conditions peculiar to the classes of substances carried.

The test results, the substances and/or the groups of substances for the carriage of which the tank is approved and its type approval number shall be entered in a test report. The substances of a group of substances shall be of similar kind and equally compatible with the characteristics of the shell. The substances or groups of substances permitted shall be specified in the test report, with their chemical names or the corresponding collective heading in the list of substances, and their class and item number. This approval shall be valid for tanks manufactured according to this prototype without modification.

211 141-
211 149

SECTION 5

TESTS

211 150 Shells and their equipment shall either together or separately undergo an initial inspection before being put into service. This inspection shall include a check of conformity to the approved prototype, a check of the design characteristics (1), an external and internal examination, a hydraulic pressure test (2) and a check of satisfactory operation of the equipment.

The hydraulic pressure test shall be carried out on the shell as a whole at the pressure indicated in Part II of this Appendix, and separately on each compartment of compartmented shells at a pressure of not less than 1,3 times the maximum working pressure. The leakproofness test shall be carried out separately on each compartment of compartmented shells.

The hydraulic pressure test shall be carried out before the installation of such thermal equipment as may be necessary. It the shells and their equipment are tested separately, they shall be jointly subjected to a leakproofness test after assembly.

211 151 Shells and their equipment shall undergo periodic inspections at fixed intervals. The periodic inspections shall include: an external and internal examination and, as a general rule, a hydraulic pressure test (2). Sheathing for thermal or other insulation shall be removed only to the extent required for reliable appraisal of the characteristics of the shell.

The hydraulic pressure test shall be carried out on the shell as a whole at the pressure indicated in Part II of this Appendix, and separately on each compartment of compartmented shells at a pressure of not less than 1,3 times the maximum working pressure.

In the case of shells intended for the carriage of powdery or granular substances, and with the agreement of the expert approved by the competent authority, the periodic hydraulic pressure tests may be omitted and replaced by leakproofness tests in accordance with marginal 211 102 (3).

The maximum intervals for inspections shall be six years.

Tank-vehicles, demountable tanks and batteries of receptacles empty, uncleaned, may be moved after expiration of the period for undergoing the test.

(1) The check of the design characteristics shall also include, for shells requiring a test pressure of 1 MPa (10 bar) or higher, the taking of weld test pieces (work samples) in accordance with the tests prescribed in Appendix B.1d.

(2) In special cases and with the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by a pressure test using another liquid or gas, where such an operation does not present any danger.

211 152 In addition, a leakproofness test of the shell with its equipment and a check of the satisfactory operation of all the equipment shall be carried out at least every three years.

The leakproofness test shall be carried out separately on each compartment of compartmented shells.

211 153 When the safety of the shell or of its equipment may have been impaired as a result of repairs, alterations or accident, an exceptional check shall be carried out.

211 154 The tests, inspections and checks in accordance with marginal 211 150 to 211 153 shall be carried out by the expert approved by the competent authority. Certificates shall be issued showing the results of these operations. These certificates shall refer to the list of the substances permitted for carriage in this shell in accordance with 211 140.

211 155-
211 159

SECTION 6

MARKING

211 160 Every shell shall be fitted with a corrosion-resistant metal plate permanently attached to the shell in a place readily accessible for inspection. The following particulars at least shall be marked on the plate by stamping or by any other similar method. These particulars may be engraved directly on the walls of the shell itself, if the walls are so reinforced that the strength of the shell is not impaired:

— approval number;

— manufacturer's name or mark;

— manufacturer's serial number;

— year of manufacture;

— test pressure [1] (gauge pressure);

— capacity [1] — in the case of multiple-element shells, the capacity of each element;

— design temperature [1] (only if above + 50 °C or below – 20 °C);

— date (month and year) of initial test and most recent periodic test in accordance with marginals 211 150 and 211 151;

— stamp of the expert who carried out the tests;

— test pressure on the shell as a whole and test pressure by compartment in MPa or bar (gauge pressure) where the pressure by compartment is less than the pressure on the shell; and

— material of the shell and, where appropriate, the protective lining.

In addition, the maximum working pressure allowed shall be inscribed on pressure-filled or pressure-discharge shells.

211 161 The following particulars shall be inscribed on the tank-vehicle itself or on a plate. These particulars shall not be required in the case of a vehicle carrying demountable tanks:

— name of owner or operator;

— unladen mass; and

— maximum permissible mass.

211 162-
211 169

[1] The units of measurement should be indicated after numerical values.

SECTION 7

OPERATION

211 170 The thickness of the walls of the shell shall not, throughout its use, fall below the minimum figure prescribed in marginal 211 127 (2).

211 171 Shells shall not be loaded with any dangerous substances other than those for whose carriage they have been approved and which, in contact with the materials of the shell, gaskets, equipment and protective linings, are not liable to react dangerously with them, to form dangerous products or appreciably to weaken the material.

Foodstuffs shall not be carried in these shells unless the necessary steps have been taken to prevent any harm to public health.

211 172 (1) The following degrees of filling shall not be exceeded in shells intended for the carriage of liquids at ambient temperatures:

(a) for inflammable substances without additional risks (e.g. toxicity or corrosivity), in shells with a venting system or with safety valves (even where preceded by a bursing disc):

$$\text{degree of filling} = \frac{100}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(b) for toxic or corrosive substances (whether flammable or not) in shells with a venting system or with safety valves (even where preceded by a bursting disc):

$$\text{degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(c) for flammable substances and for slightly toxic or slightly corrosive substances, (whether flammable or not) in hermetically-closed [1] shells without safety device:

$$\text{degree of filling} = \frac{97}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(d) for highly toxic, toxic, highly corrosive or corrosive substances (whether flammable or not) in hermetically-closed [1] shells without safety device:

$$\text{degree of filling} = \frac{95}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity.}$$

(2) In these formulae, represents the mean coefficient of cubic expansion of the liquid between 15 °C and 50 °C, i.e. for a maximum variation in temperature of 35 °C.

α is calculated by the formula: $\alpha = \frac{d_{15} - d_{50}}{35 \times d_{50}}$

where d_{15} and d_{50} are the relative densities of the liquid at 15 °C and 50 °C respectively and t_F is the mean temperature of the liquid at the time of filling.

(3) The provisions of paragraph (1) above shall not apply to shells whose contents are, by means of a heating device, maintained at a temperature above 50 °C during carriage. In such a case the degree of filling at the outset shall be such, and the temperature so regulated, that the shell is not full to more than 95 % of its capacity at any time during carriage, and that the filling temperature is not exceeded.

(4) Where hot substances are loaded, the temperature of the outer surface of the shell or of the thermal insulation shall not exceed 70 °C during carriage.

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[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 173 Where shells intended for the carriage of liquids (1) are not divided by partitions or surge-plates into sections of not more than 7 500 litres capacity, they shall be filled to not less than 80 % of their capacity unless they are nominally empty.

211 174 During loading and unloading of tanks, appropriate measures shall be taken to prevent the release of dangerous quantities of gases and vapours. Shells shall be closed in such a way that the contents cannot run out uncontrolled. The openings of bottom-discharge shells shall be closed by means of screw-threaded plugs, blank flanges or other equally effective devices. The leakproofness of the shell closures, particularly in the upper part of the dip-tube, shall be verified by the consignor after the shell has been filled.

211 175 Where several closure systems are fitted in series, that nearest to the substance being carried shall be closed first.

211 176 No dangerous residue of the substance carried shall adhere to the outside of shells during carriage, whether they are laden or empty.

211 177 To be accepted for carriage, empty shells, uncleaned, must be closed in the same manner and leakproof in the same degree as though they were full.

211 178 The connecting pipes between independent but interconnected shells of a transport unit shall be empty during carriage.

Flexible filling and discharge pipes which are not permanently connected to the shell shall be empty during carriage.

211 179

SECTION 8

TRANSITIONAL MEASURES

211 180 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles built before 1 October 1978 and not conforming to the requirements of this Appendix may, if they were built in conformity with the requirements of this Directive, be used until 30 September 1984. Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles intended for the carriage of gases of Class 2 may however be used until 30 September 1990 if the periodic-test requirement is complied with.

211 181 On the expiry of this period the aforesaid units may be kept in service if the equipment of the shell meets the present requirements. The thickness of the shell wall, except in the case of shells intended for the carriage of gases of Class 2, 7° and 8°, shall be appropriate to a calculation pressure of not less than 400 kPa (4 bar) (gauge pressure) in the case of mild steel and of not less than 200 kPa (2 bar) (gauge pressure) in the case of aluminium and aluminium alloys. For other than circular cross-sections of tanks, the diameter to be used as a basis for calculation shall be that of a circle whose area is equal to that of the actual cross-section of the tank.

211 182 The periodic tests for fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles kept in service under these transitional provisions shall be conducted in accordance with the provisions of Section 5 and with the pertinent special provisions for the various Classes. Unless the earlier provisions prescribed a higher test pressure, a test pressure of 200 kPa (2 bar) (gauge pressure) shall suffice for aluminium shells and aluminium-alloy shells.

211 183 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles which meet these transitional provisions may be used until 30 September 1993 for the carriage of the dangerous goods for which they have been approved. This transitional period shall not apply to fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles intended for the carriage of substances of Class 2, or to fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles whose wall thickness and items of equipment meet the requirements of this Appendix.

(1) Under this provision, substances whose kinematic viscosity at 20 °C is below 2 680 mm^2/s shall be deemed to be liquids.

211 184 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles constructed before 1 May 1985 in accordance with the requirements of this Directive in force between 1 October 1978 and 30 April 1985 but not conforming to the provisions applicable from 1 May 1985 may continue to be used after that date.

211 185 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles, constructed between 1 May 1985 and the entry into force of the provisions applicable from 1 January 1988 which do not conform to those provisions but were constructed according to the requirements of this Directive in force until that date, may still be used.

211 186 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles, constructed before the entry into force of the provisions applicable from 1 January 1993 which do not conform to those provisions but were constructed according to the requirements of this Directive in force until that date may still be used.

211 187 Fixed tanks (tank-vehicles), demountable tanks and batteries of receptacles constructed before 1 January 1990 shall, if used after 31 December 2004, conform to the provisions of marginal 211 127 (5), applicable as from 1 January 1990, concerning wall thickness and protection against damage.

211 188-
211 199

PART II

SPECIAL REQUIREMENTS SUPPLEMENTING OR MODIFYING THE REQUIREMENTS OF PART I

CLASS 2

GASES: COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE

211 200-
211 209

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 210 Gases of marginal 2201 except those listed below may be carried in fixed tanks, in demountable tanks, or in batteries of receptacles:

Fluorine, nitrogen trifluoride and silicon tetrafluoride of 1° (at); nitric oxide of 1° (ct); mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume of 2° (bt); mixtures of hydrogen with not more than 10 % diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume of 2° (ct), octafluorobut-2-ene (R1318) and octafluoropropane of 3° (a); boron trichloride, chlorine trifluoride, hexafluoroacetone, nitrosyl chloride, sulphuryl fluoride and tungsten hexafluoride of 3° (at); 2,2-dimethylpropane and methysilane of 3° (b); arsine, carbonyl sulphide, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane of 3° (bt); propadiene, inhibited, of 3° (c), cyanogen, cyanogen chloride, ethylene oxide and hydrogen iodide, anhydrous of 3° (ct); mixtures of methylsilanes of 4° (bt); propadiene with 1 % to 4 % methyl acetylene, stabilized, of 4° (c); ethylene oxide containing not more than 50 % by mass methyl formate of 4° (ct); silane of 5° (b); substances of 5° (bt) and (ct); dissolved acetylene of 9° (c); gases of 12° and 13°.

211 211-
211 219

SECTION 2

CONSTRUCTION

211 220 Shells intended for the carriage of substances of 1° to 6° and 9° shall be made of steel. In the case of weldless shells by derogation from marginal 211 125 (3), a minimum elongation at fracture of 14 % and also a stress σ (sigma) lower than or equal to limits hereafter given according to the material may be accepted.

(a) When the ratio Re/Rm of the minimum guaranteed characteristics after heat treatment is higher than 0,66 without exceeding 0,85:

$\sigma \leq 0{,}75$ Re.

(b) When the ratio Re/Rm of the minimum guaranteed characteristics after heat treatment is higher than 0,85:

$\sigma \leq 0{,}5$ Rm.

211 221 The requirements of Appendix B.1d shall apply to the materials and construction of welded shells.

211 222 Shells intended for the carriage of chlorine or phosgene of 3° (at) shall be designed for a calculation pressure [see marginal 211 127 (2)] of at least 2,2 MPa (22 bar))gauge pressure).

211 223-
211 229

SECTION 3

ITEMS OF EQUIPMENT

211 230 The discharge pipes of shells shall be capable of being closed by blank flanges or some other equally reliable device.

211 231 Shells intended for the carriage of liquefied gases may be provided with, in addition to the openings prescribed in marginal 211 131, openings for the fitting of gauges, including pressure gauges, and thermometers and with bleed holes, as required for their operation and safety.

211 232 Safety devices shall meet the following requirements:

(1) Filling and discharge openings of shells intended for the carriage of liquefied flammable and/or toxic gases shall be equipped with an instant-closing internal safety device which closes automatically in the event of an unintended movement of the shell or of fire. It shall also be possible to operate the closing device by remote control.

(2) All openings, other than those accommodating safety valves and than closed bleed holes, of shells intended for the carriage of liquefied flammable and/or toxic gases shall, if their nominal diameter is more than 1,5 mm, be equipped with an internal shut-off device.

(3) By derogation from the provisions of (1) and (2), shells intended for the carriage of deeply-refrigerated flammable and/or toxic liquefied gases may be equipped with external devices in place of internal devices if the external devices afford protection against external damage at least equivalent to that afforded by the wall of the shell.

(4) If the shells are equipped with gauges, the latter shall not be made of a transparent material in direct contact with the substance carried. If there are thermometers, they shall not project directly into the gas or liquid through the shell wall.

(5) Shells intended for the carriage of chlorine or sulphur dioxide or phosgene of 3° (at) or methyl mercaptan or hydrogen sulphide of 3° (bt) shall not have any opening below the surface level of the liquid. In addition, cleaning apertures (fist-holes) as referred to in marginal 211 132 shall not be permitted.

211 232 *(cont'd)* (6) Filling and discharge openings situated in the upper part of shells shall be equipped with, in addition to what is prescribed in (1), a second, external, closing device. This device shall be capable of being closed by a blank flange or some other equally reliable device.

211 233 Safety valves shall meet the following requirements:

(1) Shells intended for the carriage of gases of 1° to 6° and 9° may be provided with not more than two safety valves whose aggregate clear cross-sectional area of passage at the seating or seatings shall be not less than 20 cm^2 per 30 m^3 or part thereof of the receptacle's capacity.

These valves shall be capable of opening automatically at a pressure of between 0,9 and 1,0 times the test pressure of the shell to which they are fitted. They shall be of such a type as to resist dynamic stresses, including liquid surge. The use of dead-weight or counter-weight valves is prohibited.

Shells intended for the carriage of gases of 1° to 9° harmful to the respiratory organs or entailing a poison risk [1] shall not have safety valves unless the safety valves are preceded by a bursting disc. In the latter case the arrangement of the bursting disc and the safety valve shall be satisfactory to the competent authority.

Where tank-vehicles are intended for carriage by sea, the provisions of this paragraph shall not prohibit the fitting of safety valves conforming to the regulations governing that mode of transport [2].

(2) Shells intended for the carriage of gases of 7° and 8° shall be equipped with two independent safety valves, each so designed as to allow the gases formed by evaporation during normal operation to escape from the shell in such a way that the pressure does not at any time exceed by more than 10 % the working pressure indicated on the shell. One of the two safety valves may be replaced by a bursting disc which shall be such as to burst at the test pressure. In the event of loss of the vacuum in a double-walled shell, or of destruction of 20 % of the insulation of a single-walled shell, the safety valve and the bursting disc shall permit an outflow such that the pressure in the shell cannot exceed the test pressure.

(3) The safety valves of shells intended for the carriage of gases of 7° and 8° shall be capable of opening at the working pressure indicated on the shell. They shall be so designed as to function faultlessly even at their lowest working temperature. The reliability of their operation at that temperature shall be established and checked either by testing each valve or by testing a specimen valve of each design-type.

Thermal insulation

211 234 (1) If shells intended for the carriage of liquefied gases of 3° and 4° are equipped with thermal insulation, such insulation shall consist of either:

— a sun shield covering not less than the upper third but not more than the upper half of the shell surface and separated from the shell by an air space at least 4 cm across; or

— a complete cladding, of adequate thickness, of insulating materials.

(2) Shells intended for the carriage of gases of 7° and 8° shall be thermally insulated. Thermal insulation shall be ensured by means of a continuous sheathing. If the space between the shell and the sheathing is exhausted of air (vacuum insulation), the protective sheathing shall be so designed as to withstand without deformation an external pressure of at least 100 kPa (1 bar) (gauge pressure). By derogation from marginal 211 102 (2), external and internal reinforcing devices may be taken into account in the calculations. If the sheathing is so closed as to be gas-tight, a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the shell or of its items of equipment. The device shall prevent the infiltration of moisture into the heat-insulating sheath.

(3) Shells intended for the carriage of liquefied gases having a boiling point below −182 °C at atmospheric pressure shall not include any combustible material either in the thermal insulation or in the means of attachment to the frame.

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[1] Gases identified by the letter 't' in the list of substances are deemed to be gases harmful to the respiratory organs or entailing a poison risk.

[2] These requirements are contained in Section 13 of the General Introduction to the International Maritime Dangerous Goods (IMDG), Code published by the International Maritime Organization, London.

211 234 *(cont'd)* The means of attachment of shells intended for the carriage of argon, nitrogen, helium or neon of 7° (a) or hydrogen of 7° (b) may, with the consent of the competent authority, contain plastics substances between the shell and the sheathing.

211 235 (1) The following are considered to be elements of a battery-vehicle:

— Receptacles as defined in marginal 2212 (1)(b); or

— Tanks as defined in marginal 2212 (1)(c).

The provisions of this Appendix do not apply to frames of cylinders conforming to marginal 2212 (1)(d).

(2) The following conditions shall be complied with for battery-vehicles:

(a) If one of the elements of a battery-vehicle is equipped with a safety valve and shut-off devices are provided between the elements, every element shall be so equipped.

(b) The filling and discharge devices may be affixed to a manifold.

(c) Each element of a battery-vehicle intended for the carriage of compressed gases of 1° and 2° which are harmful to the respiratory organs or entail a poison risk [1] shall be capable of being isolated by a valve.

(d) The elements of a battery-vehicle intended for the carriage of liquefied gases of 3° to 6° shall be so designed that they can be filled separately and can be kept isolated by a valve capable of being sealed.

(3) The following requirements shall apply to demountable tanks:

(a) they shall not be interconnected by a manifold; and

(b) if the demountable tanks can be rolled, the valves shall be provided with protective caps.

211 236 By derogation from the provisions of marginal 211 131, shells intended for the carriage of deeply-refrigerated liquefied gases need not have an inspection aperture.

211 237-
211 239

SECTION 4

TYPE APPROVAL

211 240-
211 249 (No special requirements)

SECTION 5

TESTS

211 250 The materials of every welded shell shall be tested by the method described in Appendix B.1d.

211 251 The test-pressure levels shall be as follows:

(1) For shells intended for the carriage of gases of 1° and 2°: the levels indicated in marginal 2219 (1) and (3).

(2) For shells intended for the carriage of gases of 3° and 4°:

(a) if the shells are not more than 1,5 m in diameter, the levels indicated in marginal 2220 (2);

[1] Gases identified by the letter 't' in the list of substances are deemed to be gases harmful to the respiratory organs or entailing a poison risk.

211 251 *(cont'd)*

(b) if the shells are more than 1,5 m in diameter, the levels (1) indicated below:

Description of substance	Item number	Minimum test pressure for shells		Maximum mass of contents per litre of capacity kg
		with thermal MPa	without insulation MPa	
bromochlorodifluoromethane (R 12 B1)	3°(a)	1,0	1,0	1,61
chlorodifluoromethane (R 22)	3°(a)	2,4	2,6	1,03
chloropentafluoroethane (R 115)	3°(a)	2,0	2,3	1,08
1-chloro-1,2,2,2-tetrafluoroethane (R 124)	3°(a)	1	1,1	1,2
1-chloro-2,2,2-trifluoroethane (R 133a)	3°(a)	1,0	1,0	1,18
dichlorodifluoromethane (R 12)	3°(a)	1,5	1,6	1,15
chlorofluoromethane (R 21)	3°(a)	1,0	1,0	1,23
1,2-Dichloro-1,1,2,2-tetrafluoroethane (R 114)	3°(a)	1,0	1,0	1,30
octafluorocyclobutane (RC 318)	3°(a)	1,0	1,0	1,34
1,1,1,2-Tetrafluoroethane (R 134a)	3°(a)	1,6	1,8	1,04
ammonia	3°(at)	2,6	2,9	0,53
chlorine	3°(at)	1,7	1,9	1,25
hexafluoropropylene (R 1216)	3°(at)	1,7	1,9	1,11
hydrogen bromide	3°(at)	5,0	5,5	1,54
methyl bromide	3°(at)	1,0	1,0	1,51
nitrogen dioxide NO_2	3°(at)	1,0	1,0	1,30
phosgene	3°(at)	1,5	1,7	1,23
sulphur dioxide	3°(at)	1,0	1,2	1,23
butane	3°(b)	1,0	1,0	0,51
1-butene	3°(b)	1,0	1,0	0,53
1-chloro-1,1-difluoroethane (R 142b)	3°(b)	1,0	1,0	0,99
cis-2-butene	3°(b)	1,0	1,0	0,55
cyclopropane	3°(b)	1,6	1,8	0,53
1,1-difluoroethane (R 152a)	3°(b)	1,4	1,6	0,79
dimethyl ether	3°(b)	1,4	1,6	0,58
isobutane	3°(b)	1,0	1,0	0,49
isobutene	3°(b)	1,0	1,0	0,52
propane	3°(b)	2,1	2,3	0,42
propylene	3°(b)	2,5	2,7	0,43
trans-2-butene	3°(b)	1,0	1,0	0,54
1,1,1-trifluoroethane	3°(b)	2,8	3,2	0,79
dimethylamine	3°(bt)	1,0	1,0	0,59
ethylamine	3°(bt)	1,0	1,0	0,61
ethyl chloride	3°(bt)	1,0	1,0	0,80
hydrogen sulphide	3°(bt)	4,5	5,0	0,67
methylamine	3°(bt)	1,0	1,1	0,58
methyl chloride	3°(bt)	1,3	1,5	0,81
methyl mercaptan	3°(bt)	1,0	1,0	0,78

(1) 1. The prescribed test pressures are:
(a) if the shell is equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0,1 MPa (1 bar), of the liquid at 60 °C, and not less than 1 MPa (10 bar);
(b) if the shell is not equipped with thermal insulation, at least equal to the vapour pressure, reduced by 0,1 MPa (1 bar), of the liquid at 65 °C, and not less than 1 MPa (10 bar).

2. In view of the high toxicity of phosgene of 3° (at), the minimum test pressure for this gas is fixed at 1,5 MPa (15 bar) if the shell is equipped with thermal insulation and at 1,7 MPa (17 bar) if it is not so equipped.

3. The maximum values in kg/litre prescribed for the degree of filling are calculated as follows: maximum mass of contents per litre of capacity = 0,95 × density of the liquid phase at 50 °C.

211 251
(cont'd)

Description of substance	Item number	Minimum test pressure for shells		Maximum mass of contents per litre of capacity kg
		with thermal MPa	without insulation MPa	
trimethylamine	3°(bt)	1,0	1,0	0,56
1,2-butadiene	3°(c)	1,0	1,0	0,59
1,3-butadiene	3°(c)	1,0	1,0	0,55
vinyl chloride	3°(c)	1,0	1,1	0,81
methyl vinyl ether	3°(ct)	1,0	1,0	0,67
trifluorochloroethylene (R 1113)	3°(ct)	1,5	1,7	1,13
vinyl bromide	3°(ct)	1,0	1,0	1,37
mixture F 1	4°(a)	1,0	1,1	1,23
mixture F 2	4°(a)	1,5	1,6	1,15
mixture F 3	4°(a)	2,4	2,7	1,03
mixture of gases R 500	4°(a)	1,8	2,0	1,01
mixture of gases R 502	4°(a)	2,5	2,8	1,05
mixtures of 19 to 21 % by mass dichlorodifluoromethane (R 12) and 79 to 81 % bromochlorodifluoromethane R 12 B1)	4°(a)	1,0	1,1	1,50
mixtures of methyl bromide and chloropicrin	4°(at)	1,0	1,0	1,51
mixture A (trade name: butane)	4°(b)	1,0	1,0	0,50
mixture A 0 (trade name: butane)	4°(b)	1,2	1,4	0,47
mixture A 1	4°(b)	1,6	1,8	0,46
mixture B	4°(b)	2,0	2,3	0,43
mixture C (trade name: propane)	4°(b)	2,5	2,7	0,42
mixtures of hydrocarbons containing methane	4°(b)	—	22,5	0,187
		—	30,0	0,244
mixtures of methyl chloride and methylane chloride	4°(bt)	1,3	1,5	0,81
mixtures of methyl chloride and chloropicrin	4°(bt)	1,3	1,5	0,81
mixtures of methyl bromide and ethylene bromide	4°(bt)	1,0	1,0	1,51
methylacetylene/propadiene and hydrocarbon mixtures				
mixture P_1	4°(c)	2,5	2,8	0,49
mixture P_2	4°(c)	2,2	2,3	0,47
mixtures of 1,3-butadiene and hydrocarbons of 3° (b)	4°(c)	1,0	1,0	0,50
ethylene oxide containing not more than 10 % carbon dioxide by mass	4°(ct)	2,4	2,6	0,73
ethylene oxide with nitrogen up to a total pressure of 1 MPa (10 bar) at 50 °C	4°(ct)	1,5	1,5	0,78

(3) For shells intended for the carriage of gases 5° and 6°:

(a) if the shells are not sheathed in thermal insulation: the levels indicated in marginal 2220 (3) and (4);

211 251 *(cont'd)* (b) if the shells are sheathed in thermal insulation as defined in marginal 211 234 (1): the levels indicated below:

Description of substance	Item number	Minimum test pressure for shells MPa	Maximum mass of contents per litre of capacity kg
bromotrifluoromethane (R 13 B1)	5°(a)	12,0	1,50
carbon dioxide	5°(a)	19,0	0,73
		22,5	0,78
chlorotrifluoromethane (R 13)	5°(a)	12,0	0,96
		22,5	1,12
hexafluoroethane (R 116)	5°(a)	16,0	1,28
		20,0	1,34
nitrous oxide (N_2O)	5°(a)	22,5	0,78
pentafluoroethane (R 125)	5°(a)	3,4	0,95
sulphur hexafluoride	5°(a)	12,0	1,34
trifluoromethane (R 23)	5°(a)	19,0	0,92
		25	0,99
xenon	5°(a)	12,0	1,30
hydrogen chloride	5°(at)	12,0	0,69
ethane	5°(b)	12,0	0,32
ethylene	5°(b)	12,0	0,25
		22,5	0,36
1,1-Difluoroethylene	5°(c)	12,0	0,66
		22,5	0,78
vinyl fluoride	5°(c)	12,0	0,58
		22,5	0,65
mixture of gases (R 503)	6°(a)	3,1	0,11
		4,2	0,21
		10,0	0,76
carbon dioxide containing not more than 35 % ethylene oxide by mass	6°(c)	19,0	0,73
		22,5	078
ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide by mass	6°(ct)	19,0	0,66
		25,0	0,75

Where shells sheathed in thermal insulation are used which have been subjected to a test pressure lower than that shown in the table, the maximum mass of the contents per litre of capacity shall be such that the pressure reached in the shell by the substance in question at 55 °C does not exceed the test pressure stamped on the shell. In such a case the maximum load allowed shall be prescribed by the expert approved by the competent authority.

(4) For shells intended for the carriage of ammonia dissolved under pressure of 9° (at):

Description of substance	Item number	Minimum test pressure (in MPa)	Maximum mass of contents per litre of capacity (in kg)
ammonia dissolved under pressure in water			
— with more than 35 % but not more than 40 % ammonia by mass	9° (at)	1	0,80
— with more than 40 % but not more than 50 % ammonia by mass	9° (at)	1,0	0,77

(5) For shells intended for the carriage of gases of 7° and 8°: not less than 1,3 times the maximum permitted working pressure, as indicated on the shell, but not less than 300 kPa (3 bar) (gauge pressure); for shells with vacuum insulation the test presure shall be not less than 1,3 times the maximum permitted working pressure increased by 100 kPa (1 bar).

211 252 The first hydraulic pressure test shall be carried out before the thermal insulation is placed in position.

211 253 The capacity of each shell intended for the carriage of gases of 3° to 6° and 9° shall be determined, under the supervision of an expert approved by the competent authority, by weighing or volumetric measurement of the quantity of water which fills the shell; any error in the measurement of shell capacity shall be of less than 1 %. Determination by a calculation based on the dimensions of the shell is not permitted. The maximum filling masses allowed in accordance with marginals 2220 (4) and 211 251 (3) shall be prescribed by an approved expert.

211 254 Checking of the welds shall be carried out in accordance with the lambda-coefficient 1,0 requirements of marginal 211 127 (8).

211 255 By derogation from the requirements of marginal 211 151, the periodic tests shall take place:

(1) every three years in the case of shells intended for the carriage of boron trifluoride of 1° (at), town gas of 2° (bt), hydrogen bromide, chlorine, nitrogen dioxide, sulphur dioxide or phosgene of 3° (at), hydrogen sulphide of 3° (bt), or hydrogen chloride of 5° (at);

(2) after six years' service and thereafter every twelve years in the case of shells intended for the carriage of gases of 7° or 8°. A leakproofness check shall be performed by an approved expert six years after each periodic test.

211 256 In the case of vacuum-insulated shells, the hydraulic-pressure test and the check of the internal condition may, with the consent of the approved expert, be replaced by a leakproofness test and measurement of the vacuum.

211 257 If apertures have been made, on the occasion of periodic inspections, in shells intended for the carriage of gases of 7° or 8°, the method by which they are hermetically closed before the shells are replaced in service shall be approved by the approved expert and shall ensure the integrity of the shell.

211 258 Leakproofness tests of shells intended for the carriage of gases of 1° to 6° and 9° shall be performed at a pressure of not less than 400 kPa (4 bar) and not more than 800 kPa (8 bar) (gauge pressure).

211 259

SECTION 6

MARKING

211 260 The following additional particulars shall be marked by stamping or by any other similar method on the plate prescribed in marginal 211 160, or directly on the walls of the shell itself if the walls are so reinforced that the strength of the shell is not impaired:

(1) On shells intended for the carriage of only one substance:

— the name of the gas in full (1).

This indication shall be supplemented in the case of shells intended for the carriage of compressed gases of 1° and 2° by an indication of the maximum filling pressure at 15 °C allowed for the shell, and in the case of shells intended for the carriage of liquefied gases of 3° to 8° or of ammonia dissolved under pressure of 9° (at) by an indication of the maximum permissible load mass in kg and of the filling temperature if below –20 °C;

(2) On multi-purpose shells:

— the names, in full (1), of the gases for whose carriage the shell is approved.

These particulars shall be supplemented by an indication of the maximum permissible load mass in kg for each gas;

(1) The descriptions printed in italics in marginal 2201 shall be used as the full name of the gas for mixtures A, A0 and C of 4° (b) of marginal 2201. The names customary in the trade and mentioned in the Note to 4° (b) of marginal 2201 may be used only as a complement.

211 260 *(cont'd)*

(3) On shells intended for the carriage of gases of 7° or 8°:

— the working pressure; and

(4) On shells equipped with thermal insulation:

— the inscription 'thermally insulated' or 'thermally insulated by vacuum'.

211 261 The frame of a battery-vehicle shall bear near the filling point a plate specifying:

— the test pressure of the elements (1);

— the maximum filling pressure (1) at 15 °C allowed for elements intended for compressed gases;

— the number of elements;

— the aggregate capacity (1) of the elements;

— the name of the gas in full (2);

and, in the case of liquefied gases:

— the permissible maximum load (1) per element.

211 262 In addition to the particulars prescribed in marginal 211 161, the following shall be inscribed either on the shell itself or on a plate:

(a) — either: 'minimum filling temperature allowed: –20 °C',

— or: 'minimum filling temperature allowed: .....';

(b) *where the shell is intended for the carriage of one substance only:*

— the name of the gas in full (2);

— for liquefied gases of 3° to 8° and for ammonia dissolved under pressure in water of 9° (at), the maximum permissible load mass in kg;

(c) *where the shell is a multi-purpose shell:*

— the names in full (2) of all the gases to whose carriage the shell is assigned, with an indication of the maximum permissible load mass in kg for each of them;

(d) *where the shell is equipped with thermal insulation:*

— the inscription 'thermally insulated' or 'thermally insulated by vacuum', in an official language of the country of registration and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

211 263 These particulars shall not be required in the case of a vehicle carrying demountable tanks.

211 264-
211 269

SECTION 7

OPERATION

211 270 A shell assigned at different times to the carriage of different liquefied gases of 3° to 8° (multi-purpose shell) may not carry substances other than those listed in one, and one only, of the following groups:

Group 1: halogenated hydrocarbons of 3° (a) and 4° (a);

Group 2: hydrocarbons of 3° (b) and 4° (b); butadienes of 3° (c); and mixtures of 1,3-butadiene and hydrocarbons, of 4° (c);

(1) The units of measurement should be indicated after numerical values.

(2) The descriptions printed in italics in marginal 2201 shall be used as the full name of the gas for mixtures A, A0 and C of 4° (b) of marginal 2201. The names customary in the trade and mentioned in the Note to 4° (b) of marginal 2201 may be used only as a complement.

211 270 *(cont'd)*

Group 3: ammonia of 3° (at); dimethyl ether of 3° (b); dimethylamine, ethylamine, methylamine and trimethylamine of 3° (bt); and vinyl chloride of 3° (c);

Group 4: methyl bromide of 3° (at); ethyl chloride and methyl chloride of 3° (bt)

Group 5: mixtures of ethylene oxide with carbon dioxide and of ethylene oxide with nitrogen of 4°(ct);

Group 6: nitrogen, carbon dioxide, rare gases, nitrous oxide N_2O, and oxygen of 7° (a); air, mixtures of nitrogen with rare gases, and mixtures of oxygen with nitrogen, also when they contain rare gases, of 8° (a);

Group 7: ethane, ethylene, and methane of 7° (b); and mixtures of methane with ethane, also when they contain propane or butane, of 8° (b).

211 271 Shells which have been filled with a substance of group 1 or group 2 shall be emptied of liquefied gas before being loaded with another substance belonging to the same group. Shells which have been filled with a substance of groups 3 to 7 shall be completely emptied of liquefied gas and then blown down before being loaded with another substance belonging to the same group.

211 272 The multiple use of shells for the carriage of liquefied gases of the same group shall be allowed if all the requirements prescribed for the gases to be carried in one and the same shell are observed. Such multiple use shall be subject to approval by an approved expert.

211 273 The multiple use of shells for the carriage of gases of different groups shall be allowed if permitted by the approved expert.

When shells are reassigned to gases of a different group, the shells shall be completely emptied of liquefied gases, then blown down and, lastly, degassed. The degassing of shells shall be verified and certified by the approved expert.

211 274 When loaded tanks or empty but uncleaned tanks are handed over for carriage, only the particulars specified in marginal 211 262 applicable to the gas loaded or just discharged shall be visible; all particulars concerning other gases shall be covered up.

211 275 All the elements of a battery-vehicle shall contain only one and the same gas. In the case of a battery-vehicle intended for the carriage of liquefied gases of 3° to 6°, the elements shall be filled separately and be kept isolated by a sealed valve.

211 276 The maximum filling pressure for compressed gases of 1° and 2° other than boron trifluoride shall not exceed the values prescribed in marginal 2219 (2).

For boron trifluoride of 1° (at) the maximum filling mass per litre of capacity shall not exceed 0,86 kg.

The maximum filling mass per litre of capacity according to marginals 2220, (2), (3) and (4), and 211 251, (2), (3) and (4), shall be abided by.

211 277 The degree of filling of shells intended for the carriage of gases of 7° (b) and 8° (b) shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the opening pressure of the safety valve, the volume of the liquid would reach 95 % of the shell's capacity at that temperature. Shells intended for the carriage of gases of 7° (a) and 8° (a) may be filled to 98 % at the loading temperature and the loading pressure.

211 278 On shells intended for the carriage of nitrous oxide and oxygen of 7° (a), air or mixtures containing oxygen of 8° (a), substances containing grease or oil shall not be used to ensure leakproofness of the joints or for the maintenance of the closures.

211 279 The requirement in marginal 211 175 shall not apply to gases of 7° and 8°.

211 280-
211 299

CLASS 3

FLAMMABLE LIQUIDS

211 300-
211 309

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 310 The following substances of marginal 2301 may be carried in fixed or demountable tanks:

(a) propyleneimine, inhibited, of 12°;

(b) substances classified under (a) of 11°, 14° to 22°, 26° and 27°, 41° to 57°;

(c) substances classified under (b) of 11°, 14° to 27°, 41° to 57°, and substances of 32° and 33°;

(d) substances of 1° to 5°, 31°, 34° and 61° (c), with the exception of isopropyl nitrate, n-propyl nitrate and nitromethane of 3° (b).

211 311-
211 319

SECTION 2

CONSTRUCTION

211 320 Shells intended for the carriage of inhibited propyleneimine of 12° shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1,5 MPa (15 bar) (gauge pressure).

211 321 Shells intended for the carriage of the substances referred to in marginal 211 310 (b) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1,0 MPa (10 bar) (gauge pressure).

211 322 Shells intended for the carriage of the substances referred to in marginal 211 310 (c) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

211 323 Shells intended for the carriage of the substances referred to in marginal 211 310 (d) shall be designed in accordance with the requirements of Part I of this Appendix.

211 324-
211 329

SECTION 3

ITEMS OF EQUIPMENT

211 330 All openings of shells intended for the carriage of the substances referred to in marginal 211 310 (a) and (b) shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed [1] and the closures shall be capable of being protected with lockable caps.

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 331 Shells intended for the carriage of the substances referred to in marginal 211 310 (c) and (d) may also be of the bottom-discharge type. Shells intended for the carriage of the substances referred to in marginal 211 310 (c), except those of 33°, shall be capable of being hermetically closed (1).

211 332 If shells intended for the carriage of the substances referred to in marginal 211 310 (a) and (b) or (c), except those of 33°, are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority. If shells intended for the carriage of the substances referred to in marginal 211 310 (d) are equipped with safety valves or a venting system, these shall satisfy the requirements of marginals 211 133 to 211 135.

If shells intended for the carriage of the substances of 33° are fitted with safety valves, these shall satisfy the requirements of marginals 211 134 and 211 135.

Shells intended for the carriage of the substances referred to in marginal 211 310 (d) having a flash-point not exceeding 61 °C and equipped with a venting system which cannot be closed shall have a flame-trap in the venting system.

211 333-
211 339

SECTION 4

TYPE APPROVAL

211 340-
211 349 (No special requirements)

SECTION 5

TESTS

211 350 Shells intended for the carriage of the substances referred to in marginal 211 310 (a), (b) or (c) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar).

211 351 Shells intended for the carriage of the substances referred to in marginal 211 310 (d) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 211 123.

211 352-
211 359

SECTION 6

MARKING

211 360-
211 369 (No special requirements)

SECTION 7

OPERATION

211 370 Shells intended for the carriage of the substances referred to in marginal 211 310 (a), (b) and (c) except those of 33° shall be hermetically closed (1) during carriage. The closures of shells intended for the carriage of the substances referred to in 211 310 (a) and (b) shall be protected by a locked cap.

(1) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 371 Tank-vehicles and demountable tanks approved for the carriage of substances of 11°, 12°, 14° to 20°, 27°, 32° and 41° to 57° shall not be used for the carriage of foodstuffs, articles of consumption or animal feeds.

211 372 An aluminium-alloy shell shall not be used for the carriage of acetaldehyde of 1° (a) unless the shell is reserved solely for such carriage and the acetaldehyde is free from acid.

211 373 The petrol (gasoline) referred to in the Note to 3° (b) of marginal 2301 may also be carried in tanks designed according to marginal 211 123 (1) and having equipment conforming to marginal 211 133.

211 374-
211 379

SECTION 8

TRANSITIONAL MEASURES

211 380 Fixed tanks (tank-vehicles) and demountable tanks intended for the carriage of substances of 32° and 33° of marginal 2301, built according to the requirements of this Appendix applicable prior to 1 January 1995, but which do not, however, conform to the requirements applicable as from 1 january 1995, may still be used up to 31 December 2000.

211 381-
211 399

CLASS 4.1

FLAMMABLE SOLIDS

CLASS 4.2

SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

CLASS 4.3

SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

211 400-
211 409

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 410 The following substances of marginals 2401, 2431 and 2471 may be carried in fixed or demountable tanks:

(a) the substances listed under letter (a) of 6°, 17°, 19° and 31° to 33° of marginal 2431;

(b) the substances of 11° (a) and 22° of marginal 2431;

(c) the substances listed under letter (a) of 1°, 2°, 3°, 21°, 23° and 25° of marginal 2471;

(d) the substances of 11° (a) of marginal 2471;

(e) the substances listed under letter (b) or (c) of 6°, 8°, 10°, 17°, 19° and 21° of marginal 2431 and of 3°, 21°, 23° and 25° of marginal 2471;

(f) the substances of 5° and 15° of marginal 2401;

211 410 *(cont'd)* (g) powdery and granular substances listed under letter (b) or (c) of:

— 1°, 6°, 7°, 8°, 11°, 12°, 13°, 14°, 16° and 17° of marginal 2401,

— 1°, 5°, 7°, 9°, 12°, 13°, 14°, 15°, 16°, 18° and 20° of marginal 2431,

— 11°, 12°, 13°, 14°, 15°, 16°, 17°, 19°, 20°, 22° and 24° of marginal 2471.

Note: For the carriage in bulk of substances of:

— 4° (c), 6° (c), 11° (c), 12° (c), 13° (c) and 14° (c) and solid wastes classified under (c) of these items of marginal 2401,

— 1° (c), 2° (c), 3° (c), 12° (c) and 16° (c) and solid wastes classified under (c) of these items of marginal 2431,

— 11° (c), 12° (c), 13° (b) and (c), 14° (c), 15° (c), 17° (b) and 20° (c) of marginal 2471,

see marginals 41 111, 42 111 and 43 111.

211 411-
211 419

SECTION 2

CONSTRUCTION

211 420 Shells intended for the carriage of the substances referred to in marginal 211 410 (a) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 2,1 MPa (21 bar) (gauge pressure).

The requirements of Appendix B.1d are applicable to the materials and construction of these shells.

211 421 Shells intended for the carriage of the substances referred to in marginal 211 410 (b), (c) and (d) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1 MPa (10 bar) (gauge pressure).

211 422 Shells intended for the carriage of the substances referred to in marginal 211 410 (e) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

211 423 Shells intended for the carriage of the solids referred to in marginal 211 410 (f) and (g) shall be designed in conformity with the requirements of Part I of this Appendix.

211 424 Shells intended for the carriage of substances of marginal 2431, 1° (b) shall be connected to all parts of the vehicle by equipotential connections and shall be capable of being electrically earthed.

211 425-
211 429

SECTION 3

ITEMS OF EQUIPMENT

211 430 All openings of shells intended for the carriage of the substances referred to in marginal 211 410 (a), (b), (c) and (e) shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed [1] and the closure shall be capable of being protected with lockable caps. The cleaning apertures (fist-holes) referred to in marginal 211 132 shall not be permitted.

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 431 With the exception of shells intended for the carriage of caesium and rubidium of marginal 2471, 11° (a), shells intended for the carriage of substances referred to in marginal 211 410 (d), (f) and (g) may also be of the bottom-discharge type. The openings of shells intended for the carriage of caesium and rubidium of marginal 2471, 11° (a) shall be equipped with hermetically [1] closing and lockable caps.

211 432 Shells intended for the carriage of the substances referred to in marginal 211 410 (b) shall in addition meet the following requirements:

(1) The heating device shall not penetrate into, but shall be exterior to, the body of the shell. However, a pipe used for extracting the phosphorus may be equipped with a heating jacket. The device heating the jacket shall be so regulated as to prevent the temperature of the phosphorus from exceeding the filling temperature of the shell. Other piping shall enter the shell in its upper part; openings shall be situated above the highest permissible level of the phosphorus and be capable of being completely enclosed under lockable caps. In addition, the cleaning apertures (fist-holes) referred to in marginal 211 132 shall not be permitted.

(2) The shell shall be equipped with a gauging system for verifying the level of the phosphorus and, if water is used as a protective agent, with a fixed gauge mark showing the highest permissible level of the water.

211 433 If shells intended for the carriage of the substances referred to in marginal 211 410 (a), (c) and (e) are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

211 434 Shells intended for the carriage of the subtances referred to in marginal 211 410 (f) shall be equipped with thermal insulation made of materials which are not readily flammable.

211 435 If shells intended for the carriage of substances referred to in marginal 211 410 (d) are equipped with thermal insulation, such insulation shall be made of materials which are not readily flammable.

211 436 Shells intended for the carriage of the substances referred to in marginal 211 410 (f) may be equipped with valves opening automatically inwards or outwards under the effect of a difference of pressure of between 20 kPa and 30 kPa (0,2 bar and 0,3).

211 437-
211 439

SECTION 4

TYPE APPROVAL

211 440-
211 449 (No special requirements)

SECTION 5

TESTS

211 450 Shells intended for the carriage of the substances referred to in marginal 211 410 (a) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 1 MPa (10 bar). The materials of each of these shells shall be tested by the method described in Appendix B.1d.

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 451 Shells intended for the carriage of the substances referred to in marginal 211 410 (b) to (e) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 400 kPa (4 bar).

By derogation from the requirements of marginal 211 151, shells intended for the carriage of substances referred to in marginal 211 410 (d) shall undergo periodic inspections at least every eight years which shall include a thickness check using suitable instruments. For such shells, the leakproofness test and check, for which provision is made in marginal 211 152, shall be carried out at least every four years.

211 452 Shells intended for the carriage of the substances referred to in marginal 211 410 (f) and (g) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 211 123.

211 453-
211 459

SECTION 6

MARKING

211 460 Shells intended for the carriage of the substances referred to in marginal 211 410 (a) shall bear in addition to the particulars prescribed in marginal 211 161, the words: 'Do not open during carriage. Liable to spontaneous combustion.'

Shells intended for the carriage of the substances referred to in 211 410 (c) to (e) shall bear in addition to the particulars prescribed in marginal 211 161, the words:

'Do not open during carriage. Gives off flammable gases on contact with water.'

These particulars shall be in an official language of the country of approval, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

211 461 Shells intended for the carriage of substances of marginal 2471, 1° (a) shall also bear, on the plate prescribed in marginal 211 160, the names of the approved substances and the maximum permissible load of the shell in kg.

211 462-
211 469

SECTION 7

OPERATION

211 470 (1) Substances of 11° and 22° of marginal 2431 shall, if water is used as a protective agent, be covered with a depth of not less than 12 cm of water at the time of filling; the degree of filling at a temperature of 60 °C shall not exceed 98 %. If nitrogen is used as a protective agent, the degree of filling at a temperature of 60 °C shall not exceed 96 %. The remaining space shall be filled with nitrogen in such a way that, even after cooling, the pressure at no time falls below atmospheric pressure. The shell shall be hermetically closed [1] so that no leakage of gas occurs.

(2) Uncleaned empty shells which have contained substances of 11° and 22° of marginal 2431 shall, when handed over for carriage, either:

— be filled with nitrogen; or

— be filled with water to not less than 96 % and not more than 98 % of their capacity; between 1 October and 31 March, this water shall contain sufficient anti-freeze agent to make it impossible for the water to freeze during carriage; the anti-freeze agent shall be free from corrosive action and not liable to react with phosphorus.

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 471 Shells containing substances of 31° to 33° of marginal 2431 and substances of 2° (a), 3° (a) and 3° (b) of marginal 2471 shall be filled to not more than 90 % of their capacity; a space of 5 % shall remain empty for safety when the liquid is at an average temperature of 50 °C. During carriage, the substances shall be under a layer of inert gas, the gauge pressure of which shall not be less than 50 kPa (0,5 bar). The shells shall be hermetically closed (1) and the protective caps conforming to marginal 211 430 shall be locked. Uncleaned empty shells shall, when handed over for carriage, be filled with an inert gas at a gauge pressure of at least 50 kPa (0,5 bar).

211 472 For ethyldichlorosilane, methyldichlorosilane and trichlorosilane of marginal 2471, 1°, the degree of filling shall not exceed 0,93 or 0,95 or 1,14 kg per litre of capacity respectively, if filling is by mass. If filling is by volume, and for chlorosilanes not mentioned by name (n.o.s.) of marginal 2471, 1°, the rate of filling shall not exceed 85%. The shells shall be hermetically closed (1) and the protective caps conforming to marginal 211 430 shall be locked.

211 473 Shells containing substances of marginal 2401, 5° and 15°, shall not be filled to more than 98 % of their capacity.

211 474 For the carriage of caesium and rubidium of marginal 2471, 11° (a), the substance shall be covered by an inert gas and the caps conforming to marginal 211 431 shall be locked. Shells containing other substances of marginal 2471, 11° (a), shall not be handed over for carriage until the substance has solidified completely and been covered by an inert gas.

Uncleaned empty shells which have contained substances of marginal 2471, 11° (a) shall be filled with an inert gas. The shells shall be hermetically closed.

211 475 When substances of marginal 2431, 1° (b) are being loaded, the temperature of the goods being loaded shall not exceed 60 °C.

211 476-
211 499

CLASS 5.1

OXIDIZING SUBSTANCES

CLASS 5.2

ORGANIC PEROXIDES

211 500-
211 509

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 510 The following substances of marginal 2501 may be carried in fixed or demountable tanks:

(a) substances of 5°;

(b) substances listed under letter (a) or (b) of 1° to 4°, 11°, 13°, 16°, 17°, 22° and 23°, carried in the liquid state;

(c) ammonium nitrate liquid of 20°;

(1) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with safety valves, frangibles discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 510 *(cont'd)*

(d) substances listed under letter (c) of 1°, 16°, 18°, 22° and 23°, carried in the liquid state;

(e) substances in powdery or granular form listed under letter (b) or (c) of 11°, 13° to 19°, 21° to 27°, 29° and 31°.

Note: For the carriage in bulk of substances of 11° to 13°, 16°, 18°, 19°, 21° and 22° (c), and of solid wastes classified in the aforementioned items of marginal 2501, see marginal 51 111.

211 511 Substances of 9° (b), 10° (b), 19° (b) or 20° (b) of marginal 2551 may be carried in fixed or demountable tanks at the latest from 1 January 1995 under conditions laid down by the competent authority of the country of origin if, on the basis of tests (see marginal 211 541), the competent authority is satisfied that such a transport operation can be carried out safely.

211 512-
211 519

SECTION 2

CONSTRUCTION

211 520 Shells intended for the carriage of the substances referred to in marginal 211 510 (a) shall be designed for a calculation pressure [see marginal 211 127 (2)] of at least 1 MPa (10 bar) (gauge pressure).

211 521 Shells intended for the carriage of the substances referred to in marginal 211 510 (b) shall be designed for a calculation pressure [see marginal 211 127 (2)] of at least 400 kPa (4 bar) (gauge pressure). Shells, and their items of equipment, intended for the carriage of substances of 1° shall be made of aluminium not less than 99,5 % pure or of suitable steel not liable to cause hydrogen peroxide to decompose. Where shells are made of aluminium not less than 99.5 % pure, the wall thickness need not be greater than 15 mm, even where calculation in accordance with marginal 211 127 (2) gives a higher value.

211 522 Shells intended for the carriage of the substances referred to in marginal 211 510 (c) shall be designed for a calculation pressure [see marginal 211 127 (2)] of at least 400 kPa (4 bar) (gauge pressure). The shells shall be made of austenitic steel.

211 523 Shells intended for the carriage of the liquids referred to in marginal 211 510 (d) and the powdery or granular substances referred to in marginal 211 510 (e) shall be designed in accordance with the requirements of Part I of this Appendix.

211 524 Shells intended for the carriage of substances referred to in marginal 211 511 shall be designed for a calculation pressure of at least 400 kPa (4 bar) (gauge pressure).

211 525-
211 529

SECTION 3

ITEMS OF EQUIPMENT

211 530 Shells intended for the carriage of substances of 1° (a), 3° (a) and 5° of marginal 2501 shall have their openings above the surface level of the liquid. In addition, the cleaning apertures (fist holes) referred to in marginal 211 132 shall not be permitted. For solutions containing more than 60 % but not more than 70 % hydrogen peroxide, openings below the surface level of the liquid shall be permissible. In this case the shell-discharge system shall be equipped with two mutually independent shut-off devices mounted in series, the first taking the form of a quick-closing internal stop-valve of an approved type and the second that of a sluice-valve, one at each end of the discharge pipe.

A blank flange, or another device providing the same measure of security, shall also be fitted at the outlet of each external sluive-valve. The internal stop-valve shall be such that if the pipe is wrenched off the stop-valve wil remain integral with the shell and in the closed position.

211 530 *(cont'd)* The connections to the external pipe-sockets of shells shall be made of materials not liable to cause decomposition of hydrogen peroxide.

211 531

211 532 Shells intended for the carriage of hydrogen peroxide or aqueous solutions of hydrogen peroxide of 1°, or carriage of ammonium nitrate liquid of 20° of marginal 2501 shall be fitted in their upper part with a shut-off device preventing any build-up of excess pressure inside the shell, any leakage of liquid, and any entry of foreign matter into the shell. The shut-off devices of shells intended for the ammonium nitrate liquid of marginal 2501, 20°, shall be so designed as to preclude obstruction of the devices by solidified ammonium nitrate during carriage.

211 533 Where shells intended for the carriage of ammonium nitrate liquid of marginal 2501, 20°, are sheathed in thermally-insulating material, the material shall be of an inorganic nature and entirely free from combustible matter.

211 534 Shells intended for the carriage of substances referred to in marginal 211 511 shall be equipped with thermal insulation complying with the requirements of marginal 211 234 (1). If the SADT of the organic peroxide in the shell is 55 °C or less, or the shell is constructed of aluminium, the shell shall be completely insulated. The sun shield and any part of the shell not covered by it, or the outer sheathing of a complete lagging, shall be painted white or finished in bright metal. The paint shall be cleaned before each transport journey and renewed in case of yellowing or deterioration. The thermal insulation shall be free from combustible matter.

211 535 Shells intended for the carriage of substances referred to in marginal 211 511 shall be fitted with temperature sensing devices.

211 536 (1) Shells intended for the carriage of substances referred to in marginal 211 511 shall be fitted with safety valves and pressure-relief devices. Vacuum-relief devices may also be used. Pressure-relief devices shall operate at pressures determined according to both the properties of the organic peroxide and the construction characteristics of the tank. Fusible elements shall not be permitted in the body of the shell.

(2) Shells intended for the carriage of substances referred to in marginal 211 511 shall be fitted with spring-loaded safety valves to prevent significant pressure build-up within the shell of the decomposition products and vapours released at a temperature of 50 °C. The capacity and start-to-discharge pressure of the safety-valve(s) shall be based on the results of the tests specified in marginal 211 541. The start-to-discharge pressure shall however in no case be such that liquid could escape from the valve(s) if the shell were overturned.

(3) The pressure-relief devices of shells intended for the carriage of substances referred to in marginal 211 511 may be of the spring-loaded type or bursting disc type, designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of fire engulfment (heath load 110 kW/m^2) or self-accelerating decomposition. The start-to-discharge pressure of the pressure-relief device(s) shall be higher than that specified in paragraph (2) and based on the results of the tests referred to in marginal 211 541. The dimensions of the pressure-relief devices shall be such that maximum pressure in the shell never exceeds the test pressure of the shell.

(4) For shells with an insulation consisting of a complete cladding intended for the carriage of substances referred to in marginal 211 511, the capacity and setting of the pressure-relief device(s) shall be determined assuming a loss of insulation from 1 % of the surface area.

(5) Vacuum-relief devices and spring-loaded safety valves of shells for the carriage of substances referred to in marginal 211 511 shall be provided with flame arresters unless the substances to be carried and their decomposition products are non-combustible. Due attention shall be paid to the reduction of the relief capacity caused by the flame arrester.

211 537-
211 539

SECTION 4

TYPE APPROVAL

211 540-211 541 For the type approval of shells intended for the carriage of substances referred to in marginal 211 511, tests shall be undertaken:

— to prove the compatibility of all materials normally in contact with the substance during carriage;

— to provide data to facilitate the design of the pressure-relief devices and safety valves taking into account the design characteristics of the tank; and

— to establish any special requirements necessary for the safe carriage of the substance.

The test results shall be included in the report for the type approval of the tank.

211 542-211 549

SECTION 5

TESTS

211 550 Shells intended for the carriage of the substances referred to in marginal 211 510 (a), (b) and (c) shall be subjected to the initial and periodic hydraulic pressure tests at a pressure of not less than 400 kPa (4 bar) (gauge pressure). Shells of pure aluminium intended for the carriage of substances of marginal 2501, 1°, may be subjected to the initial and periodic hydraulic pressure tests at a pressure of only 250 kPa (2,5 bar) (gauge pressure).

Shells intended for the carriage of the substances referred to in marginal 211 510 (d) and (e) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 211 123.

211 551 Shells intended for the carriage of substances referred to in marginal 211 511 shall be subjected to the initial and periodic hydraulic pressure tests at the calculation pressure as defined in marginal 211 524.

211 552-211 559

SECTION 6

MARKING

211 560 For shells intended for the carriage of substances referred to in marginal 211 511, the following additional particulars shall be marked by stamping or by any other similar method on the plate prescribed in marginal 211 161 or directly on the walls of the shell itself, if the walls are so reinforced that the strength of the shell is not impaired:

— the chemical name with the approved concentration of the substance concerned.

211 561-211 569

SECTION 7

OPERATION

211 570 The inside of the shell and all parts liable to come into contact with the substances referred to in marginals 211 510 and 211 511 shall be kept clean. No lubricant capable of combining dangerously with the substance carried shall be used for pumps, valves or other devices.

211 571 Shells intended for the carriage of substances of 1° (a), 2° (a) and 3° (a) of marginal 2501 shall be filled to not more than 95 % of their capacity at a reference temperature of 15 °C. Shells intended for the carriage of substances of marginal 2501, 20°, shall be filled to not more than 97 % of their capacity, and the maximum temperature after filling shall not exceed 140 °C. Shells approved for the carriage of ammonium nitrate liquid shall not be used for the carriage of other substances without being first carefully cleansed of any residues.

211 572 Shells intended for the carriage of substances referred to in marginal 211 511 shall be filled as set out in the test report for the type approval of the tank but shall be filled to not more than 90 % of their capacity. Shells shall be free from impurities at the time of filling.

211 573 Service equipment such as valves and external piping of shells intended for the carriage of substances referred to in marginal 211 511 shall be emptied after filling or discharging of the tank.

211 574-
211 599

CLASS 6.1

TOXIC SUBSTANCES

CLASS 6.2

INFECTIOUS SUBSTANCES

211 600-
211 609

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 610 (1) The following substances of marginal 2601 may be carried in fixed or demountable tanks:

(a) the substances listed by name in 2° to 4°;

(b) substances classified under (a) of 6° to 13° — with the exception of isopropyl chloroformate of 10° —, 15° to 17°, 20°, 22°, 23°, 25° to 28°, 31° to 36°, 41°, 44°, 51°, 52°, 55°, 61°, 65° to 68°, 71° to 87° and 90°, carried in the liquid state;

(c) substances classified under (b) or (c) of 11°, 12°, 14° to 28°, 32° to 36°, 41°, 44°, 51° to 55°, 57° to 62°, 64° to 68°, 71° to 87° and 90°, carried in the liquid state;

(d) substances in powdery or granular form classified under (b) or (c) of 12°, 14°, 17°, 19°, 21°, 23°, 25° to 27°, 32° to 35°, 41°, 44°, 51° to 55°, 57° to 68°, 71° to 87° and 90°.

Note: For the carriage in bulk of substances of 60° (c), of solids containing toxic liquids of 65° (b) (identification number 3243) and of solid wastes classified under (c) of the various items, see marginal 61 111.

(2) Substances of marginal 2651, 3° and 4°, may be carried in fixed or demountable tanks.

211 611-
211 619

SECTION 2

CONSTRUCTION

211 620 Shells intended for the carriage of substances referred to in marginal 211 610 (1) (a) listed by name under 2° to 4° of marginal 2601 shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1,5 MPa (15 bar) (gauge pressure).

211 621 Shells intended for the carriage of the substances referred to in marginal 211 610 (1) (b) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1,0 MPa (10 bar) (gauge pressure).

211 622 Shells intended for the carriage of the substances referred to in marginal 211 610(1)(c) and 211 610(2) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

Shells intended for the carriage of chloroacetic acid of 24° (b) of marginal 2601 shall be provided with an enamel equivalent protective lining if the material of the shell is attacked by chloroacetic acid.

211 623 Shells intended for the carriage of the powdery or granular substances referred to in marginal 211 610(1)(d) shall be designed in accordance with the requirements of Part I of this Appendix.

211 624-
211 629

SECTION 3

ITEMS OF EQUIPMENT

211 630 All openings of shells intended for the carriage of the substances referred to in marginal 211 610(1)(a) and (b) shall be above the surface level of the liquid. No pipe or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed [1] and the closures shall be capable of being protected with lockable caps. The cleaning openings provided for in marginal 211 132 shall not however be permitted for shells intended for the carriage of solutions of hydrocyanic acid of 2°.

211 631 Shells intended for the carriage of the substances referred to in marginal 211 610(1)(c) and (d) and (2) may also be of the bottom-discharge type. The shells shall be capable of being hermetically closed [1].

211 632 If shells are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

Protection of equipment

211 633 (1) Fittings and accessories mounted in the upper part of the shell

Such fittings and accessories shall be either:

— inserted in a recessed housing; or

— equipped with an internal safety valve; or

— shielded by a cap, or by transverse and/or longitudinal members, or by other equally effective devices, so profiled that in the event of overturning the fittings and accessories will not be damaged.

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with saferty valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 633 *(cont'd)* (2) Fittings and accessories mounted in the lower part of the shell

Pipe-sockets, lateral shut-off devices, and all discharge devices shall either be recessed by at lest 200 mm from the extreme outer edge of the shell or be protected by a rail having a coefficient of inertia of not less than 20 cm^3 transversally to the direction of travel; their ground clearance shall be not less than 300 mm with the shell full.

3) Fittings and accessories mounted on the rear face of the shell

All fittings and accessories mounted on the rear face shall be protected by the bumper prescribed in marginal 10 220. Their height above the ground shall be such that they are adequately protected by the bumper.

211 634-
211 639

SECTION 4

TYPE APPROVAL

211 640-
211 649 (No special requirements)

SECTION 5

TESTS

211 650 Shells intended for the carriage of the substances referred to in marginal 211 610(1)(a), (b) and (c) and (2) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar).

For shells intended for the carriage of substances of 31° (a) of marginal 2601, the periodic tests shall be carried out at intervals of not more than three years and shall include the hydraulic pressure test.

211 651 Shells intended for the carriage of the substances referred to in marginal 211 610(1)(d) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 211 123.

211 652-
211 659

SECTION 6

MARKING

211 660-
211 669 (No special requirements)

SECTION 7

OPERATION

211 670 Shells intended for the carriage of substances of 3° of marginal 2601 shall not be filled to more than 1 kg per litre of capacity.

211 671 Shells shall be hermetically closed (1) during carriage. The closures of shells intended for the carriage of the substances referred to in marginal 211 610(1)(a) and (b) shall be protected with locked caps.

211 672 Tank vehicles and demountable tanks approved for the carriage of the substances referred to in marginal 211 610 shall not be used for the carriage of foodstuffs, articles of consumption or animal feedstuffs.

211 673-
211 699

CLASS 7

RADIOACTIVE SUBSTANCES

211 700-
211 709

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 710 Materials of marginals 2704, Schedules 1, 5, 6, 9, 10 and 11, except uranium hexafluoride, may be carried in fixed or demountable tanks. The provisions of the appropriate schedule in marginal 2704 are applicable.

Note: There may be additional requirements for tanks which are designed as a Type A or Type B packaging.

211 711-
211 719

SECTION 2

CONSTRUCTION

211 720 See marginal 3736.

211 721-
211 729

SECTION 3

ITEMS OF EQUIPMENT

211 730 The openings of shells for the carriage of liquid radioactive material (2) shall be above the level of the liquid. The shell walls shall not have any piping or pipe connections below the level of the liquid.

211 731-
211 739

(1) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with saferty valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

(2) Under this provision, substances whose kinematic viscosity at 20 °C is below 2 680 mm^2/s shall be deemed to be liquids.

SECTION 4

TYPE APPROVAL

211 740 Tanks which are approved for the carriage of radioactive material shall not be approved for the carriage of other substances.

211 741-
211 749

SECTION 5

TESTS

211 750 The shells shall initially and periodically undergo a hydraulic pressure test at a pressure of at least 265 kPa (2,65 bar). Notwithstanding the provisions of marginal 211 151, the periodic internal inspection may be replaced by a programme approved by the competent authority.

211 751-
211 759

SECTION 6

MARKING

211 760 In addition, the trefoil symbol, as described in marginal 2705(5), shall be marked by stamping or by any other equivalent method on the plate described in marginal 211 160. This trefoil marking may be applied directly on the walls of the shell itself, if the walls are so reinforced that the strength of the shell is not impaired.

211 761-
211 769

SECTION 7

OPERATION

211 770 The degree of filling, according to marginal 211 172, at the reference temperature of 15 °C shall not exceed 93 % of the capacity of the shell.

211 771 Tanks in which radioactive material has been carried shall not be used for the carriage of other substances.

211 772-
211 799

CLASS 8

CORROSIVE SUBSTANCES

211 800-
211 809

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 810 The following substances of marginal 2801 may be carried in fixed or demountable tanks:

(a) substances listed by name in 6° and 14°;

(b) substances classified under (a) of 1°, 2°, 3°, 7°, 8°, 12°, 17°, 32°, 33°, 39°, 40°, 46°, 47°, 52° to 56°, 64° to 68° and 70°, 72° to 76°, carried in the liquid state;

(c) phosphorus oxybromide of 15° and substances classified under (b) or (c) of 1° to 5°, 7°, 8° 10°, 12°, 17°, 31° to 40°, 42° to 47°, 51° to 56°, 61° to 76°, carried in the liquid state;

(d) powdery or granular substances classified under (b) or (c) of 9°, 11°, 13°, 16°, 31°, 34°, 35°, 39°, 41°, 45°, 46°, 52°, 55°, 62°, 65°, 67°, 69°, 71°, 73° and 75°.

Note: For the carriage in bulk of lead sulphate of 1° (b), of substances of 13° (b), solids containing a corrosive liquid of 65° (b) of identification number 3244, and solid wastes classified under (c) of the various items, see marginal 81 111.

211 811-
211 819

SECTION 2

CONSTRUCTION

211 820 Shells intended for the carriage of substances listed by name in 6° and 14° shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 2,1 MPa (21 bar) (gauge pressure). Shells intended for the carriage of substances of 14° shall be provided with a lead lining not less than 5 mm thick or an equivalent lining.

The requirement of Appendix B.1d shall apply to the materials and construction of welded shells intended fot the carriage of substances of 6°.

211 821 Shells intended for the carriage of the substances referred to in marginal 211 810 (b) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 1,0 MPa (10 bar) (gauge pressure). Where the use of aluminium is necessary for shells intended for the carriage of nitric acid of 2° (a), such shells shall be made of aluminium not less than 99,5 % pure, in which case, by derogation from the provisions of the paragraph above, the wall thickness need not exceed 15 mm.

211 822 Shells intended for the carriage of the substances referred to in marginal 211 810 (c) shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

Notwithstanding the provisions of the paragraph above, the wall thickness need not be greater than 15 mm when the shells are made of pure aluminium.

211 823 Shells intended for the carriage of the powdery or granular substances referred to in marginal 211 810 (d) shall be designed in accordance with the requirements of Part I of this Appendix.

211 824-
211 829

SECTION 3

ITEMS OF EQUIPMENT

211 830 All openings of shells intended for the carriage of substances of 6°, 7° and 14° shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed (1) and the closures shall be capable of being protected by lockable caps. In addition, the cleaning openings referred to in marginal 211 132 shall not be permitted.

211 831 Shells intended for the carriage of the substances referred to in marginal 211 810 (b), (c) and (d) may also be of the bottom-discharge type.

211 832 If shells intended for the carriage of the substances referred to in marginal 211 810 (b) are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

211 833 Shells intended for the carriage of sulphur trioxide of 1° (a) shall be thermally insulated and fitted with a heating device on the outside.

211 834 Shells and their service equipment intended for carriage of hypochlorite solutions of 61° shall be so designed as to prevent the entry of foreign matter, leakage of liquid or any building up of dangerous excess pressure inside the shell.

211 835-
211 839

SECTION 4

TYPE APPROVAL

211 840-
211 849 (No special requirements)

SECTION 5

TESTS

211 850 Shells intended for the carriage of substances of 6° shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 1,0 MPa (10 bar) and those intended for the carriage of substances of 7° shall be subjected to initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar). The materials of every welded shell intended for the carriage of substances of 6° shall be tested by the method described in Appendix B.1d.

211 851 Shells intended for the carriage of substances of 14° or of the substances referred to in marginal 211 810 (b) and (c) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar). The hydraulic pressure test for shells intended for the carriage of sulphur trioxide of 1° (a) shall be repeated every three years.

(1) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with saferty valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

211 851 *(cont'd)* Shells made of pure aluminium and intended for the carriage of nitric acid of 2° (a) need be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of only 250 kPa (2,5 bar).

The condition of the lining of shells intended for the carriage of substances of 14° shall be inspected every year by an expert approved by the competent authority, who shall inspect the inside of the shell.

211 852 Shells intended for the carriage of the substances referred to in marginal 211 810 (d) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 211 123.

211 853-
211 859

SECTION 6

MARKING

211 860 Shells intended for the carriage of substances of 6° and 14° shall bear, in addition to the particulars referred to in marginal 211 160, the date (month, year) of the most recent inspection of the internal condition of the shell.

Shells intended for the carriage of inhibited sulphur trioxide of 1° (a) and substances of 6° and 14° shall bear in addition, on the plate referred to in marginal 211 160, the maximum permissible load mass in kg of the shell.

211 862-
211 869

SECTION 7

OPERATION

211 870 Shells intended for the carriage of inhibited sulphur trioxide of 1° (a) shall not be filled to more than 88 % of their capacity; those intended for the carriage of substances of 14° shall be filled to not less than 88 % and not more than 92 % of their capacity or to 2,86 kg per litre of capacity. Shells intended for the carriage of substances of 6° shall not be filled to more than 0,84 kg per litre of capacity.

211 871 Shells intended for the carriage of substances of 6°, 7° and 14° shall be hermetically closed [1] [see marginal 211 127(2)] during carriage and the closures shall be protected with lockable caps.

211 872-
211 899

[1] 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with saferty valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

CLASS 9

MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

211 900-
211 909

SECTION 1

GENERAL; SCOPE (USE OF TANKS); DEFINITIONS

Use

211 910 Substances of 1°, 2° and 4°, 11° and 12° of marginal 2901 may be carried in fixed or demountable tanks.

Note: For the carriage in bulk of substances of 4° and 12° of marginal 2901, see marginal 91 111.

211 911-
211 919

SECTION 2

CONSTRUCTION

211 920 Shells intended for the carriage of substances of 1°, 4°, 11° and 12° shall be designed in accordance with the requirements of Part I of this Appendix.

211 921 Shells intended for the carriage of substances of 2° shall be designed for a calculation pressure [see marginal 211 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

211 922-
211 929

SECTION 3

ITEMS OF EQUIPMENT

211 930 Shells intended for the carriage of substances of 1° and 2° shall be capable of being hermetically closed (1). Shells intended for the carriage of substances of 4° (c) shall be equipped with a safety valve.

211 931 If shells intended for the carriage of substances of 1° and 2° are fitted with safety valves, a bursting disc shall be placed before the valves. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

211 932-
211 939

SECTION 4

TYPE APPROVAL

211 940-
211 949 (No special requirements)

(1) 'Hermetically closed shells' means whose openings are hermetically closed and which are not equipped with saferty valves, frangible discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 5

TESTS

211 950 Shells intended for the carriage of substances of 2° shall be subjected to the initial and periodic hydraulic pressure tests at a pressure of at 400 kPa (4 bar) (gauge pressure).

211 951 Shells intended for the carriage of substances of 1°, 4°, 11° and 12° shall be subject to the initial and periodic hydraulic pressure tests at the calculation pressure used in their design as defined in marginal 211 123.

211 952-
211 959

SECTION 6

MARKING

211 960- (No special requirements)
211 969

SECTION 7

OPERATION

211 970 Shells intended for the carriage of substances of 1° and 2° shall be hermetically closed during carriage.

211 971 Tank-vehicles and demountable tanks approved for the carriage of substances of 1° and 2° shall not be used for the carriage of foodstuffs, articles of consumption or animal feedstuffs.

211 972-
211 999

APPENDIX B.1b

PROVISIONS CONCERNING TANK-CONTAINERS

Note: Part I sets out the requirements applicable to tank-containers intended for the carriage of substances of all classes. Part II contains particular requirements supplementing or modifying the requirements of Part I.

PART I

REQUIREMENTS APPLICABLE TO ALL CLASSES

212 000-
212 099

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Notes: 1. In accordance with the provisions of marginal 10 121 (1), the carriage of dangerous substances in tank-containers is permitted only where expressly authorized for such substances in each of the Sections 1 of Part II of this Appendix.

2. For the purposes of this Directive, tank swap bodies are considered as tank-containers.

212 100 These requirements shall apply to tank-containers of a capacity of more than 0,45 m^3 which are used for the carriage of liquid, gaseous, powdery or granular substances, and to their fittings and accessories.

212 101 A tank-container comprises a shell and items of equipment, including the equipment to facilitate movement of the tank-container without significant change of attitude.

212 102 In the following requirements:

(1) (a) '*shell*' means the tank proper (including the openings and their closures);

(b) '*service equipment*' of the shell means filling and emptying, venting, safety, heating and heat-insulating devices and measuring instruments; and

(c) '*structural equipment*' means the internal or external reinforcing, fastening, protective or stabilizing members of the shell.

(2) (a) '*calculation pressure*' means a theoretical pressure at least equal to the test pressure which, according to the degree of danger exhibited by the substance being carried, may to a greater or lesser degree exceed the working pressure. It is used solely to determine the thickness of the walls of the shell, independently of any external or internal reinforcing device;

(b) '*test pressure*' means the highest effective pressure which arises in the shell during the pressure test;

(c) '*filling pressure*' means the maximum pressure actually built up in the shell when it is being filled under pressure;

(d) '*discharge pressure*' means the maximum pressure actually built up in the shell when it is being discharged under pressure;

(e) '*maximum working pressure (gauge pressure)*' means the highest of the following three pressures:

(i) the highest effective pressure allowed in the shell during filling ('maximum filling pressure allowed');

(ii) the highest effective pressure allowed in the shell during discharge ('maximum discharge pressure allowed'); and

(iii) the effective gauge pressure to which the shell is subjected by its contents (including such extraneous gases as it may contain) at the maximum working temperature.

Unless the special requirements for each class provide otherwise, the numerical value of this working pressure (gauge pressure) shall not be lower than the vapour pressure (absolute pressure) of the filling substance at 50 °C.

For shells equipped with safety valves (with or without bursting disc), the maximum working pressure (gauge pressure) shall however be equal to the prescribed opening pressure of such safety valves.

(3) '*Leakproofness test*' means the test which consists of subjecting the shell to an effective internal pressure equal to the maximum working pressure, but not less than 20 kPa (0,2 bar) (gauge pressure), using a method approved by the competent authority.

For shells equipped with venting systems and a safety device to prevent the contents spilling out if the shell overturns, the pressure for the leakproofness test shall be equal to the static pressure of the filling substance.

212 103-
212 119

SECTION 2

CONSTRUCTION

212 120 Shells shall be designed and constructed in accordance with the provisions of a technical code recognized by the competent authority, but the following minimum requirements shall be met:

(1) Shells shall be made of suitable metallic materials which, unless other temperature ranges are prescribed in the various classes, shall be resistant to brittle fracture and to stress corrosion cracking between –20 °C and +50 °C.

(2) For welded shells only materials of faultless weldability whose adequate impact strength at an ambient temperature of –20 °C can be guaranteed, particularly in the weld seams and the zones adjacent thereto, shall be used.

(3) Welds shall be skilfully made and shall afford the fullest safety. For the execution and checking of weld beads, see also marginal 212 127 (6). Shells whose minimum wall thicknesses have been determined in accordance with marginal 212 127 (3) and (4) shall be checked by the methods described in the definition of the weld coefficient of 0,8.

(4) The materials of shells or of their protective linings which are in contact with the contents shall not contain substances liable to react dangerously with the contents, to form dangerous compounds, or substantially to weaken the material.

(5) The protective lining shall be so designed that its leakproofness remains intact, whatever the deformation liable to occur in normal conditions of carriage [marginal 212 127 (1)].

(6) If contact between the substance carried and the material used for the construction of the shell entails a progressive decrease in the thickness of the walls, this thickness shall be increased at manufacture by an appropriate amount. This additional thickness to allow for corrosion shall not be taken into consideration in calculating the thickness of the shell walls.

212 121 Shells, their attachments and their service and structural equipment shall be designed to withstand without loss of contents (other than quantitites of gas escaping through any degassing vents):

— static and dynamic stresses in normal conditions of carriage;

— prescribed minimum stresses as defined in marginals 212 125 and 212 127.

212 122 The pressure on which the wall thickness of the shell is based shall not be less than the calculation pressure, but the stresses referred to in marginal 212 121 shall also be taken into account.

212 123 Unless specially prescribed otherwise in the various classes, the following particulars shall be taken into account in the design of shells:

(1) Gravity-discharge shells intended for the carriage of substances having a vapour pressure not exceeding 110 kPa (1,1 bar) (absolute pressure) at 50 °C shall be designed for a calculation pressure of twice the static pressure of the substance to be carried but not less than twice the static pressure of water.

(2) Pressure-filled or pressure-discharge shells intended for the carriage of substances having a vapour pressure not exceeding 110 kPa (1,1 bar) (absolute pressure) at 50 °C shall be designed for a calculation pressure equal to 1,3 times the filling or discharge pressure.

(3) Shells intended for the carriage of substances having a vapour pressure of more than 110 kPa (1,1 bar) but not more than 175 kPa (1,75 bar) (absolute pressure) at 50 °C shall, whatever their filling or discharge system, be designed for a calculation pressure of not less than 150 kPa (1,5 bar) (gauge pressure) or 1,3 times the filling or discharge pressure, whichever is the higher.

212 123 *(cont'd)* (4) Shells intended for the carriage of substances having a vapour pressure of more than 175 kPa (1,75 bar) (absolute pressure) at 50 °C shall, whatever their filling or discharge system, be designed for a calculation pressure equal to 1,3 times the filling or discharge pressure but not less than 400 kPa (4 bar) (gauge pressure).

212 124 Tank-containers intended to contain certain dangerous substances shall be provided with additional protection, which may take the form of additional thickness of the shell (such additional thickness being determined in the light of the dangers inherent in the substances concerned: see the relevant classes) or of a protective device.

212 125 At the test pressure, the stress σ (sigma) at the most severely stressed point of the shell shall not exceed the material-dependent limits prescribed below. Allowance shall be made for any weakening due to the welds. In addition, in choosing the material and determining wall thickness, the maximum and minimum filling and working temperatures should be taken into account.

(1) For all metals and alloys, the stress σ at the test pressure shall be lower than the smaller of the values given by the following formulae:

$\sigma \leq 0{,}75\ Re$ or $\sigma \leq 0{,}5\ Rm$

where: Re = apparent yield stress, or 0,2 % or, in the case of austenitic steels, 1 %;

Rm = minimum tensile strength.

Ratios of Re/Rm exceeding 0,85 are not allowed for steels used in the construction of welded tanks.

The values of Re and Rm to be used shall be specified minimum values according to material standards. If no material standard exists for the metal or alloy in question, the values of Re and Rm used shall be approved by the competent authority or by a body designated by that authority.

When austenitic steels are used, the specified minimum values according to the material standards may be exceeded by up to 15 % if these higher values are attested in the inspection certificate.

The values specified in the certificate shall be taken as a basis in determining the Re/Rm ratio in each case.

(2) When the maximum working temperature of the shell does not exceed 50 °C, the values of Re and Rm at 20°C may be used; when the working temperature exceeds 50 °C, the values at this maximum working temperature (calculation temperature) shall be used.

(3) For steel, the elongation at fracture, in per cent, shall be not less than

$$\frac{10\,000}{\text{determined tensile strength in N/mm}^2}$$

but in any case for fine grained steels it shall be not less than 16 % and not less than 20 % for other steels. For aluminium alloys the elongation at fracture shall be not less than 12 % (1).

212 126 All parts of a tank-container intended for the carriage of liquids having a flash-point of not more than 61 °C, or for the carriage of flammable gases, shall be capable of being electrically earthed. Any metal contact which might encourage electrochemical corrosion shall be avoided.

(1) In the case of sheet metal, the axis of the tensile test-piece shall be at right angles to the direction of rolling. The permanent elongation at fracture shall be measured on test-pieces of circular crosssection in which the gauge length 1 is equal to five times the diameter d ($1 = 5d$); if test-pieces of rectangular section are used, the gauge length shall be calculated by the formula $l = 5{,}65 \sqrt{F_o}$, where F_0 indicates the initial cross-section area of the test-piece.

212 127 Tank-containers shall be capable of withstanding the stresses specified in paragraph (1) and the wall thickness of the shells shall be at least that prescribed in paragraphs (2) to (5) below.

(1) Tank-containers and their fastenings shall, under the maximum permissible load be capable of absorbing the stresses equal to those exerted by:

— in the direction of travel: twice the total mass;

— horizontally at right angles to the direction of travel: the total mass; (where the direction of travel is not clearly determined, twice the total mass in each direction);

— vertically upwards: the total mass; and

— vertically downwards: twice the total mass.

Under each force the safety factors to be complied with shall be the following:

— for metals having a clearly-defined yield point: a safety factor of 1,5 in relation to the guaranteed apparent yield stress; or

— for metals with no clearly-defined yield point: a safety factor of 1,5 in relation to the guaranteed 0,2 % proof stress, and in the case of austenitic steels the 1 % maximum elongation.

(2) The thickness of the cylindrical wall of the shell and of the ends and cover plates shall be not less than the value determined by the following formulae:

$$e = \frac{P_{MPa} \times D}{2 \times \sigma \times \lambda} \text{ (in mm)} \quad \left(\; e = \frac{P_{bar} \times D}{20 \times \sigma \times \lambda} \text{ (in mm)} \; \right)$$

where:

P_{MPa} = calculation pressure in MPa;

P_{bar} = calculation pressure in bar;

D = internal diameter of shell in mm;

σ = permissible stress, as defined in marginal 212 125(1) and (2), in N/mm²;

λ = a coefficient not exceeding 1, allowing for any weakening due to welds.

The thickness shall in no case be less than the value prescribed in paragraphs (3) and (4) below.

(3) The walls, ends and cover plates of shells not more than 1,80 m in diameter (1) shall be not less than 5 mm thick if of mild steel (2) (in conformity with the provisions of marginal 212 125) or of equivalent thickness if of another metal. Where the diameter is more than 1,80 m (1), this thickness shall be increased to 6 mm except in the case of shells intended for the carriage of powdery or granular substances, if the shell is of mild steel (2) (in conformity with the provisions of marginal 212 125) or to an equivalent thickness if the tank is of another metal.

(1) For shells not of circular cross-section, for example box-shaped or elliptical shells, the indicated diameters shall correspond to those calculated on the basis of a circular cross-section of the same area. For such shapes of cross-section the radius of convexity of the shell wall shall not exceed 2 000 mm at the sides or 3 000 mm at the top and bottom.

(2) 'Mild steel' means a steel having a minimum breaking strength between 360 N/mm² and 440 N/mm².

212 127 *(cont'd)*

Whatever the metal used, the thickness of the shell wall shall in no case be less than 3 mm.

'*Equivalent thickness*' means the thickness obtained by the following formula:

$$e_1 = \frac{21{,}4 \times e_0 (^1)}{\sqrt[3]{Rm_1 \times A_1}}$$

(4) Where protection of the shell against damage is provided, the competent authority may allow the aforesaid minimum thicknesses to be reduced in proportion to the protection provided; however, the said thicknesses shall be not less than 3 mm in the case of mild steel (2), or than an equivalent thickness in the case of other materials, for shells not more than 1,80 m in diameter (3). For shells of a diameter exceeding 1,80 m (3) this minimum thickness shall be increased to 4 mm in the case of mild steel (2) and to an equivalent thickness in the case of other metals.

'*Equivalent thickness*' means the thickness obtained by the following formula:

$$e_1 = \frac{21{,}4 \times e_0 (^1)}{\sqrt[3]{Rm_1 \times A_1}}$$

(5) The protection referred to under (4) may consist of over-all external structural protection as in 'sandwich' construction where the sheathing is secured to the shell, or a structure in which the shell is supported by a complete skeleton including longitudinal and transverse structural members, or double-wall construction.

Where the shells are made with double walls, the space between being evacuated of air, the aggregate thickness of the outer metal wall and the shell wall shall correspond to the minimum wall thickness prescribed in (3), the thickness of the wall of the shell itself being not less than the minimum thickness prescribed in (4).

Where shells are made with double walls with an intermediate layer of solid materials at least 50 mm thick, the outer wall shall have a thickness of not less than 0,5 mm if it is made of mild steel (2) or at least 2 mm if it is made of a plastics material reinforced with glass fibre. Solid foam with an impact absorption capacity such as that, for example, of polyurethane foam, may be used as the intermediate layer of solid material.

(6) The manufacturer's qualification for performing welding operations shall be one recognized by the competent authority. Welding shall be performed by skilled welders using a welding process whose effectiveness (including any heat treatments required) has been demonstrated by test. Non-destructive tests shall be carried out by radiography or by ultrasound and must confirm that the quality of the welding is appropriate to the stresses.

In determining the thickness of the shell walls in accordance with (2), the following values of the coefficient λ (lambda) should be adopted for the welds:

0,8: where the weld beads are so far as possible inspected visually on both faces and are subjected to a non-destructive spot check with particular attention to connections;

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(1) This formula is derived from the general formula:

$$e_1 = e_0 \sqrt[3]{\frac{Rm_0 \times A_0}{Rm_1 \times A_1}}$$

where

$Rm_0 = 360$;

$A_0 = 27$ for the mild steel of reference;

Rm_1 = minimum tensile strength of the metal chosen, in N/mm²; and

A_1 = minimum elongation of the metal chosen on fracture under tensile stress, in %.

(2) 'Mild steel' means a steel having a minimum breaking strength between 360 N/mm² and 440 N/mm².

(3) For shells not of circular cross-section, for example box-shaped or elliptical shells, the indicated diameters shall correspond to those calculated on the basis of a circular cross-section of the same area. For such shapes of cross-section the radius of convexity of the shell wall shall not exceed 2 000 mm at the sides or 3 000 mm at the top and bottom.

212 127 *(cont'd)*

0,9: where all longitudinal beads throughout their length, all connections, 25 % of circular beads, and welds for the assembly of large-diameter items of equipment are subjected to non-destructive checks. Beads shall be checked visually on both sides as far as possible;

1,0: where all beads are subjected to non-destructive checks and are so far as possible inspected visually on both sides. A weld test-piece shall be taken.

Where the competent authority has doubts regarding the quality of weld beads, it may require additional checks.

(7) Measures shall be taken to protect shells against the risk of deformation as a result of a negative internal pressure.

Unless otherwise prescribed in the special provisions for the individual classes, these shells may have valves to avoid an unacceptable negative internal pressure, without intervening bursting discs.

(8) The thermal insulation shall be so designed as not to hinder access to, or the operation of, filling and discharge devices and safety valves.

212 128-
212 129

SECTION 3

ITEMS OF EQUIPMENT

212 130 The items of equipment shall be so arranged as to be protected against the risk of being wrenched off or damaged during carriage or handling. They shall exhibit a suitable degree of safety comparable to that of the shells themselves and shall in particular:

— be compatible with the substances carried;

— meet the requirements of marginal 212 121.

The leakproofness of the service equipment shall be ensured even in the event of the overturning of the tank-container. The gaskets shall be made of material compatible with the substance carried and shall be replaced as soon as their effectiveness is impaired, for example as a result of ageing. Gaskets ensuring the leakproofness of fittings requiring manipulation during normal use of the tank-containers shall be so designed and arranged that manipulation of the fittings incorporating them does not damage them.

212 131 Every bottom-discharge tank-container, and in the case of compartmented bottom-discharge tank-containers every compartment, shall be equipped with two mutually independent shut-off devices, the first being an internal stop-valve [1] fixed directly to the shell and the second being a sluice-valve or other equivalent device [2], mounted in series, one at each end of the discharge pipe. The bottom discharge of shells intended for the carriage of powdery or granular substances may be constituted by external piping with a stop-valve if it is made of a malleable metal material. In addition, the openings shall be capable of being closed by means of screw-threaded plugs, blank flanges or other equally effective devices.

The internal stop-valve shall be operable from above or from below. Its setting — open or closed — shall so far as possible in each case be capable of being verified from the ground. Internal stop-valve control devices shall be so designed as to prevent any unintended opening through impact or an inadvertent act.

The internal shut-off device shall continue to be effective in the event of damage to the external control device.

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[1] However, in the case of shells intended for the carriage of certain crystallizable or highly viscous substances, of deeply refrigerated liquefied gases and shells fitted with an ebonite or thermoplastic coating, the internal stop-valve may be replaced by an external stop-valve provided with additional protection.

[2] In the case of tank-containers of less than 1 m^3 capacity, the sluice-valve or other equivalent device may be replaced by a blank flange.

212 131 *(cont'd)* In order to avoid any loss of contents in the event of damage to the external discharge fittings (pipes, lateral shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external stresses or shall be so designed as to resist them. The filling and discharge devices (including flanges or threaded plugs) and protective caps (if any) shall be capable of being secured against any unintended opening.

The position and/or direction of closure of the valves shall be clearly apparent.

The shell or each of its compartments shall be provided with an opening large enough to permit inspection.

212 132 Tank-containers intended for the carriage of substances for which all the openings are above the surface level of the liquid may be equipped, in the lower part of the body, with a cleaning aperture (fist-hole). This aperture shall be capable of being sealed by a flange so closed as to be leakproof, the design of which shall be approved by the competent authority or by a body designated by that authority.

212 133 Tank-containers intended for the carriage of liquids having a vapour pressure of not more than 110 kPa (1,1 bar) (absolute pressure) at 50 °C shall have a venting system and a safety device to prevent the contents from escaping from the shell if the tank-container overturns; or they shall conform to the requirements of marginal 212 134 or 212 135 below.

212 134 Tank-containers intended for the carriage of liquids having a vapour pressure of more than 110 kPa (1,1 bar) and not more than 175 kPa (1,75 bar) (absolute pressure) at 50 °C shall have a safety valve set at not less than 150 kPa (1,5 bar) (gauge pressure) and such that it is fully open at a pressure not exceeding the test pressure; or shall conform to the requirements of marginal 212 135.

212 135 Tank-containers intended for the carriage of liquids having a vapour pressure of more than 175 kPa (1,75 bar) and not more than 300 kPa (3 bar) (absolute pressure) at 50 °C shall be equipped with a safety valve set at not less than 300 kPa (3 bar) (gauge pressure) and such that it is fully open at a pressure not exceeding the test pressure; or shall be hermetically closed (1).

212 136 No movable parts such as covers, closures, etc., which are liable to come into frictional or percussive contact with aluminium shells intended for the carriage of flammable liquids having a flash-point of not more than 61 °C or for the carriage of flammable gases may be made of unprotected corrodible steel.

212 137-
212 139

SECTION 4

TYPE APPROVAL

212 140 The competent authority or a body designated by that authority shall issue in respect of each new type of tank-container a certificate attesting that the prototype tank-container, including fastenings, which it has inspected is suitable for the purpose for which it is intended and meets the construction requirements of Section 2, the equipment requirements of Section 3 and the special conditions for the classes of substances carried. If the tank-containers are manufactured in series without modification, this approval shall be valid for the entire series. The test results, the substances and/or the groups of substances for the carriage of which the tank-container is approved and its type approval number as a prototype shall be specified in a test report. The substances of a group of substances shall be of a similar kind and equally compatible with the characteristics of the shell. The substances or groups of substances permitted shall be specified in the test report, with their chemical names or the corresponding collective heading in the list of substances, and with their Class and item number. The approval number shall consist of the distinguishing sign (2) of the State in whose territory the approval was granted, and a registration number.

212 141-
212 149

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

(2) Distinguishing sign for used in international traffic prescribed by the Convention on Road Traffic (Vienna, 1968).

SECTION 5

TESTS

212 150 Shells and their equipment shall either together or separately undergo an initial inspection before being put into service. This inspection shall include:

— a check of conformity to the approved prototype;

— a check of the design characteristics (1);

— an examination of the internal and external conditions;

— a hydraulic pressure test (2) at the test pressure indicated on the data plate; and

— a check of satisfactory operation of the equipment.

The hydraulic pressure test shall be carried out before the installation of such thermal insulation as may be necessary. If the shells and their equipment are tested separately, they shall be jointly subjected to a leakproofness test in accordance with marginal 212 102 (3).

212 151 Shells and their equipment shall undergo periodic inspections at fixed intervals. The periodic inspections shall include an external and internal examination and, as a general rule, a hydraulic pressure test (2). Sheathing for thermal or other insulation shall be removed only to the extent required for reliable appraisal of the characteristics of the shell.

In the case of shells intended for the carriage of powdery or granular substances, and with the agreement of the expert approved by the competent authority, the periodic hydraulic pressure tests may be omitted and replaced by leakproofness tests in accordance with marginal 212 102 (3).

The maximum intervals for inspections shall be five years.

Tank-containers, empty, uncleaned, may also be moved after expiration of this period for the purpose of undergoing the test.

212 152 In addition, a leakproofness test of the shell with its equipment in accordance with marginal 212 102 (3) and a check of the satisfactory operation of all the equipment shall be carried out at least every two and a half years.

212 153 When the safety of the shell or of its equipment may have been impaired as a result of repairs, alterations or accident, an exceptional check shall be carried out.

212 154 The tests, inspections and checks in accordance with marginals 212 150 to 212 153 shall be carried out by the expert approved by the competent authority. Certificates shall be issued showing the results of these operations. These certificates shall refer to the list of substances permitted for carriage in this shell in accordance with 212 140.

212 155-
212 159

(1) The check of the design characteristics shall also include, for shells requiring a test pressure of 1 MPa (10 bar) or higher, the taking of weld test-pieces (work samples) in accordance with the tests in Appendix B.1d.

(2) In special cases and with the agreement of the expert approved by the competent authority, the hydraulic pressure test may be replaced by a pressure test using another liquid or gas, where such an operation does not entail any danger.

SECTION 6

MARKING

212 160 Each tank-container shall be fitted with a corrosion-resistant metal plate permanently attached to the shell in a place readily accessible for inspection. The following particulars at least shall be marked on the plate by stamping or by any other similar method. These particulars may be engraved directly on the walls of the shell itself if the walls are so reinforced that the strength of the shell is not impaired:

— approval number;

— manufacturer's name or mark;

— manufacturer's serial number;

— year of manufacture;

— test pressure (1) (gauge pressure);

— capacity (1) — in the case of multiple-element tank-containers: capacity of each element;

— design temperature (1) (only if above 50 °C or below –20 °C);

— date (month and year) of initial test and most recent periodic test in accordance with marginals 212 150 and 212 151; and

— stamp of the expert who carried out the tests;

— material of the shell and, when appropriate, the protective lining.

In addition the maximum working pressure shall be inscribed on pressure-filled or pressure-discharge shells.

212 161 The following particulars shall be inscribed either on the tank-container itself or on a plate:

— names of owner and of operator;

— capacity of the shell (1);

— tare (1);

— the maximum permissible laden mass (1); and

— name of substance carried (2).

In addition, tank-containers shall bear the prescribed danger labels.

212 162-
212 169

SECTION 7

OPERATION

212 170 During carriage, tank-containers shall be fixed on the carrying vehicle in such a way as to be adequately protected by the fittings of the carrying vehicle or of the tank-container itself against lateral and longitudinal impact and against overturning (3). If the shells, including the service equipment, are so constructed as to withstand impact or overturning they need not be protected in this way. The thickness of the walls of the shell shall remain, throughout its period of use, not less than the minimum value required by marginal 212 127 (2).

(1) The units of measurement should be indicated after numerical values.

(2) A collective description covering a group of substances of a similar nature and equally compatible with the characteristics of the shell may be given instead of the name.

(3) Examples of protection of shells:

1. Protection against lateral impact may, for example, consist of longitudinal bars protecting the shell on both sides at the level of the median line.
2. Protection against overturning may, for example, consist of reinforcing rings or bars fixed transversally in relation to the frame.
3. Protection against rear impact may for example consist of a bumper or frame.

212 171 Shells shall not be loaded with any dangerous substances other than those for whose carriage they have been approved and which, in contact with the materials of the shell, gaskets, equipment and protective linings, are not liable to react dangerously with them, to form dangerous products or appreciably to weaken the material. Foodstuffs shall not be carried in these shells unless the necessary steps have been taken to prevent any harm to public health.

212 172 (1) The following degrees of filling shall not be exceeded in tank-containers intended for the carriage of liquids at ambient temperatures:

(a) for flammable substances without additional risks (e.g. toxicity or corrosivity), in tank-containers with a venting system or with safety valves (even where preceded by a bursting disc):

$$\text{degree of filling} = \frac{100}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(b) for toxic or corrosive substances (whether inflammable or not) in tank-containers with a venting system or with safety valves (even where preceded by a bursting disc):

$$\text{degree of filling} = \frac{98}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(c) for flammable substances and for slightly toxic or slightly corrosive substances (whether flammable or not) in hermetically closed shells [1] without safety device:

$$\text{degree of filling} = \frac{97}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(d) for highly toxic, toxic, highly corrosive or corrosive substances (whether inflammable or not) in hermetically closed shells [1] without safety device:

$$\text{degree of filling} = \frac{100}{1 + \alpha\,(50 - t_F)} \text{ \% of capacity;}$$

(2) In these formulae, is the mean coefficient of cubical expansion of the liquid between 15 °C and 50 °C, i.e. for a maximum variation in temperature of 35 °C.

α is calculated by the formula: $\alpha = \dfrac{d_{15} - d_{50}}{35 \times d_{50}}$

where d_{15} and d_{50} are the relative densities of the liquid at 15 °C and 50 °C respectively. t_F is the mean temperature of the liquid during filling.

(3) The provisions of (1) shall not apply to shells whose contents are, by means of a heating device, maintained at a temperature above 50 °C during carriage. In this case the degree of filling at the outset shall be such, and the temperature so regulated, that the shell is not full to more than 95 % of its capacity and that the filling temperature is not exceeded, at any time during carriage.

(4) Where hot substances are loaded, the temperature of the outer surface of the shell or of the thermal insulation shall not exceed 70 °C during carriage.

212 173 If the shells of tank-containers intended for the carriage of liquids [2] are not divided by partitions or surge plates into sections of not more than 7 500 litres capacity, they shall be filled to not less than 80 % of their capacity unless they are nominally empty.

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[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

[2] Substances whose kinematic viscosity at 20 °C is less than 2 680 mm²/s shall be deemed to be liquids for the purposes of this provision.

212 174 During loading and unloading of tanks, appropriate measures shall be taken to prevent the release of dangerous quantities of gases and vapours.

Tank-containers shall be closed so that the contents cannot spill out uncontrolled. The openings of bottom-discharge shells shall be closed by means of screw-threaded plugs, blank flanges or other equally effective devices. The leakproofness of the closures of the shells, in particular at the top of the dip-tube, shall be checked by the consignor after the shell is filled.

212 175 Where several closure systems are fitted in a series, that nearest to the substance being carried shall be closed first.

212 176 No dangerous residue of the filling substance shall adhere to the outside of a tank-container during transport either laden or empty.

212 177 To be accepted for carriage, empty tank-containers, uncleaned, shall be closed in the same manner and leakproof in the same degree as though they were full.

212 178-
212 179

SECTION 8

TRANSITIONAL MEASURES

212 180 Tank-containers constructed before the entry into force of the provisions applicable from 1 January 1988 which do not conform to those provisions but were constructed according to the requirements of this Directive in force before that date may still be used.

212 181 Tank-containers constructed before the entry into force of the provisions applicable from 1 January 1993 which do not conform to those provisions but were constructed according to the requirements of this Directive in force until that date may still be used.

212 182-
212 189

SECTION 9

USE OF TANK-CONTAINERS APPROVED FOR MARITIME TRANSPORT

212 190 Tank-containers which do not fully meet the requirements of this appendix but which have been approved in accordance with the requirements concerning maritime transport shall be accepted for carriage [1].

In addition to the particulars already prescribed, the transport document shall bear the words: 'Carriage in accordance with marginal 212 190'.

Only substances authorized under marginal 10 121 (1) may be carried in tank-containers.

212 191-
212 199

[1] These requirements are contained in Section 13 of the General Introduction to the International Maritime Dangerous Goods (IMDG) Code published by the International Maritime Organisation, London.

PART II

SPECIAL REQUIREMENTS SUPPLEMENTING OR MODIFYING THE REQUIREMENTS OF PART I

CLASS 2

GASES; COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE

212 200-
212 209

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 210 Gases of marginal 2201, except those listed below may be carried in tank-containers:

Fluorine, nitrogen trifluoride and silicon tetrafluoride of 1° (at); nitric oxide of 1° (ct); mixtures of hydrogen with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % hydrogen selenide or phosphine or germane by volume or with not more than 15 % arsine by volume of 2° (bt); mixtures of hydrogen with not more than 10 % diborane by volume; mixtures of nitrogen or rare gases (containing not more than 10 % xenon by volume) with not more than 10 % diborane by volume of 2° (ct); octafluorobut-2-ene (R 1318) and octafluoropropane of 3° (a); boron trichloride, chlorine trifluoride, hexafluoroacetone, nitrosyl chloride, sulphuryl fluoride and tungsten hexafluoride of 3° (at); 2,2-dimethylpropane and methylsilane of 3° (b); arsine, carbonyl sulphide, dichlorosilane, dimethylsilane, hydrogen selenide and trimethylsilane of 3° (bt); propadiene, inhibited, of 3° (c); cyanogen, cyanogen chloride, ethylene oxide and hydrogen iodide, anhydrous of 3° (ct); mixtures of methylsilanes of 4° (bt); propadiene with 1 % to 4 % methylacetylene, stabilized, of 4° (c); ethylene oxide containing not more than 50 % by mass methyl formate of 4° (ct); silane of 5° (b); substances of 5° (bt) and (ct); dissolved acetylene of 9° (c); and the gases of 12° and 13°.

212 211-
212 219

SECTION 2

CONSTRUCTION

212 220 Shells intended for the carriage of substances of 1° to 6° and 9° shall be made of steel.

In the case of weldless shells by derogation from marginal 212 125 (3) a minimum elongation at fracture of 14 % and also a stress σ (sigma) lower than or equal to limits hereafter given according to the material may be accepted.

(a) When the ratio Re/Rm of the minimum guaranteed characteristics after heat treatment is higher than 0,66 without exceeding 0,85: $\sigma \leq 0{,}75$ Re;

(b) When the ratio Re/Rm of the minimum guaranteed characteristics after heat treatment is higher than 0,85: $\sigma \leq 0{,}5$ Rm.

212 221 The requirements of Appendix B.1d shall apply to the materials and construction of welded shells.

212 222 Shells intended for the carriage of chlorine or phosgene of 3° (at) shall be designed for a calculation pressure [see marginal 212 127 (2)] of at least 2,2 MPa (22 bar) (gauge pressure).

212 223-
212 229

SECTION 3

ITEMS OF EQUIPMENT

212 230 The discharge pipes of shells shall be capable of being closed by blank flanges or some other equally reliable device.

212 231 Shells intended for the carriage of liquefied gases may, in addition to openings prescribed in marginals 212 131 and 212 132, be provided with openings for the fitting of gauges, thermometers, manometers and with bleed holes, as required for their operational safety.

212 232 Safety devices shall meet the following requirements:

(1) Filling and discharge openings of shells of a capacity exceeding 1 m^3 intended for the carriage of liquefied inflammable and/or toxic gases shall be equipped with an instant-closing internal safety device which closes automatically in the event of an unintended movement of the tank-container or of fire. It shall also be possible to operate the closing device by remote control.

(2) All openings, other than those for the accommodation of safety valves and closed bleed holes, of shells intended for the carriage of liquefied inflammable and/or toxic gases shall, if their nominal diameter is more than 1,5 mm, be equipped with an internal shut-off device.

(3) By derogation from the provisions of paragraphs (1) and (2), shells intended for the carriage of deeply refrigerated inflammable and/or toxic liquefied gases may be equipped with external devices in place of internal devices if the external devices afford protection against external damage at least equivalent to that afforded by the wall of the shell.

(4) If the shells are equipped with gauges, these shall not be of a transparent material in direct contact with the substance carried. If there are thermometers they shall not project directly into the gas or liquid through the shell wall.

(5) Shells intended for the carriage of chlorine, sulphur dioxide and phosgene of 3° (at), methyl mercaptan and hydrogen sulphide of 3°(bt) shall not have any opening below the surface level of the liquid. In addition, the cleaning apertures (fist holes) referred to in marginal 212 132 shall not be permitted.

(6) Filling and discharge orifices situated in the upper part of shells shall be equipped with, in addition to what is prescribed in paragraph (1) a second, external, closing device. This device shall be capable of being closed by a blank flange or some other equally reliable device.

212 233 Safety valves shall meet the conditions prescribed in paragraphs (1), (2) and (3) below:

(1) Shells intended for the carriage of gases of 1° to 6° and 9° may be fitted with not more than two safety valves whose aggregate clear cross-sectional area of passage at the seating or seatings shall be not less than 20 cm^2 per 30 m^3 or part thereof of the receptacle's capacity. These valves shall be capable of opening automatically under a pressure of from 0,9 to 1,0 times the test pressure of the shell to which they are fitted. They shall be of such a type as to resist dynamic stresses, including liquid surge. The use of deadweight or counterweight valves is prohibited.

212 233 *(cont'd)* Shells intended for the carriage of gases of 1° to 9° harmful to the respiratory organs or entailing a poison risk [1] shall not have safety valves unless the safety valves are preceded by a bursting disc. In the latter case the arrangement of the bursting disc and the safety valve shall be satisfactory to the competent authority.

Where tank-containers are intended for carriage by sea, the provisions of this paragraph shall not prohibit the fitting of safety valves conforming to the regulations governing that mode of transport [2].

(2) Shells intended for the carriage of gases of 7° and 8° shall be fitted with two independent safety valves; each valve shall be so designed as to allow the gases formed by evaporation during normal operation to escape from the shell in such a way that the pressure does not at any time exceed by more than 10 % the working pressure indicated on the shell. One of the two safety valves may be replaced by a bursting disc which shall be such as to burst at the test pressure.

In the event of loss of the vacuum in a double-walled shell, or of destruction of 20 % of the insulation of a single-walled shell, the safety valve and the bursting disc shall permit an outflow such that the pressure in the shell cannot exceed the test pressure.

(3) The safety valves of shells intended for the carriage of gases of 7° and 8° shall be capable of opening at the working pressure indicated on the shell. They shall be so designed as to function faultlessly even at the lowest working temperature. The reliability of their operation at that temperature shall be established and checked either by testing each valve or by testing a specimen valve of each design type.

Thermal insulation

212 234 (1) If the shells intended for the carriage of liquefied gases of 3° and 4° are equipped with thermal insulation, such insulation shall consist of either:

— a sun shield covering not less than the upper third but not more than the upper half of the shell surface and separated from the shell by an air space at least 4 cm across; or

— a complete cladding, of adequate thickness, of insulating materials.

(2) Shells intended for the carriage of gases of 7° and 8° shall be thermally insulated. The thermal insulation shall be protected by means of continuous sheathing. If the space between the shell and the sheathing is under vacuum (vacuum insulation), the protective sheathing shall be so designed as to withstand without deformation an external pressure of at least 100 kPa (1 bar) (gauge pressure). Notwithstanding marginal 212 102 (2)(a) external and internal reinforcing devices may be taken into account in the calculations. If the sheathing is so closed as to be gas-tight, a device shall be provided to prevent any dangerous pressure from developing in the insulating layer in the event of inadequate gas-tightness of the shell or of its items of equipment. The device shall prevent the infiltration of moisture into the heat-insulating sheath.

(3) Shells intended for the carriage of liquefied gases having a boiling point below – 182 °C at atmospheric pressure shall not include any combustible material either in the thermal insulation or in the fastenings.

The fastening of shells intended for the carriage of argon, nitrogen, helium and neon of 7° (a) and hydrogen of 7° (b) may, with the consent of the competent authority, contain plastics substances between the shell and the sheathing.

212 235 (1) The following are considered to be elements of a multiple-element tank-container:

— receptacles as defined in marginal 2212 (1)(b); or

— tanks as defined in marginal 2212 (1)(c).

The provisions of this Appendix do not apply to frames of cylinders conforming to marginal 2212 (1)(d).

(1) Gases identified by the letter 't' in the list of substances are deemed to be gases harmful to the respiratory organs or entailing a poison risk.

(2) These requirements are contained in Section 13 of the General Introduction to the International Maritime Dangerous Goods (IMDG) Code published by the International Maritime Organisation, London.

212 235 *(cont'd)* (2) For multiple-element tank-containers, the following conditions shall be complied with:

(a) If one of the elements of a multiple-element tank-container is fitted with a safety valve and shut-off devices are provided between the elements, every element shall be so fitted.

(b) The filling and discharge devices may be fitted to a manifold.

(c) Each element of a multiple-element tank-container intended for the carriage of compressed gases of 1° and 2° harmful to the respiratory organs or entailing a poison risk [1] shall be capable of being isolated by a valve.

(d) The elements of a multiple-element tank-container intended for the carriage of liquefied gases of 3° to 6° shall be so designed that they can be filled separately and be kept isolated by a valve capable of being sealed.

212 236 By derogation from the provisions of marginal 212 131 shells intended for the carriage of deeply-refrigerated liquefied gases need not have an inspection aperture.

212 237-
212 239

SECTION 4

TYPE APPROVAL

212 240-
212 249 (No special requirements)

SECTION 5

TESTS

212 250 The materials of every welded shell shall be tested according to the method described in Appendix B.1d.

212 251 The test pressure values shall be as follows:

(1) For shells intended for the carriage of gases of 1° and 2°: the values indicated in marginal 2219 (1) and (3).

(2) For shells intended for the carriage of gases of 3° and 4°:

(a) if the shells are not more than 1,5 m in diameter, the values indicated in marginal 2220 (2);

[1] Gases identified by the letter 't' in the list of substances are deemed to be gases harmful to the respiratory organs or entailing a poison risk.

212 251 *(cont'd)*

b) if the shells are more than 1,5 m in diameter the values (1) indicated below:

Description of substance	Item number	Minimum test pressure for shells		Maximum mass of contents per litre of capacity kg
		with thermal insulation MPa	without thermal insulation MPa	
bromochlorodifluoromethane (R 12 B1)	3°(a)	1,0	1,0	1,61
chlorodifluoromethane (R 22)	3°(a)	2,4	2,6	1,03
chloropentafluoromethane (R 115)	3°(a)	2,0	2,3	1,08
1-chloro-1,2,2,2-tetrafluoroethane (R 124)	3°(a)	1,0	1,1	1,2
1-chloro-2,2,2-trifluoroethane (R 133a)	3°(a)	1,0	1,0	1,18
dichlorodifluoromethane (R 12)	3°(a)	1,5	1,6	1,15
dichlorofluoromethane (R 21)	3°(a)	1,0	1,0	1,23
1,2-dichloro-1,1,2,2-tetrafluoroethane (R 114)	3°(a)	1,0	1,0	1,30
octafluorocyclobutane (RC 318)	3°(a)	1,0	1,0	1,34
1,1,1,2-tetrafluoroethane (R 134a)	3°(a)	1,6	1,8	1,04
ammonia	3°(at)	2,6	2,9	0,53
chlorine	3°(at)	1,7	1,9	1,25
hexafluoropropylene (R 1216)	3°(at)	1,7	1,9	1,11
hydrogen bromide	3°(at)	5,0	5,5	1,54
methyl bromide	3°(at)	1,0	1,0	1,51
nitrogen dioxide NO_2	3°(at)	1,0	1,0	1,30
phosgene	3°(at)	1,5	1,7	1,23
sulphur dioxide	3°(at)	1,0	1,2	1,23
butane	3°(b)	1,0	1,0	0,51
1-butene	3°(b)	1,0	1,0	0,53
1-chloro-1,1-difluoroethane (R 142b)	3°(b)	1,0	1,0	0,99
Cis-2-butene	3°(b)	1,0	1,0	0,55
cyclopropane	3°(b)	1,6	1,8	0,53
1,1-difluoroethane (R 152a)	3°(b)	1,4	1,6	0,79
dimethyl ether	3°(b)	1,4	1,6	0,58
isobutane	3°(b)	1,0	1,0	0,49
isobutene	3°(b)	1,0	1,0	0,52
propane	3°(b)	2,1	2,3	0,42
propylene	3°(b)	2,5	2,7	0,43
trans-2-butene	3°(b)	1,0	1,0	0,54
1,1,1-trifluoroethane	3°(b)	2,8	3,2	0,79
dimethylamine	3°(bt)	1,0	1,0	0,59
ethylamine	3°(bt)	1,0	1,0	0,61
ethyl chloride	3°(bt)	1,0	1,0	0,80
hydrogen sulphide	3°(bt)	4,5	5,0	0,67
methylamine	3°(bt)	1,0	1,1	0,58
methyl chloride	3°(bt)	1,3	1,5	0,81

(1) (i) The prescribed test pressures are:
(a) if the shell is equipped with thermal insulation, at least equal to the vapour pressure, reduced by 100 kPa (1 bar), of the liquid at 60 °C, and not less than 1 MPa (10 bar);
(b) if the shell is not equipped with thermal insulation, at least equal to the vapour pressure, reduced by 100 kPa (1 bar), of the liquid at 65 °C, and not less than 1 MPa (10 bar);
(ii) in view of the high toxicity of phosgene of 3° (at), the minimum test pressure for this gas shall be 1,5 MPa (15 bar) if the shell is equipped with thermal insulation and 1,7 MPa (17 bar) if it is not so equipped;
(iii) the maximum values in kg/litre prescribed for the degree of filling are calculated as follows: maximum mass of contents per litre of capacity = 0,95 × density of the liquid phase at 50 °C.

212 251
(cont'd)

Description of substance	Item number	Minimum test pressure for shells		Maximum mass of contents per litre of capacity kg
		with thermal insulation MPa	without thermal insulation MPa	
methyl mercaptan	3°(bt)	1,0	1,0	0,78
trimethylamine	3°(bt)	1,0	1,0	0,56
1,2-butadiene	3°(c)	1,0	1,0	0,59
1,3-butadiene	3°(c)	1,0	1,0	0,55
vinyl chloride	3°(c)	1,0	1,1	0,81
methyl vinyl ether	3°(ct)	1,0	1,0	0,67
trifluorochloroethylene (R 1113)	3°(ct)	1,5	1,7	1,13
vinyl bromide	3°(ct)	1,0	1,0	1,37
mixture F 1	4°(a)	1,0	1,1	1,23
mixture F 2	4°(a)	1,5	1,6	1,15
mixture F 3	4°(a)	2,4	2,7	1,03
mixture of gases R 500	4°(a)	1,8	2,0	1,01
mixture of gases R 502	4°(a)	2,5	2,8	1,05
mixture of 19 to 21 % by mass dichlorodifluoromethane (R 12) and 79 to 81 % by mass bromochlorodifluoromethane (R 12 B1)	4°(a)	1,0	1,1	1,50
mixtures of dichlorodifluoromethane and ethylene oxide with not more than 12 % ethylene oxide by mass	4°(at)	1,5	1,6	1,09
mixtures of methyl bromide and chloropicrin	4°(at)	1,0	1,0	1,51
mixture A (trade name: butane)	4°(b)	1,0	1,9	0,50
mixture A O (trade name: butane)	4°(b)	1,2	1,4	0,47
mixture A 1	4°(b)	1,6	1,8	0,46
mixture B	4°(b)	2,0	2,3	0,43
mixture C (trade name: propane)	4°(b)	2,5	2,7	0,42
mixtures of hydrocarbons containing methane	4°(b)	—	22,5	0,187
		—	30,0	0,244
mixtures of methyl chloride and methylene chloride	4°(bt)	1,3	1,5	0,81
mixtures of methyl chloride and chloropicrin	4°(bt)	1,3	1,5	0,81
mixtures of methyl bromide and ethylene bromide	4°(bt)	1,0	1,0	1,51
methylacetylene/propadiene and hydrocarbon mixtures				
mixture P1	4°(c)	2,5	2,8	0,49
mixture P2	4°(c)	2,2	2,3	0,47
mixtures of 1,3-butadiene and hydrocarbons of 3°(b)	4°(c)	1,0	1,0	0,50
ethylene oxide containing not more than 10 % carbon dioxide by mass	4°(ct)	2,4	2,6	0,73
ethylene oxide with nitrogen up to a total pressure of 1 MPa (10 bar) at 50 °C	4°(ct)	1,5	1,5	0,78

(3) For shells intended for the carriage of gases of 5° and 6°:

(a) if the shells are not sheathed in thermal insulation: the values indicated in marginal 2220 (3) and (4);

212 251 *(cont'd)*

(b) if the shells are sheathed in thermal insulation: the values indicated below:

Description of substance	Item number	Minimum test pressure MPa	Maximum mass of contents per litre of capacity kg
bromotrifluoromethane (R 13 B1)	5°(a)	12,0	1,50
carbon dioxide	5°(a)	19,0	0,73
		22,5	0,78
chlorotrifluoromethane (R 13)	5°(a)	12,0	0,96
		22,5	1,12
hexafluoroethane (R 116)	5°(a)	16,0	1,28
		20,0	1,34
nitrous oxide (N_2O)	5°(a)	22,5	0,78
pentafluoroethane (R125)	5°(a)	3,4	0,95
sulphur hexafluoride	5°(a)	12,0	1,34
trifluoromethane (R 23)	5°(a)	19,0	0,92
		25,0	0,99
xenon	5°(a)	12,0	1,30
hydrogen chloride	5°(at)	12,0	0,69
ethane	5°(b)	12,0	0,32
ethylene	5°(b)	12,0	0,25
		22,5	0,36
1,1-difluoroethylene	5°(c)	12,0	0,66
		22,5	0,78
vinyl fluoride	5°(c)	12,0	0,58
		22,5	0,65
mixture of gases R 503	6°(a)	3,1	0,11
		4,2	0,21
		10,0	0,76
carbon dioxide containing not more than 35 % ethylene oxide by mass	6°(c)	19,0	0,73
		22,5	0,78
ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide by mass	6°(ct)	19,0	0,66
		25,0	0,75

Where shells sheathed in thermal insulation are used which have been subjected to a test pressure lower than that shown in the table, the maximum mass of the contents per litre of capacity shall be such that the pressure reached in the shell by the substance in question at 55 °C does not exceed the test pressure stamped on the shell. In such a case the maximum load allowed shall be prescribed by the expert approved by the competent authority.

(4) For shells intended for the carriage of ammonia dissolved under pressure of 9° (at), the values indicated below:

Description of substance	Item number	Minimum test pressure MPa	Maximum mass of contents per litre of capacity kg
ammonia dissolved under pressure in water			
— with more than 35 % but not more than 40 % ammonia by mass	9°(at)	1,0	0,80
— with more than 40 % but not more than 50 % ammonia by mass	9°(at)	1,0	0,77

(5) For shells intended for the carriage of gases of 7° and 8°: not less than 1.3 times the maximum permitted working pressure indicated on the shell, but not less than 300 kPa (3 bar) (gauge pressure); for shells with vacuum insulation the test pressure shall be not less than 1.3 times the maximum permitted working pressure increased by 100 kPa (1 bar).

212 252 The first hydraulic pressure test shall be carried out before thermal insulation is placed in position.

212 253 The capacity of each shell intended for the carriage of gases of 3° to 6° and 9° shall be determined, under the supervision of an expert approved by the competent authority, by weighing or volumetric measurement of the quantity of water which fills the shell; any error in the measurement of shell capacity shall be of less than 1 %. Determination by a calculation based on the dimensions of the shell is not permitted. The maximum filling masses allowed in accordance with marginals 2220 (4) and 212 251 (3) shall be prescribed by an approved expert.

212 254 Checking of the welds shall be carried out in accordance with the lambda-coefficient 1,0 requirements of marginal 212 127 (6).

212 255 Notwithstanding the requirements of Section 5 of Part I of this Appendix, the periodic tests shall take place:

(1) Every two and a half years in the case of tank-containers intended for the carriage of boron trifluoride of 1° (at), town gas of 2° (bt), chlorine, hydrogen bromide, nitrogen dioxide, phosgene or sulphur dioxide of 3° (at), hydrogen sulphide of 3° (bt), or hydrogen chloride of 5° (at);

(2) After eight years' service and thereafter every 12 years in the case of tank-containers intended for the carriage of gases of 7° and 8°. A leakproofness check may be performed, at the request of the competent authority, between any two successive tests.

212 256 In the case of vacuum-insulated shells the hydraulic-pressure test and the check of the internal condition may, with the consent of the approved expert, be replaced by a leakproofness test and measurement of the vacuum.

212 257 If apertures have been made, on the occasion of periodic inspections, in shells intended for the carriage of gases of 7° or 8°, the method by which they are hermetically closed before the shells are replaced in service shall be approved by the approved expert and shall ensure the integrity of the shell.

212 258 The leakproofness test of shells intended for the carriage of gases of 1° to 6° and 9° shall be carried out at a pressure of not less than 400 kPa (4 bar) and not more than 800 kPa (8 bar) (gauge pressure).

212 259

SECTION 6

MARKING

212 260 The following additional particulars shall be marked by stamping or by any other similar method on the plate described in marginal 212 160, or directly on the walls of the shell itself if the walls are so reinforced that the strength of the shell is not impaired:

(1) On shells intended for the carriage of only one substance:

— the name of the gas in full [1].

This indication shall be supplemented, in the case of shells intended for the carriage of compressed gases of 1° and 2° by an indication of the maximum filling pressure at 15 °C allowed for the shell and, in the case of shells intended for the carriage of liquefied gases of 3° to 8° or of ammonia dissolved under pressure of 9° (at), by an indication of the maximum permissible load mass in kg and of the filling temperature if below – 20 °C;

(2) On multi-purpose tank-containers:

— the names, in full [1], of the gases for whose carriage the shell is approved.

These particulars shall be supplemented by an indication of the maximum permissible load mass in kg for each gas;

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[1] The descriptions printed in italics in marginal 2201 shall be used as the full name of the gas for mixtures A, A0 and C of 4° (b) of marginal 2201. The names customary in the trade and mentioned in the Note to 4° (b) of marginal 2201 may be used only as a complement.

212 260 *(cont'd)*

(3) On shells intended for the carriage of gases of 7° and 8°:

— the working pressure; and

(4) On shells equipped with thermal insulation:

— the inscription 'Thermally insulated' or 'Thermally insulated by vacuum'.

212 261 The frame of a multiple-element tank-container shall bear near the filling point a plate specifying:

— the test pressure of the elements (1);

— the maximum permissible filling pressure (1) at 15 °C allowed for elements intended for compressed gases;

— the number of elements;

— the total capacity (1) of the elements;

— the name of the gas in full (2);

and, in addition, in the case of liquefied gases:

— the permissible maximum load mass (1) per element.

212 262 In addition to the particulars prescribed in marginal 212 161, the following shall be inscribed either on the tank-container itself or on a plate:

(a) — either: 'minimum filling temperature allowed: – 20 °C', or

— 'minimum filling temperature allowed: .....';

(b) *where the shell is intended for the carriage of one substance only:*

— the name of the gas in full (2);

— for liquefied gases of 3° to 8° and for ammonia dissolved under pressure in water of 9° (at), the maximum permissible load mass in kg;

(c) *where the shell is a multi-purpose shell:*

— the names in full (2) of all the gases to whose carriage the shell is assigned, with an indication of the maximum permissible load mass in kg for each of them;

(d) *where the shell is equipped with thermal insulation:*

— the inscription 'thermally insulated' or 'thermally insulated by vacuum', in an official language of the country of registration, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

212 263-
212 269

SECTION 7

OPERATION

212 270 A shell assigned at different times to the carriage of different liquefied gases of 3° to 8° (multi-purpose shells) may not carry substances other than those listed in one, and one only, of the following groups:

Group 1: halogenated hydrocarbons of 3° (a) and 4° (a);

Group 2: hydrocarbons of 3° (b) and 4° (b), butadienes of 3° (c) and mixtures of 1,3-butadiene and hydrocarbons of 4° (c);

(1) The units of measurement should be indicated after numerical values.

(2) The descriptions printed in italics in marginal 2201 shall be used as the full name of the gas for mixtures A, A0 and C of 4° (b) of marginal 2201. The names customary in the trade and mentioned in the Note to 4° (b) of marginal 2201 may be used only as a complement.

212 270 *(cont'd)*

Group 3: ammonia of 3° (at); dimethyl ether of 3° (b); dimethylamine, ethylamine, methylamine and trimethylamine of 3° (bt); and vinyl chloride of 3° (c);

Group 4: methyl bromide of 3° (at); ethyl chloride and methyl chloride of 3° (bt);

Group 5: mixtures of ethylene oxide with carbon dioxide and of ethylene oxide with nitrogen of 4° (ct);

Group 6: nitrogen, carbon dioxide, rare gases, nitorus oxide N_20, and oxygen of 7° (a); air, mixtures of nitrogen with rare gases and mixtures of oxygen with nitrogen, also when they contain rare gases of 8° (a);

Group 7: ethane, ethylene, and methane of 7° (b); and mixtures of methane with ethane, also when they contain propane or butane of 8° (b).

212 271 Shells which have been filled with a substance of group 1 or group 2 shall be emptied of liquefied gas before being loaded with another substance belonging to the same group. Shells which have been filled with a substance of groups 3 to 7 shall be completely emptied of liquefied gas and blown down before being loaded with another substance belonging to the same group.

212 272 The multiple use of shells for the carriage of liquefied gases of the same group shall be allowed if all the requirements prescribed for the gases to be carried in one and the same shell are observed. Such multiple use shall be subject to approval by an approved expert.

212 273 The multiple use of shells for the carriage of gases of different groups shall be allowed if permitted by the approved experts.

When shells are reassigned to gases of a different group, the shells shall be completely emptied of liquefied gases, then blown down and, lastly, degassed. The degassing of shells shall be verified and certified by the approved expert.

212 274 When loaded tanks or empty but uncleaned tanks are handed over for carriage, only the particulars specified in marginal 212 262 applicable to the gas loaded or just discharged shall be visible; all particulars concerning other gases shall be covered up.

212 275 All the elements of a multiple-element tank-container shall contain only one and the same gas. In the case of a multiple-element tank-container intended for the carriage of liquefied gases of 3° to 6°, the elements shall be filled separately and be kept isolated by a sealed valve.

212 276 The maximum filling pressure for compressed gases of 1° and 2° other than boron trifluoride of 1° (at) shall not exceed the values prescribed in marginal 2219 (2).

For boron trifluoride of 1° (at) the maximum filling mass per litre of capacity shall not exceed 0,86 kg. The maximum filling mass per litre of capacity shall comply with marginals 2220 (2), (3) and (4) and 212 251 (2), (3) and (4).

212 277 The degree of filling of the shells intended for the carriage of gases of 7° (b) and 8° (b) shall remain below the level at which, if the contents were raised to the temperature at which the vapour pressure equalled the opening pressure of the safety-valve, the volume of the liquid would reach 95 % of the capacity of the shell at that temperature. Shells intended for the carriage of gases of 7° (a) and 8° (a) may be filled to 98 % at the loading temperature and the loading pressure.

212 278 On shells for the carriage of nitrous oxide and oxygen of 7° (a), air or mixtures containing oxygen of 8° (a), substances containing grease or oil shall not be used to ensure leakproofness of the joints or for the maintenance of the closures.

212 279 The requirements in marginal 212 175 shall not apply to gases of 7° and 8°.

212 280-
212 299

CLASS 3

FLAMMABLE LIQUIDS

212 300-
212 309

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 310 The following substances of marginal 2301 may be carried in tank-containers:

(a) propyleneimine, inhibited, of 12°;

(b) substances classified under (a) of 11°, 14° to 22°, 26° and 27°, 41° to 57°;

(c) substances classified under (b) of 11°, 14° to 27°, 41° to 57°, and substances of 32° and 33°;

(d) substances of 1° to 5°, 31°, 34° and 61° (c), with the exception of isopropyl nitrate, n-propyl nitrate and nitromethane of 3° (b).

212 311-
212 319

SECTION 2

CONSTRUCTION

212 320 Shells intended for the carriage of inhibited propyleneimine of 12° shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 1,5 MPa (15 bar) (gauge pressure).

212 321 Shells intended for the carriage of the substances referred to in marginal 212 310 (b) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 100 kPa (10 bar) (gauge pressure).

212 322 Shells intended for the carriage of the substances referred to in marginal 212 310 (c) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

212 323 Shells intended for the carriage of the substances referred to in marginal 212 310 (d) shall be designed in accordance with the requirements of Part I of this Appendix.

212 324-
212 329

SECTION 3

ITEMS OF EQUIPMENT

212 330 All openings of shells intended for the carriage of the substances referred to in marginal 212 310 (a) and (b) shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed [1] and the closures shall be capable of being protected with lockable caps.

[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

212 331 Shells intended for the carriage of the substances referred to in marginal 212 310 (c) and (d) may also be of the bottom-discharge type. Shells intended for the carriage of the substances referred to in marginal 212 310 (c), except those of 33°, shall be capable of being hermetically closed 25 (1).

212 332 If shells intended for the carriage of the substances referred to in marginal 212 310 (a), (b) or (c), except those of 33°, are fitted with safety valves, a bursting disc shall be placed before the valve.

The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority. If shells intended for the carriage of the substances referred to in marginal 212 310 (d) are equipped with safety valves or a venting system, these shall satisfy the requirements of marginals 212 133 to 212 135.

If shells intended for the carriage of substances of 33° are fitted with safety valves, these shall satisfy the requirements of marginals 212 134 and 212 135.

Shells intended for the carriage of the substances referred to in marginal 212 310 (d) having a flash-point not exceeding 61 °C and equipped with a venting system which cannot be closed shall have a flame-trap in the venting system.

212 333-
212 339

SECTION 4

TYPE APPROVAL

212 340-
212 349 (No special requirements)

SECTION 5

TESTS

212 350 Shells intended for the carriage of the substances referred to in marginal 212 310 (a), (b) or (c) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar).

212 351 Shells intended for the carriage of the substances referred to in marginal 212 310 (d) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 212 123.

212 352-
212 359

SECTION 6

MARKING

212 360-
212 369 (No special requirements)

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 7

OPERATION

212 370 Shells intended for the carriage of the substances referred to in marginal 212 310 (a), (b) or (c), except those of 33°, shall be hermetically closed (1) during carriage. The closures of shells intended for the carriage of the substances referred to in marginal 212 310 (a) and (b) shall be protected by a locked cap.

212 371 Tank-containers approved for the carriage of substances of 11°, 12°, 14° to 20°, 27°, 32° and 41° to 57° shall not be used for the carriage of foodstuffs, articles of consumption or animal feeds.

212 372 An aluminium-alloy shell shall not be used for the carriage of acetaldehyde of 1° (a) unless the shell is reserved solely for such carriage and the acetaldehyde is free from acid.

212 373 The petrol (gasoline) referred to in the Note to 3° (b) of marginal 2301 may also be carried in tanks designed according to marginal 212 123 (1) and having equipment conforming to marginal 212 133.

212 374-
212 379

SECTION 8

TRANSITIONAL MEASURES

212 380 Tank-containers intended for the carriage of substances of 32° and 33° of marginal 2301, built according to the requirements of this Appendix applicable prior to 1 January 1995, but which do not, however, conform to the requirements applicable as from 1 January 1995, may still be used up to 31 December 1999.

212 381-
212 399

CLASS 4.1

FLAMMABLE SOLIDS

CLASS 4.2

SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION

CLASS 4.3

SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

212 400-
212 409

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 410 The following substances of marginals 2401, 2431 and 2471 may be carried in tank-containers:

(a) the substances listed under letter (a) of 6°, 17°, 19° and 31° to 33° of marginal 2431;

(b) the substances of 11° (a) and 22° of marginal 2431;

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

212 410 *(cont'd)*

(c) the substances listed under letter (a) of 1°, 2°, 3°, 21°, 23° and 25° of marginal 2471;

(d) the substances of 11° (a) of marginal 2471;

(e) the substances listed under letter (b) or (c) of:

— 6°, 8°, 10°, 17°, 19° and 21° of marginal 2431, and

— 3°, 21°, 23° and 25° of marginal 2471;

(f) the substances of 5° and 15° of marginal 2401;

(g) powdery and granular substances listed under letter (b) or (c) of:

— 1°, 6°, 7°, 8°, 11°, 12°, 13°, 14°, 16° and 17° of marginal 2401,

— 1°, 5°, 7°, 9°, 12°, 13°, 14°, 15°, 16°, 18° and 20° of marginal 2431,

— 11°, 12°, 13°, 14°, 15°, 16°, 17°, 19°, 20°, 22° and 24° of marginal 2471.

Note: For the carriage in bulk of substances of

— 4° (c), 6° (c), 11° (c), 12° (c), 13° (c) and 14° (c) and solid wastes classified under (c) of these items of marginal 2401,

— 1° (c), 2° (c), 3° (c), 12° (c) and 16° (c), and solid wastes classified under (c) of these items of marginal 2431,

— 11° (c), 12° (c), 13° (b) and (c), 14° (c), 15° (c), 17° (b) and 20° (c) of marginal 2471,

see marginals 41 111, 42 111 and 43 111.

212 411-
212 419

SECTION 2

CONSTRUCTION

212 420 Shells intended for the carriage of the substances referred to in marginal 212 410 (a) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 2,1 MPa (21 bar) (gauge pressure).

The requirements of Appendix B.1d are applicable to the materials and construction of these shells.

212 421 Shells intended for the carriage of the substances referred to in marginal 212 410 (b), (c) and (d) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 1 MPa (10 bar) (gauge pressure).

212 422 Shells intended for the carriage of the substances referred to in marginal 212 410 (e) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

212 423 Shells intended for the carriage of the solids referred to in marginal 212 410 (f) and (g) shall be designed in conformity with the requirements of Part I of this Appendix.

212 424 All parts of the tank-container intended for the carriage of substances of marginal 2431, 1°(b) shall be capable of being electrically earthed.

212 425-
212 429

SECTION 3

ITEMS OF EQUIPMENT

212 430 All openings of shells intended for the carriage of the substances referred to in marginal 212 410 (a), (b), (c) and (e) shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed (1) and the closure shall be capable of being protected with lockable caps. The cleaning apertures (fist-holes) referred to in marginal 212 132 shall not be permitted.

212 431 With the exception of shells intended for the carriage of caesium and rubidium of marginal 2471, 11° (a), shells intended for the carriage of substances referred to in marginal 212 410 (d), (f) and (g) may also be of the bottom-discharge type. The openings of shells intended for the carriage of caesium and rubidium of marginal 2471, 11° (a) shall be equipped with hermetically (1) closing and lockable caps.

212 432 Shells intended for the carriage of the substances referred to in marginal 212 410 (b) shall in addition meet the following requirements:

(1) The heating device shall not penetrate into, but shall be exterior to, the body of the shell. However, a pipe used for extracting the phosphorus may be equipped with a heating jacket. The device heating the jacket shall be so regulated as to prevent the temperature of the phosphorus from exceeding the filling temperature of the shell. Other piping shall enter the shell in its upper part; openings shall be situated above the highest permissible level of the phosphorus and be capable of being completely enclosed under lockable caps. In addition, the cleaning apertures (fist-holes) referred to in marginal 212 132 shall not be permitted.

(2) The shell shall be equipped with a gauging system for verifying the level of the phosphorus and, if water is used as a protective agent, with a fixed gauge mark showing the highest permissible level of the water.

212 433 If shells intended for the carriage of the substances referred to in marginal 212 410 (a), (c) and (e) are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

212 434 Shells intended for the carriage of the subtances referred to in marginal 212 410 (f) shall be equipped with thermal insulation made of materials which are not readily flammable.

212 435 If shells intended for the carriage of substances referred to in marginal 212 410 (d) are equipped with thermal insulation, such insulation shall be made of materials which are not readily flammable.

212 436 Shells intended for the carriage of the substances referred to in marginal 212 410 (f) may be equipped with valves opening automatically inwards or outwards under the effect of a difference of pressure of between 20 kPa and 30 kPa (0,2 bar and 0,3 bar).

212 437-
212 439

SECTION 4

TYPE APPROVAL

212 440-
212 449 (No special requirements)

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 5

TESTS

212 450 Shells intended for the carriage of the substances referred to in marginal 212 410 (a) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 1 MPa (10 bar). The materials of each of these shells shall be tested by the method described in Appendix B.1d.

212 451 Shells intended for the carriage of the substances referred to in marginal 212 410 (b) to (e) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 400 kPa (4 bar).

By derogation from the requirements of marginal 212 151, shells intended for the carriage of substances referred to in marginal 212 410 (d) shall undergo periodic inspections at least every eight years which shall include a thickness check using suitable instruments. For such shells, the leakproofness test and check, for which provision is made in marginal 212 152, shall be carried out at least every four years.

212 452 Shells intended for the carriage of the substances referred to in marginal 212 410 (f) and (g) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 212 123.

212 453-
212 459

SECTION 6

MARKING

212 460 Shells intended for the carriage of the substances referred to in marginal 212 410 (a) shall bear in addition to the particulars prescribed in marginal 212 161, the words: 'Do not open during carriage. Liable to spontaneous combustion'.

Shells intended for the carriage of the substances referred to in marginal 212 410 (c) to (e) shall bear in addition to the particulars prescribed in marginal 212 161, the words: 'Do not open during carriage. Gives off flammable gases on contact with water.'

These particulars shall be in an official language of the country of approval, and also, if that language is not English, French or German, in English, French or German, unless any agreements concluded between the countries concerned in the transport operation provide otherwise.

212 461 Shells intended for the carriage of substances of marginal 2471, 1° (a) shall also bear, on the plate prescribed in marginal 212 160, the names of the approved substances and the maximum permissible load of the shell in kg.

212 462-
212 469

SECTION 7

OPERATION

212 470 (1) Substances of 11° and 22° of marginal 2431 shall, if water is used as a protective agent, be covered with a depth of not less than 12 cm of water at the time of filling; the degree of filling at a temperature of 60 °C shall not exceed 98 %. If nitrogen is used as a protective agent, the degree of filling at a temperature of 60 °C shall not exceed 96 %. The remaining space shall be filled with nitrogen in such a way that, even after cooling, the pressure at no time falls below atmospheric pressure. The shell shall be hermetically closed [1] so that no leakage of gas occurs.

[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

212 470 (cont'd) (2) Uncleaned empty shells which have contained substances of 11° and 22° of marginal 2431 shall, when handed over for carriage, either:

— be filled with nitrogen; or

— be filled with water to not less than 96 % and not more than 98 % of their capacity; between 1 October and 31 March, this water shall contain sufficient anti-freeze agent to make it impossible for the water to freeze during carriage; the anti-freeze agent shall be free from corrosive action and not liable to react with phosphorus.

212 471 Shells containing substances of 31° to 33° of marginal 2431 and substances of 2° (a), 3° (a) and 3° (b) of marginal 2471 shall be filled to not more than 90 % of their capacity; a space of 5 % shall remain empty for safety when the liquid is at an average temperature of 50 °C. During carriage, the substances shall be under a layer of inert gas, the gauge pressure of which shall not be less than 50 kPa (0,5 bar). The shells shall be hermetically closed [1] and the protective caps conforming to 212 430 shall be locked. Uncleaned empty shells shall when handed over for carriage be filled with an inert gas at a gauge pressure of at least 50 kPa (0,5 bar).

212 472 For ethyldichlorosilane, methyldichlorosilane and trichlorosilane of marginal 2471, 1°, the degree of filling shall not exceed 0,93 or 0,95 or 1,14 kg per litre of capacity respectively, if filling is by mass. If filling is by volume, and for chlorosilanes not mentioned by name (n.o.s.) of marginal 2471, 1°, the rate of filling shall not exceed 85 %. The shells shall be hermetically closed [1] and the protective caps conforming to marginal 212 430 shall be locked.

212 473 Shells containing substances of marginal 2401, 5° and 15°, shall not be filled to more than 98 % of their capacity.

212 474 For the carriage of caesium and rubidium of marginal 2471 11° (a) , the substances shall be covered by an inert gas and the caps conforming to marginal 212 431 shall be locked. Shells containing other substances of marginal 2471, 11° (a) shall not be handed over for carriage until the substance has solidified completely and been covered by an inert gas.

Uncleaned empty shells which have contained substances of marginal 2471, 11°(a) shall be filled with an inert gas. The shells shall be hermetically closed [1].

212 475 When substances of marginal 2431, 1° (b) are being loaded, the temperature of the goods being loaded shall not exceed 60 °C.

212 476-
212 499

CLASS 5.1

OXIDIZING SUBSTANCES

CLASS 5.2

ORGANIC PEROXIDES

212 500-
212 509

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 510 The following substances of marginal 2501 may be carried in tank-containers:

(a) substances of 5°;

(b) substances listed under letter (a) or (b) of 1° to 4°, 11°, 13°, 16°, 17°, 22° and 23°, carried in the liquid state;

(c) ammonium nitrate liquid of 20°;

[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

212 510 (cont'd)

(d) substances listed under letter (c) of 1°, 16°, 18°, 22° and 23°, carried in the liquid state;

(e) substances in powdery or granular form listed under letter (b) or (c) of 11°, 13° to 19°, 21° to 27°, 29° and 31°.

Note: For the carriage in bulk of substances of 11° to 13°, 16°, 18°, 19°, 21° and 22° (c), and of solid wastes classified in the aforementioned items of marginal 2501, see marginal 51 111.

212 511 Substances of 9° (b), 10° (b), 19° (b) or 20° (b) of marginal 2551 may be carried in tank-containers at the latest from 1 January 1995 under conditions laid down by the competent authority of the country of origin if, on the basis of tests (see marginal 212 541), the competent authority is satisfied that such a transport operation can be carried out safely.

212 512-
212 519

SECTION 2

CONSTRUCTION

212 520 Shells intended for the carriage of the substances referred to in marginal 212 510 (a) shall be designed for a calculation pressure [see marginal 212 127 (2)] of at least 1 MPa (10 bar) (gauge pressure).

212 521 Shells intended for the carriage of the substances referred to in marginal 212 510 (b) shall be designed for a calculation pressure [see marginal 212 127(2)] of at least 400 kPa (4 bar) (gauge pressure). Shells, and their items of equipment, intended for the carriage of substances of 1° shall be made of aluminium not less than 99,5 % pure or of suitable steel not liable to cause hydrogen peroxide to decompose. Where shells are made of aluminium not less than 99,5 % pure, the wall thickness need not be greater than 15 mm, even where calculation in accordance with marginal 212 127 (2) gives a higher value.

212 522 Shells intended for the carriage of the substances referred to in marginal 212 510 (c) shall be designed for a calculation pressure [see marginal 212 127 (2)] of at least 400 kPa (4 bar) (gauge pressure). The shells shall be made of austenitic steel.

212 523 Shells intended for the carriage of the liquids referred to in marginal 212 510 (d) and the powdery or granular substances referred to in marginal 212 510 (e) shall be designed in accordance with the requirements of Part I of this Appendix.

212 524 Shells intended for the carriage of substances referred to in marginal 212 511 shall be designed for a calculation pressure of at least 400 kPa (4 bar) (gauge pressure).

212 525-
212 529

SECTION 3

ITEMS OF EQUIPMENT

212 530 Shells intended for the carriage of substances of 1° (a), 3° (a) and 5° of marginal 2501 shall have their openings above the surface level of the liquid. In addition, the cleaning apertures (fist holes) referred to in marginal 212 132 shall not be permitted.

For solutions containing more than 60 % but not more than 70 % hydrogen peroxide, openings below the surface level of the liquid shall be permissible. In this case the shell-discharge system shall be equipped with two mutually independent shut-off devices mounted in series, the first taking the form of a quick-closing internal stop-valve of an approved type and the second that of a sluice-valve, one at each end of the discharge pipe. A blank flange, or another device providing the same measure of security, shall also be fitted at the outlet of each external sluice-valve. The internal stop-valve shall be such that if the pipe is wrenched off the stop-valve will remain integral with the shell and in the closed position. The connections to the external pipe-sockets of shells shall be made of materials not liable to cause decomposition of hydrogen peroxide.

212 531

212 532 Shells intended for the carriage of hydrogen peroxide or aqueous solutions of hydrogen peroxide of 1°, or of ammonium nitrate liquid of 20° of marginal 2501 shall be fitted in their upper part with a shut-off device preventing any build-up of excess pressure inside the shell, any leakage of liquid, and any entry of foreign matter into the shell. The shut-off devices of shells intended for the carriage of ammonium nitrate liquid of marginal 2501, 20°, shall be so designed as to preclude obstruction of the devices by solidified ammonium nitrate during carriage.

212 533 Where shells intended for the carriage of ammonium nitrate liquid of marginal 2501, 20°, are sheathed in thermally-insulating material, the material shall be of an inorganic nature and entirely free from combustible matter.

212 534 Shells intended for the carriage of substances referred to in marginal 212 511 shall be equipped with thermal insulation complying with the requirements of marginal 212 234 (1). If the SADT of the organic peroxide in the shell is 55 °C or less, or the shell is constructed of aluminium, the shell shall be completely insulated. The sun shield and any part of the shell not covered by it, or the outer sheathing of a complete lagging, shall be painted white or finished in bright metal. The paint shall be cleaned before each transport journey and renewed in case of yellowing or deterioration. The thermal insulation shall be free from combustible matter.

212 535 Shells intended for the carriage of substances referred to in marginal 212 511 shall be fitted with temperature sensing devices.

212 536 (1) Shells intended for the carriage of substances referred to in marginal 212 511 shall be fitted with safety valves and pressure-relief devices. Vacuum-relief devices may also be used. Pressure-relief devices shall operate at pressures determined according to both the properties of the organic peroxide and the construction characteristics of the tank. Fusible elements shall not be permitted in the body of the shell.

(2) Shells intended for the carriage of substances referred to in marginal 212 511 shall be fitted with spring-loaded safety valves to prevent significant pressure build-up within the shell of the decomposition products and vapours released at a temperature of 50 °C. The capacity and start-to-discharge pressure of the safety-valve(s) shall be based on the results of the tests specified in marginal 212 541. The start-to-discharge pressure shall however in no case be such that liquid could escape from the valve(s) if the shell were overturned.

(3) The pressure-relief devices of shells intended for the carriage of substances referred to in marginal 212 511 may be of the spring-loaded type or bursting disc type, designed to vent all the decomposition products and vapours evolved during a period of not less than one hour of fire engulfment (heat load 110 kW/m^2) or self-accelerating decomposition. The start-to-discharge pressure of the pressure-relief device(s) shall be higher than that specified in paragraph (2) and based on the results of the tests referred to in marginal 212 541. The dimensions of the pressure-relief devices shall be such that the maximum pressure in the shell never exceeds the test pressure of the shell.

(4) For shells with an insulation consisting of a complete cladding intended for the carriage of substances referred to in marginal 212 511, the capacity and setting of the pressure-relief device(s) shall be determined assuming a loss of insulation from 1 % of the surface area.

(5) Vacuum-relief devices and spring-loaded safety valves of shells for the carriage of substances referred to in marginal 212 511 shall be provided with flame arresters unless the substances to be carried and their decomposition products are non-combustible. Due attention shall be paid to the reduction of the relief capacity caused by the flame arrester.

212 537-
212 539

SECTION 4

TYPE APPROVAL

212 540 Tank-containers approved for the carriage of ammonium nitrate liquid of marginal 2501, 20°, shall not be approved for the carriage of other substances.

212 541 For the type approval of shells intended for the carriage of substances referred to in marginal 212 511, tests shall be undertaken:

— to prove the compatibility of all materials normally in contact with the substance during carriage;

— to provide data to facilitate the design of the pressure-relief devices and safety valves taking into account the design characteristics of the tank-container; and

— to establish any special requirements necessary for the safe carriage of the substance.

The test results shall be included in the report for the type approval of the shell.

212 542-
212 549

SECTION 5

TESTS

212 550 Shells intended for the carriage of the substances referred to in marginal 212 510 (a), (b) and (c) shall be subjected to the initial and periodic hydraulic pressure tests at a pressure of not less than 400 kPa (4 bar) (gauge pressure). Shells of pure aluminium intended for the carriage of substances of marginal 2501, 1°, may be subjected to the initial and periodic hydraulic pressure tests at a pressure of only 250 kPa (2,5 bar) (gauge pressure).

Shells intended for the carriage of the substances referred to in marginal 212 510 (d) and (e) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 212 123.

212 551 Shells intended for the carriage of substances referred to in marginal 212 511 shall be subjected to the initial and periodic hydraulic pressure tests at the calculation pressure in accordance with marginal 212 524.

212 552-
212 559

SECTION 6

MARKING

212 560 The following additional particulars shall be marked by stamping or by any other similar method on the plate prescribed in marginal 212 161 or directly on the walls of the shell itself, if the walls are so reinforced that the strength of the shell is not impaired:

— the chemical name with the approved concentration of the substance concerned.

212 561-
212 569

SECTION 7

OPERATION

212 570 The inside of the shell and all parts liable to come into contact with the substances referred to in marginals 212 510 and 212 511 shall be kept clean. No lubricant capable of combining dangerously with the substance carried shall be used for pumps, valves or other devices.

212 571 Shells intended for the carriage of substances of 1° (a), 2° (a) and 3° (a) of marginal 2501 shall be filled to not more than 95 % of their capacity at a reference temperature of 15 °C. Shells intended for the carriage of substances of marginal 2501, 20°, shall be filled to not more than 97 % of their capacity, and the maximum temperature after filling shall not exceed 140 °C. Shells approved for the carriage of ammonium nitrate liquid shall not be used for the carriage of other substances.

212 572 Shells intended for the carriage of substances referred to in marginal 212 511 shall be filled as set out in the test report for the type approval of the tank but shall be filled to not more than 90 % of their capacity. Shells shall be free from impurities at the time of filling.

212 573 Service equipment such as valves and external piping of shells intended for the carriage of substances referred to in marginal 212 511 shall be emptied after filling or discharging of the tank.

212 574-
212 599

CLASS 6.1

TOXIC SUBSTANCES

CLASS 6.2

INFECTIOUS SUBSTANCES

212 600-
212 609

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 610 (1) The following substances of marginal 2601 may be carried in tank-containers:

(a) the substances listed by name in 2° to 4°;

(b) substances classified under (a) of 6° to 13° with the exception of isopropyl chloroformate of 10°, 15° to 17°, 20°, 22°, 23°, 25° to 28°, 31° to 36°, 41°, 44°, 51°, 52°, 55°, 61°, 65° to 68°, 71° to 87° and 90°, carried in the liquid state;

(c) substances classified under (b) or (c) of 11°, 12°, 14° to 28°, 31° to 36°, 41°, 44°, 51° to 55°, 57° to 62°, 64° to 68°, 71° to 87° and 90°, carried in the liquid state;

(d) substances in powdery or granular form classified under (b) or (c) of 12°, 14°, 17°, 19°, 21°, 23°, 25° to 27°, 32° to 35°, 41°, 44°, 51° to 55°, 57° to 68°, 71° to 87° and 90°.

Note: For the carriage in bulk of substances of 60° (c), of solids containing toxic liquids of 65° (b) (identification number 3243) and of solid wastes classified under (c) of the various items, see marginal 61 111.

(2) Substances of marginal 2651, 3° and 4° may be carried in tank-containers.

212 611-
212 619

SECTION 2

CONSTRUCTION

212 620 Shells intended for the carriage of substances referred to in marginal 212 610 (1) (a) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 1,5 MPa (15 bar) (gauge pressure).

212 621 Shells intended for the carriage of the substances referred to in marginal 212 610 (1) (b) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 1,0 MPa (10 bar) (gauge pressure).

212 622 Shells intended for the carriage of the substances referred to in marginals 212 610 (1) (c) and 212 610 (2) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure). Shells intended for the carriage of chloroacetic acid of 24°(b) of marginal 2601 shall be provided with an enamel or equivalent protective lining if the material of the shell is attacked by chloroacetic acid.

212 623 Shells intended for the carriage of the powdery or granular substances referred to in marginal 212 610 (1) (d) shall be designed in accordance with the requirements of Part I of this Appendix.

212 624-
212 629

SECTION 3

ITEMS OF EQUIPMENT

212 630 All openings of shells intended for the carriage of the substances referred to in marginal 212 610 (1) (a) and (b) shall be above the surface level of the liquid. No pipe or pipe connections shall pass through the walls of the shell below the surface level of the liquid. Shells shall be capable of being hermetically closed [1] and the closures shall be capable of being protected with lockable caps. The cleaning openings (fist holes) provided for in marginal 212 132 shall not however be permitted for shells intended for the carriage of solutions of hydrocyanic acid of 2°.

212 631 Shells intended for the carriage of the substances referred to in marginal 212 610 (1) (c) and (d) and (2) may also be of the bottom-discharge type. The shells shall be capable of being hermetically closed [1].

212 632 If shells are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

212 633-
212 639

SECTION 4

TYPE APPROVAL

212 640- (No special requirements)
212 649

[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 5

TESTS

212 650 Shells intended for the carriage of the substances referred to in marginal 212 610 (1) (a), (b) and (c) and (2) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar).

212 651 Shells intended for the carriage of the substances referred to in marginal 212 610 (1) (d) shall be subjected to the initial and periodic hydraulic pressure tests at their calculation pressure as defined in marginal 212 123.

212 652-
212 659

SECTION 6

MARKING

212 660- (No special requirements)
212 669

SECTION 7

OPERATION

212 670 Shells intended for the carriage of substances of 3° of marginal 2601 shall not be filled to more than 1 kg per litre of capacity.

212 671 Shells shall be hermetically closed [1] during carriage. The closures of shells intended for the carriage of the substances referred to in marginal 212 610 (1) (a) and (b) shall be protected with locked caps.

212 672 Tank-containers approved for the carriage of the substances referred to in marginal 212 610 shall not be used for the carriage of foodstuffs, articles of consumption or animal feeds.

212 673-
212 699

CLASS 7

RADIOACTIVE MATERIAL

212 700-
212 709

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 710 Materials of marginal 2704, Schedules 1, 5, 6, 9, 10 and 11, except uranium hexafluoride, may be carried in tank-containers. The provisions of the appropriate schedule in marginal 2704 are applicable.

Note: There may be additional requirements for tank-containers which are designed as a Type A or Type B packaging.

212 711-
212 719

[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 2

CONSTRUCTION

212 720 See marginal 3736.

212 721-
219 729

SECTION 3

ITEMS OF EQUIPMENT

212 730 The openings of tank-containers for the carriage of liquid radioactive material (1) shall be above the level of the liquid. The shell walls shall not have any piping or pipe connection below the level of the liquid.

212 731-
212 739

SECTION 4

TYPE APPROVAL

212 740 Tank-containers approved for the carriage of radioactive material shall not be approved for the carriage of any other substance.

212 741-
212 749

SECTION 5

TESTS

212 750 The shells shall initially and periodically undergo a hydraulic pressure test at a pressure of at least 265 kPa (2,65 bar), (gauge pression).

Notwithstanding the provisions of marginal 212 151 the periodic internal inspection may be replaced by a programme approved by the competent authority.

212 751-
212 759

SECTION 6

MARKING

212 760 In addition, the trefoil symbol described in marginal 2705 (5), shall be marked by stamping or by any other equivalent method on the place described in marginal 212 160. This trefoil marking may be applied directly on the walls of the shell itself, if the walls are so reinforced that the strength of the shell is not impaired.

212 761-
212 769

(1) Substances whose kinematic viscosity at 20 °C is less than 2 680 mm^2/s shall be deemed to be liquids for the purposes of this provision.

SECTION 7

OPERATION

212 770 The degree of filling according to marginal 212 172, at the reference temperature of 15 °C shall not exceed 93 % of the capacity of the shell.

212 771 Tank-containers in which radioactive material has been carried shall not be used for the carriage of other substances.

212 772-
212 799

CLASS 8

CORROSIVE SUBSTANCES

212 800-
212 809

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 810 The following substances of marginal 2801 may be carried in tank-containers:

(a) substances listed by name in 6° and 14°;

(b) substances classified under (a) of 1°, 2°, 3°, 7°, 8°, 12°, 17°, 32°, 33°, 39°, 40°, 46°, 47°, 52° to 56°, 64° to 68°, 70°, 72° to 76°, carried in the liquid state;

(c) substances 15° or classified under (b) or (c) of 1° to 5°, 7°, 8° 10°, 12°, 17°, 31° to 40°, 42° to 47°, 51° to 56°, 61° to 76°, carried in the liquid state;

(d) substances in powdery or granular form classified under (b) or (c) of 9°, 11°, 13°, 16°, 31°, 34°, 35°, 39°, 41°, 45°, 46°, 52°, 55°, 62°, 65°, 68°, 69°, 71°, 73° and 75°.

Note: For the carriage in bulk of lead sulphate of 1° (b), of substances of 13° (b), and solid wastes and solids containing a corrosive liquid of 65° (b) of identification number 3244 classified under (c) of the various items, see marginal 81 111.

212 811-
212 819

SECTION 2

CONSTRUCTION

212 820 Shells intended for the carriage of substances listed by name in 6° and 14° shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 2,1 MPa (21 bar) (gauge pressure). Shells intended for the carriage of substances of 14° shall be provided with a lead lining not less than 5 mm thick or an equivalent lining. The requirement of Appendix B.1d shall apply to the materials and construction of welded shells, intended for the carriage of substances of 6°.

212 821 Shells intended for the carriage of the substances referred to in marginal 212 810 (b) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 1,0 MPa (10 bar) (gauge pressure).

Where the use of aluminium is necessary for shells intended for the carriage of nitric acid of 2° (a), such shells shall be made of aluminium not less than 99,5 % pure; even where the calculation pressure according to marginal 212 127 (2) gives a higher value, the wall thickness need not exceed 15 mm.

212 822 Shells intended for the carriage of the substances referred to in marginal 212 810 (c) shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

If the shells are made of pure aluminium, the wall thickness need not be greater than 15 mm even where the calculation pressure according to marginal 212 127(2) gives a higher value.

212 823 Shells intended for the carriage of the powdery or granular substances referred to in marginal 212 810 (d) shall be designed in accordance with the requirements of Part I of this Appendix.

212 824-
212 829

SECTION 3

ITEMS OF EQUIPMENT

212 830 All openings of shells intended for the carriage of substances of 6°, 7° and 14° shall be above the surface level of the liquid. No pipes or pipe connections shall pass through the walls of the shell below the surface level of the liquid. In addition, the cleaning openings (fist holes) referred to in marginal 212 132 shall not be permissible. Tank-containers shall be capable of being hermetically closed [1] and the closures shall be capable of being protected by lockable cap.

212 831 Shells intended for the carriage of the substances referred to in marginal 212 810 (b), (c) and (d) may also be of the bottom-discharge type.

212 832 If shells intended for the carriage of the substances referred to in marginal 212 810 (b) are fitted with safety valves, a bursting disc shall be placed before the valve. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

212 833 Shells intended for the carriage of sulphur trioxide of 1° (a) shall be thermally insulated and fitted with a heating device on the outside.

212 834 Shells and their service equipment intended for carriage of hypochlorite solutions of 61° shall be so designed as to prevent the entry of foreign matter, leakage of liquid or any building up of dangerous excess pressure inside the shell.

212 835-
212 839

SECTION 4

TYPE APPROVAL

212 840- (No special requirements)
212 849

SECTION 5

TESTS

212 850 Shells intended for the carriage of substances of 6° shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of at least 1,0 MPa (10 bar) and those intended for the carriage of substances of 7° shall be subjected to initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar).

The materials of every welded shell intended for the carriage of substances of 6° shall be tested by the method described in Appendix B.1d.

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[1] 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

212 851 Shells intended for the carriage of substances of 14° or of the substances referred to in marginal 212 810 (b) and (c) shall be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of not less than 400 kPa (4 bar). The hydraulic pressure test for shells intended for the carriage of sulphur trioxide of 1° (a) shall be repeated every two and a half years.

Shells made of pure aluminium and intended for the carriage of nitric acid of 2° (a) need be subjected to the initial and periodic hydraulic pressure tests at a gauge pressure of only 250 kPa (2,5 bar).

The condition of the lining of shells intended for the carriage of substances of 14° shall be inspected every year by an expert approved by the competent authority, who shall inspect the inside of the shell.

212 852 Shells intended for the carriage of the substances referred to in marginal 212 810 (d) shall be subjected to the initial and periodic tests at their calculation pressure as defined in marginal 212 123.

212 853-
212 859

SECTION 6

MARKING

212 860 Shells intended for the carriage of substances of 6° and 14°, shall bear, in addition to the particulars referred to in marginal 212 160, the date (month, year) of the most recent inspection of the internal condition.

212 861 Shells intended for the carriage of inhibited sulphur trioxide of 1° (a) and substances of 6° and 14° shall bear in addition, on the plate referred to in marginal 212 160, the maximum permissible load mass in kg of the shell.

212 862-
212 869

SECTION 7

OPERATION

212 870 Shells intended for the carriage of inhibited sulphur trioxide of 1° (a) shall not be filled to more than 88 % of their capacity; those intended for the carriage of substances of 14° shall be filled to not less than 88 % and not more than 92 % of their capacity or to 2,86 kg per litre of capacity.

Shells intended for the carriage of substances of 6° shall not be filled to more than 0,84 kg per litre of capacity.

212 871 Shells intended for the carriage of substances of 6°, 7° and 14° shall be hermetically closed (1) [see marginal 212 127 (2)] during carriage and the closures shall be protected with lockable caps.

212 872-
212 899

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

CLASS 9

MISCELLANEOUS DANGEROUS SUBSTANCES AND ARTICLES

212 900-
212 909

SECTION 1

GENERAL; SCOPE (USE OF TANK-CONTAINERS); DEFINITIONS

Use

212 910 Substances of 1°, 2°, 4°, 11° and 12° of marginal 2901 may be carried in tank-containers.

Note: For the carriage in bulk of substances of 4° and 12° of marginal 2901, see marginal 91 111.

212 911-
212 919

SECTION 2

CONSTRUCTION

212 920 Shells intended for the carriage of substances of 1°, 4°, 11° and 12° shall be designed in accordance with the requirements of Part I of this Appendix.

212 921 Shells intended for the carriage of substances of 2° shall be designed for a calculation pressure [see marginal 212 127 (2)] of not less than 400 kPa (4 bar) (gauge pressure).

212 922-
212 929

SECTION 3

ITEMS OF EQUIPMENT

212 930 Shells intended for the carriage of substances of 1° and 2° shall be capable of being hermetically closed (1). Shells intended for the carriage of substances of 4° (c) shall be equipped with a safety valve.

212 931 If shells intended for the carriage of substances of 1° and 2° are fitted with safety valves, a bursting disc shall be placed before the valves. The arrangement of the bursting disc and safety valve shall be such as to satisfy the competent authority.

212 932-
212 939

SECTION 4

TYPE APPROVAL

212 940-
212 949 (No special requirements)

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 5

TESTS

212 950 Shells intended for the carriage of substances of 2° shall be subjected to the initial and periodic hydraulic pressure tests at a pressure of at least 400 kPa (4 bar) (gauge pressure).

212 951 Shells intended for the carriage of substances of 1°, 4°, 11° and 12° shall be subject to the initial and periodic hydraulic pressure tests at the calculation pressure used in their design as defined in marginal 212 123.

212 952-
212 959

SECTION 6

MARKING

212 960- (No special requirements)
212 969

SECTION 7

OPERATION

212 970 Shells intended for the carriage of substances of 1° and 2° shall be hermetically closed (1) during carriage.

212 971 Tank-containers approved for the carriage of substances of 1° and 2° shall not be used for the carriage of foodstuffs, articles of consumption or animal feeds.

212 972-
212 999

APPENDIX B.1c

PROVISIONS CONCERNING FIXED TANKS AND DEMOUNTABLE TANKS MADE OF REINFORCED PLASTICS

Notes: 1. This Appendix applies to fixed tanks and demountable tanks; it does not apply to batteries of receptacles, to tank-containers, or to receptacles.

2. For receptacles, see the requirements concerning them in Annex A (packages).

213 000-
213 009

(1) 'Hermetically closed shells' means shells whose openings are hermetically closed and which are not equipped with safety valves, bursting discs or other similar safety devices. Shells having safety valves preceded by a bursting disc shall be deemed to be hermetically closed.

SECTION 1

GENERAL PROVISIONS CONCERNING THE USE AND CONSTRUCTION OF FIXED AND DEMOUNTABLE TANKS

Note: In accordance with the provisions of marginal 10 121 (2) the carriage of dangerous substances in fixed or demountable tanks made of reinforced plastics complying with the requirements of this Appendix is permitted only where the use of such tanks for those substances is expressly authorized under marginal 213 010.

Use

213 010 The following substances may be carried in reinforced-plastics tanks conforming to the provisions of this Appendix:

(a) crude petroleum and other crude oils; volatile products from the distillation of crude petroleum and of other crude oils of 3° (b) of Class 3;

(b) semi-heavy products from the distillation of petroleum and of other crude oils of 31° (c) of Class 3;

(c) heating oils and diesel oils of 31° (c) of Class 3;

(d) aqueous solutions of hydrogen peroxide of 1° (b) and (c) and solutions of 11° (b) of Class 5.1;

(e) substances of 1° (b) and (c), 2° (b), 5°, 8° (b) and (c), 17° (c), 42°, 43° (c) and 61° of Class 8.

213 011-
213 099

Construction

213 100 The tanks shall comply with the following requirements of Appendix B.1a:

(1) General provisions applicable to tanks used for carriage of substances of all classes:

Marginals 211 120 (4), (5) and (6); 211 121; 211 122; 211 124; 211 126; 211 127 (7); 211 128; 211 130; 211 132; 211 140; 211 150 to 211 154; 211 160 and 211 161; 211 171; 211 172 (1) and (2); 211 173 to 211 178.

(2) Provisions applicable to tanks used for carriage of substances of Class 3: Shells which are fitted with a venting device not capable of being closed and which are intended for the carriage of inflammable liquids having a flash-point not exceeding 55 °C shall have a flame-trap in the venting device.

The leakproofness test and the internal inspection shall be performed every three years.

(3) Special privisions applicable to tanks used for the carriage of substances of Class 5.1: marginal 211 532.

(4) Provisions applicable to tanks used for carriage of substances of Class 8: marginal 211 834.

213 101 The walls of the tank must present no material defect causing a reduction in safety.

213 102 The walls of the tank must have a lasting resistance to the mechanical, thermal and chemical stresses to which they are subjected.

Tank openings

213 103 (1) Where the tank has one or more discharge openings below the level of the liquid, any pipe or valve fitted to such opening or openings shall be protected either by being recessed into the tank shell or by any other means approved by the competent authority and providing equivalent protection.

(2) The use of screwed plugs is strictly prohibited. Valves shall be of a model approved by the competent authority.

(3) Filling apertures shall be closed by a hermetic device. If the device projects outwards from the tank shell it shall be protected by a cap capable of withstanding wrenching stresses occurring through accidental overturning of the tank.

213 104-
213 119

SECTION 2

MATERIALS USED FOR THE WALLS OF THE TANK

213 120 The walls of tanks may be made of the following materials:

(1) Synthetic resin

— non-saturated polyester resins;

— epoxide resins;

— other resins with similar characteristics, provided that the safety of the wall is demonstrated.

(2) Fibre reinforcements

Glass fibres (glass of types E and C) [1] with an appropriate coating, for example with a silane base or similar products. The glass fibres may be used in the form of cut or uncut rovings including prestressed continuous rovings or filaments, mats, surface mats or woven fabric.

(3) Additives

(a) Additives necessary for the treatment of resins, for example, catalysts, accelerators, monomers, hardeners, thixotropic substances, in accordance with instructions by the manufacturer of the resin.

(b) Extenders, pigments, colorants and other products enabling the required properties to be obtained, for example, the increase of fire-resistant properties, provided that they cause no reduction in the safety of use of the walls of the tank.

213 121-
213 129

SECTION 3

STRUCTURE OF THE WALLS OF THE TANK

213 130 The external surface layer of the walls of the tank must be resistant to atmospheric effects and also to brief contact with the substance to be carried.

213 131 The walls of the tank and the sealed joints must satisfy the mechanical resistance requirements listed in section 4.

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[1] Glass of types E and C is defined in Table 1.

213 132 The internal surface layer of the walls must be resistant to the lasting effects of the substance to be carried. This layer must be made of reinforced resin having a minimum thickness of 1 mm. The fibres used must not reduce the chemical resistance of the layer. The inner part of the layer must be rich in resins and must have a minimum thickness of 0,2 mm.

The requirements detailed in marginals 213 140 (6) and 213 142 (2) of section 4 must be satisfied.

213 133 The finished walls must satisfy the requirements detailed in marginal 213 140 (3) of section 4.

213 134 The minimum thickness of the wall shall be

— 3,5 mm if the capacity of the tank does not exceed 3 m^3;

— 5,0 mm if the capacity of the tank is more than 3 m^3.

213 135-
213 139

SECTION 4

TEST METHODS AND QUALITIES REQUIRED

Tests and qualities required for materials for the prototype tank

213 140 (1) Taking of specimens

The specimens required for the test must wherever possible be taken from the walls of the tank. For this purpose cut-out parts resulting from the making of apertures, etc. may be used.

(2) Percentage of glass fibre

The test must be conducted in accordance with the methods prescribed in ISO Recommendation R1172 1970.

The fiberglass content of the specimen must be higher than 25 % and lower than 75 % by mass.

(3) Degree of polymerization

(a) Wall in polyester resins

The residual styrene content may not be higher than 2 %, calculated on the total quantity of resins. The test shall be conducted in accordance with a suitable method (1).

(b) Wall in epoxide resins

The acetone extract may not be higher than 2 % calculated on the total quantity of resins. The test shall be conducted in accordance with a suitable method (2).

(4) Bending and tensile strength

The mechanical properties must be determined:

— for the shell, in the axial and circumferential directions;

— for the ends and walls of compartments, in any direction.

If the principal directions of the reinforcement do not coincide with the axial and circumferential directions (for example in the case of biaxial winding), the strength must be determined in the principal directions of the reinforcement and calculated for the axial and circumferential directions by applying the following formulae:

(1) The method prescribed in standard DIN 16945 of June 1969, paragraph 6.4.3 is regarded as suitable.
(2) The method prescribed in standard DIN 16945 of June 1969, paragraph 6.4.2 is regarded as suitable.

213 140 (cont'd)

Tensile:

$\sigma_{T,c} = 2\sigma_{T,H} \sin^2\alpha$ T = tensile
c = circumferential
$\sigma_{T,a} = 2\sigma_{T,H} \cos^2\alpha$ a = axial

Bending:

$\sigma_{F,c} = 2\sigma_{F,H} \sin^2\alpha$ H = helicoidal
F = bending
$\sigma_{F,a} = 2\sigma_{F,H} \cos^2\alpha$ a = preferential winding angle

The tensile strength must be tested in accordance with the methods prescribed in document ISO/TC61/WG2/TG 'Tests of glass reinforced plastics' No 4 of February 1971.

The bending strength must be tested in accordance with the methods prescribed in Recommendation ISO/TC61 No 1540 of April 1970.

Requirements:

New tanks must meet the following safety factors against rupture:

safety factor for static loading: 7,5

safety factor for dynamic loading: 5,5

The acceleration values to be applied in computing the dynamic load are as follows:

2 g in direction of travel;

1 g at right angles to direction of travel;

1 g vertically upwards; and

2 g vertically downwards.

As the characteristics of a reinforced plastics laminate may vary according to its structure, minimum values are not prescribed for bending and tensile strength but for loads:

$A = e\,\sigma_T$ where σ_T is the tensile strength at break;

$B = e^2\,\sigma_F$ where σ_F is the bending strength at break;

where e is the thickness of the wall.

The minimum values for forces A and B are:

For bending:

Capacity of tank $\leq 3\ m^3$

— circumferential direction B = 600 daN

— axial direction B = 300 daN

Capacity of tank $> 3\ m^3$

— circumferential direction B = 600 daN

— axial direction B = 600 daN

For tensile:

— circumferential direction A = 100 daN/mm

— axial direction A = 70 daN/mm

Module E on bending is measured at – 40 °C and at + 60 °C. The two values may not differ by more than 30 % from the value obtained at 20 °C. Behaviour of wall material during a tensile test lasting more than 1 000 hours.

213 140 *(cont'd)*

The test tension is:

The test tension is: $\frac{\sigma T}{7,5}$

During the test the factor $K = \frac{\varepsilon_{1\,000}}{\varepsilon_o}$ may not be higher than 1,6.

ε_o = elongation of loaded speciment at beginning of test.

$\varepsilon_{1\,000}$ = elongation of loaded speciment at end of test.

(5) Impact behaviour

(a) *Nature of test*

Impact behaviour is determined on a sample of laminate corresponding to the structural material used for the construction of the tank. The test is carried out by dropping a 5 kg steel mass onto the surface of the laminate corresponding to the external surface of the tank.

(b) *Apparatus*

The apparatus consists of a 5 kg steel mass, a guidance device for this mass and a specimen-bearing chassis. A general diagram of the apparatus is given in figure 1. The mass is in the form of a steel cylinder provided with two guide channels, the lower extremity being spherically shaped, 90 mm diameter. The guidance device is fitted vertically to a wall.

The specimen-bearer is composed of two angle-bars of 100 × 100 × 25 mm and 300 mm long, welded to a 400 × 400 mm metal support. The gap between the two bars is 175 mm. The specimen-bearer, fixed to the ground, is provided with a 50 mm deep cavity to allow flexion of the specimen.

(c) *Preparation of specimens*

From the sample, three specimens are taken, each measuring 200 × 200 mm × thickness of the sample.

(d) *Operating method*

The specimen is placed symmetrically on the specimen-bearer; if possible it rests on the support following two basic straight lines of the surface, in such a way that the mass strikes the centre of the face of the specimen corresponding to the external surface of the tank.

The mass is allowed to fall from a determined height, care being taken to ensure that it does not rebound and strike the specimen a second time.

The test must be conducted at ambient temperature.

The height to which the mass is raised in the guidance device is noted.

The other two specimens are tested in the same way.

(e) *Requirement*

The drop height for a 5 kg mass shall be 1 metre; the specimen must not allow leakage of more than 1 litre per 24 hours when subjected to a column of water of 1 m.

(6) Resistance to chemical agents

Flat reinforced plastics test plates, prepared in the laboratory, are subjected to attack by the dangerous substance at a temperature of 50 °C for 30 days in accordance with the following procedure:

(a) *Description of the test apparatus (shown in figure 2)*

The test apparatus comprises a glass cylinder, diameter 140 × 150 mm, 150 mm high with two nozzles positioned at 135° one fitted with an NS 29 joint to take an intermediate pipe for a reflux condenser (1), the other nozzle fitted with an NS 14,5 joint to take a thermometer (2), an intermediate pipe for a reflux condenser and a reflux condenser not shown in the diagram. The glass part of the apparatus shall be in glass resistant to changes of temperature.

213 140 *(cont'd)* The specimens taken from the test plates form the base and the top of the glass cylinder. They are sealed to the sides of the cylinder by a PTFE collar. The cylinder with the two specimens is clamped between two pressure plates in corrosion-resistant steel with six threaded bolts tightened by means of wing nuts. An asbestos washer must be placed between the pressure plates and the specimens. These washers are not shown in figure 2. Heating is effected from outside by means of an automatically controlled sleeve heater. The temperature is measured in the chamber containing the liquid.

(b) *Operation of the test apparatus*

The test apparatus allows only flat plates of uniform thickness to be tested. The test plates should, if possible, be 4 mm thick. Should these plates be covered with a gel coating, they must be tested in condition as for practical use. Six hexagonal specimens, each side measuring 100 mm, are cut from the test plate.

For each test, three speciments are prepared per apparatus. One of these samples is used as a reference and the other two are used for checking in the liquid zone, and vapour zone of the device respectively.

(c) *Test procedure*

The specimens to be tested are placed on the apparatus with the surface which may be gel-coated facing inwards. 1 200 ml of test liquid is poured into the glass cylinder. The apparatus is then heated to the test temperature. A constant temperature is maintained during the test. After the test the apparatus is cooled to the ambient temperature and the test liquid removed. The specimens tested are immediately washed with distilled water. Liquids which are not soluble in water are removed with a solvent which does not attack the specimens. Mechanical cleaning of the plates cannot be performed because of the danger of damaging the surface of the specimens.

(d) *Evaluation*

A visual examination is made:

— if the visual examination reveals excessive attack (cracks, bubbles, pores, peeling off, swelling, or roughness), the test is conclusive negatively;

— if the visual examination reveals no abnormality, bending tests are made by the methods specified in marginal 213 140 (4) on the two specimens subjected to chemical attack and on the reference specimen. In this case the bending strength shall not be more than 20 % lower than the value ascertained for the test plate not subjected to any stress.

Test and quality required for the prototype unit

213 141 The prototype tank shall be subjected to a hydraulic pressure test conducted by an expert approved by the competent authorities of a Member State.

If the prototype tank is divided into compartments either by bulkheads or by baffle plates, the test shall be conducted on a unit made for this purpose with the same external ends as the entire tank and which represents the part of the tank subjected, under normal conditions of use, to the greatest stresses.

This test should not be conducted if there has already been a successful test on another prototype unit of the same section or a section with larger dimensions, geometrically similar to that of the prototype unit in question, even if that unit has a different internal surface layer.

This test must demonstrate that the prototype unit has, under normal conditions of use, a factor of not less than 7,5 so far as rupture is concerned.

It must be proved, e.g. by calculation, that safety factors against fracture given in marginal 213 140 (4) are complied with for each section of the tank.

Rupture occurs when the test liquid escapes from the tank in the form of jets. Consequently, before this rupture, the presence of delaminations and losses of liquid through these delaminations in the form of droplets is permitted.

213 141 *(cont'd)* The prototype unit shall be submitted to a hydraulic pressure.

$H = 7,5 \times d \times h$

where H is the height of the column of water;

h is the height of the tank;

d is the density of the substance to be carried.

If a rupture occurs with a water-column height H_1 less than H, there must still be

$H_1 \leq 7,5 \times d \times (h\text{-}h_1)$

where h_1 is the height of the highest point where the first jet of liquid appears.

Should the flow of liquid at point h_1 be too great, it is essential to make a temporary repair and temporary local strengthening to enable the test to continue to height H.

Conformity check on tanks produced in series

213 142 (1) The inspection of conformity on tanks produced in series shall be carried out by conducting one or more of the tests listed in marginal 213 140. However, the measurement of the degree of polymerization is replaced by Barcol hardness measurement.

(2) Barcol hardness

The test must be conducted in accordance with suitable procedures [1]. Barcol hardness measured on the internal surface of the finished tank shall not be less than 75 % of the value obtained in the laboratory on pure hardened resin.

(3) The percentage of glass fibre must be within the limits prescribed in marginal 213 140 (2) and, in addition, must not deviate by more than 10 % of the figure for the prototype tank.

Tests and qualities required for all tanks before being put into service

213 143 **Leakproofness test**

The leakproofness test shall be conducted in accordance with the provisions of marginals 211 150, 211 151 and 211 152 and the expert's stamp shall be applied to the tank.

213 144-
213 149

SECTION 5

SPECIAL PROVISIONS FOR TANKS USED FOR THE CARRIAGE OF SUBSTANCES WITH A FLASH-POINT OF 55 °C OR LOWER

213 150 The tank must be constructed so as to ensure the elimination of static electricity from the various component parts so as to avoid the accumulation of dangerous electric charges.

213 151 All metal parts of the tank and the transport unit and also wall layers conducting electricity must be interconnected.

[1] The procedures prescribed in standard ASTM-D 2583-67 are regarded as suitable.

213 152 The resistance between each conducting part and the chassis must not be higher than 10^6 ohms.

Elimination of hazards due to charges generated by friction

213 153 The surface resistance and the discharge resistance to earth of the entire surface of the tank shall conform with the requirements of marginal 213 154.

213 154 The surface resistance and discharge resistance to earth measured in accordance with marginal 213 155 must satisfy the following requirements.

(1) Walls not equipped with electrically conducting elements:

(a) Surfaces upon which one can walk:

the discharge resistance to earth shall not be higher than 10^8 ohms.

(b) Other surfaces:

the surface resistance shall not be higher than 10^9 ohms.

(2) Walls equipped with electrically conducting elements:

(a) Surfaces on which one can walk:

the discharge resistance to earth shall not be higher than 10^8 ohms.

(b) Other surfaces:

conductance shall be considered as sufficient if the maximum thickness of non-conducting layers on conducting elements, for example conducting sheets, metal netting or other appropriate material, connected to the earthing connexion, does not exceed 2 mm, and that, in the case of a metal netting, the surface area of the mesh does not exceed 64 cm^2.

(3) Any measurement of surface resistance or discharge resistance to earth must be carried out on the tank itself shall be replaced at intervals of not more than one year to ensure that the specified resistances are not exceeded.

Test methods

213 155 (1) Surface resistance (R_{100}) — (insulating resistance) in ohms, electrodes of conducting paint in accordance with figure 3 of Recommendation IEC 167 of 1964, measured in the standard 23/50 atmosphere according to Recommendation ISO R291, paragraph 3.1, of 1963.

(2) The discharge resistance to earth in ohms is the ratio between the direct voltage measured between an electrode described below in contact with the surface of the tank of the vehicle and the earthed chassis of the vehicle, and the total current.

The conditioning of the specimens is the same as in paragraph 1. The electrode is a disc with a surface area of 20 cm^2 and a diameter of 50 mm. Its close contact with the surface of the tank must be ensured, for example by using damp paper or a damp sponge or any other suitable substance. The earthed chassis of the vehicle is used as the other electrode. A direct voltage in the range of 100 volts-500 volts shall be applied. The measurement shall be carried out after the test voltage has been applied for one minute. The electrode may be placed on any point of the internal or external surface of the tank.

If measuring is impossible on the tank, it may also be carried out, under the same conditions, in the laboratory, on a specimen of the material.

Elimination of hazards due to charges generated during filling

213 156 Metallic components bonded to earth shall be provided and so disposed that at any stage of the filling or emptying process there is an area of not less than 0,04 sq. metres of earthed metal in contact with the product per cubic metre of product contained in the tank at that instant, and that no part of the product shall be more than 2,0 metres from the nearest earthed metal component. Such metallic components may take the form of:

(a) A metal foot valve, pipe outlet, or plate provided the total area of metal in contact with the liquid is not less than that specified, or

(b) A metallic grill with wire thickness not less than 1 mm diameter and hole area not greater than 4 sq. centimetres, provided that the total area of the grill in contact with the liquid is not less than that specified.

213 157 Marginal 213 156 shall not apply to reinforced-plastics tanks equipped with any other system for eliminating the hazard from charges generated during filling, provided it has been demonstrated by a practical comparative test in accordance with marginal 213 158 that the relaxation time of the charge generated within the tank during filling is equivalent to that obtained for a metal tank of comparable dimensions.

Comparative test

213 158 (1) A comparative test of the electrostatic charge relaxation time in accordance with the conditions of test described in paragraph (2) shall be carried out on a prototype reinforced-plastics tank and steel tank in the following manner (see figure 3).

(a) The reinforced-plastics tank shall be mounted in the same manner as it would be in use, for example, on a steel support simulating a vehicle's chassis, and shall be filled to not less than 75 % capacity with automotive diesel fuel, a proportion of which is passed through a suitable microfilter in such a manner that the charge density of the total flow is approximately 100 $\mu C/m^3$.

(b) The field strength in the tank vapour space shall be measured by a suitable continuous reading field meter mounted with its axis vertical and placed at least 20 cm from the vertical fill pipe.

(c) A similar test shall be carried out on a steel tank whose width, length, breadth, and volume are within 15 % of those of the reinforced-plastics tank, or on a reinforced-plastics tank of similar dimensions, coated internally with metal foil connected to earth.

(2) The following conditions of test shall be met:

(a) The test shall be carried out in a covered area in conditions of relative humidity less than 80 %.

(b) The automotive diesel fuel used in the test shall have a residual conductivity at the temperature of measurement between 3 and 5 pS/m. This shall be measured in a cell in which

$$\frac{VT}{d^2} \text{ is less than or equal to } 2{,}5 \times 10^6$$

Where V = applied voltage

d = spacing between electrodes in metres

T = duration of measurement in seconds

The residual conductivity measured on samples of the product taken from the test tank after filling shall not differ in successive tests on plastics and metal tanks by more than 0,5 pS/m.

213 158 *(cont'd)*

(c) Filling shall be at a constant rate within the range 1 to 2 m^3/min and shall be the same for the reinforced-plastics tank and for the steel tank. At the end of filling, the flow should be stopped in a time which is shorter than the relaxation time for the charge in the steel tank.

(d) The charge density shall be measured by a suitable continuous reading field meter (for example, a field mill type) immersed in the product and placed as close as possible to the filling pipe.

(e) The supply pipes and the vertical filling pipe shall be of 10 cm internal diameter and shall terminate in a 'T' type filling pipe outlet.

(f) A suitable microfilter [1], with an adjustable by-pass enabling the proportion of flow passing through it to be regulated, shall be fitted not more than 5 m from the filling pipe outlet.

(g) The liquid level shall not reach the bottom of the filling pipe or the field meter.

Comparison of relaxation times

(3) The initial value of the field strength shall be that recorded at the earliest point of time after the cessation of flow of the fuel when a smooth decay curve has been established. The relaxation time in both tests shall be expressed as the time taken for the field strength to decay from the initial value to 37 % of the initial value.

(4) The relaxation time of the reinforced-plastics tank shall not exceed that of the steel tank.

213 159-
213 999

TABLE 1

Composition of glass

Glass E: Composition by mass:		
Silica	(SiO_2)	52 to 55 %
Alumina	(Al_2O_3)	14 to 15,5 %
Lime	(CaO)	16,5 to 18 %
Magnesia	(MgO)	4 to 5,5 %
Boric oxide	(B_2O_3)	6,5 to 21 %
Fluorine	(F)	0,2 to 0,6 %
Ferric oxide	(Fe_2O_3)	< 1 %
Titanium oxide	(TiO_2)	< 1 %
Alkaline oxides	($Na_2O + K_2O$)	< 1 %

Glass C: Composition by mass:		
Silica	(SiO_2)	63,5 to 65 %
Aluminina	(Al_2O_3)	4 to 4,5 %
Lime	(CaO)	14 to 14,5 %
Magnesia	(MgO)	2,5 to 3 %
Boric oxide	(B_2O_3)	5 to 6,5 %
Iron	(Fe_2O_3)	0,3 %
Sodium oxide	(Na_2O)	7 to 9 %
Potassium oxide	(K_2O)	0,7 to 1 %

[1] A Rellumit 5 has been found to be suitable.

Figure 1

Device for measuring impact resistance by means of a spherically-ended falling weight

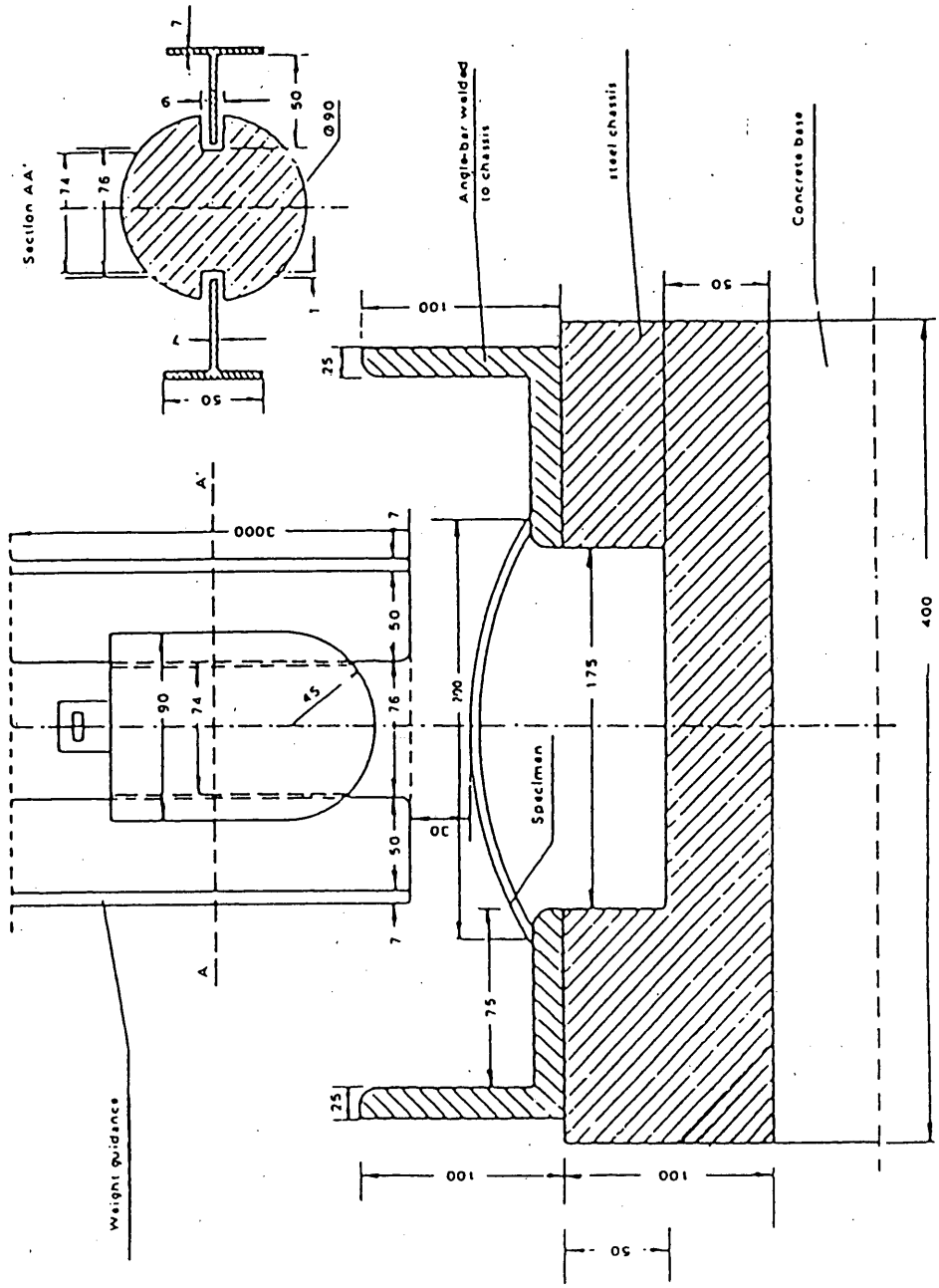


Figure 2

Device to test resistance to chemical agents

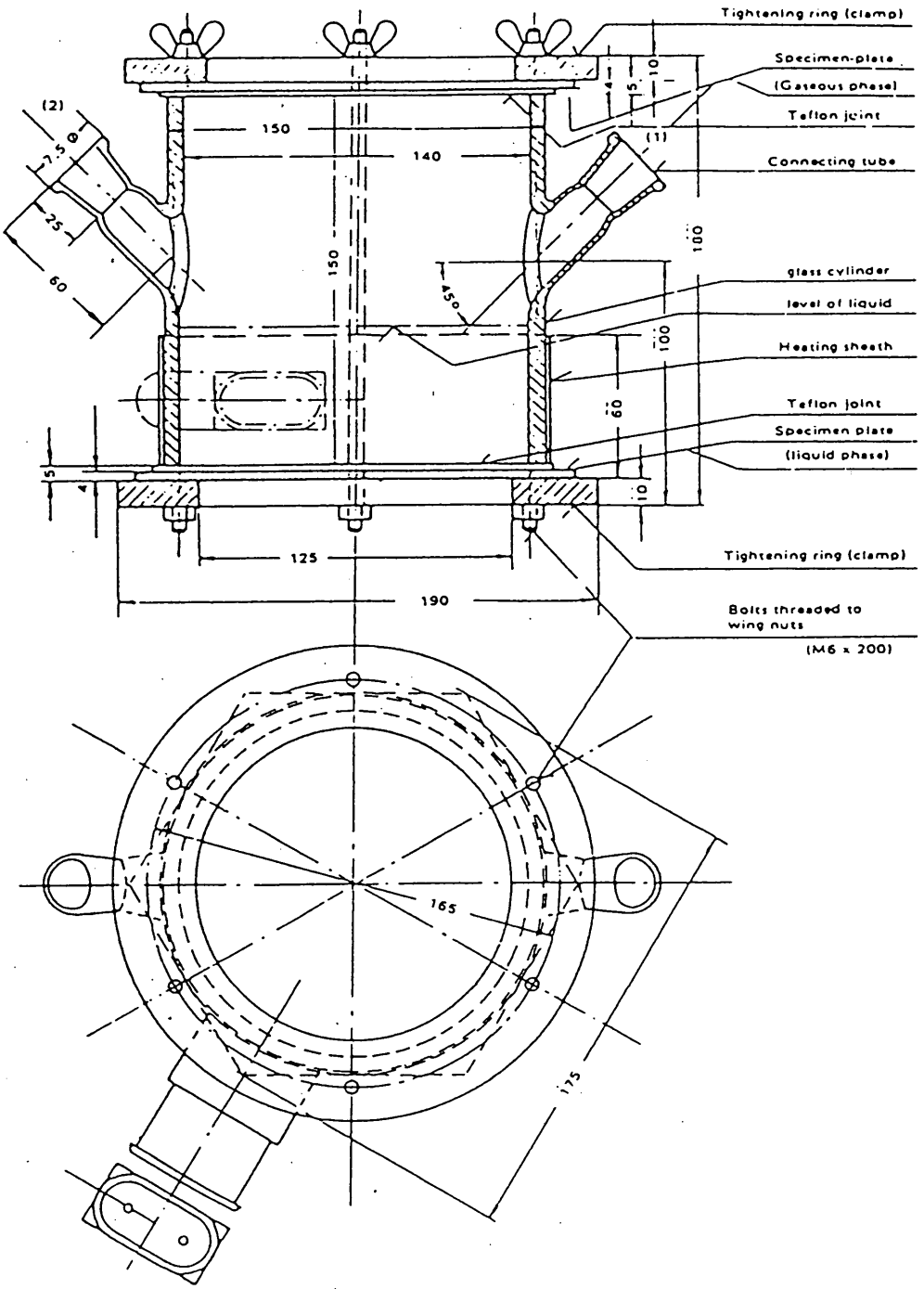
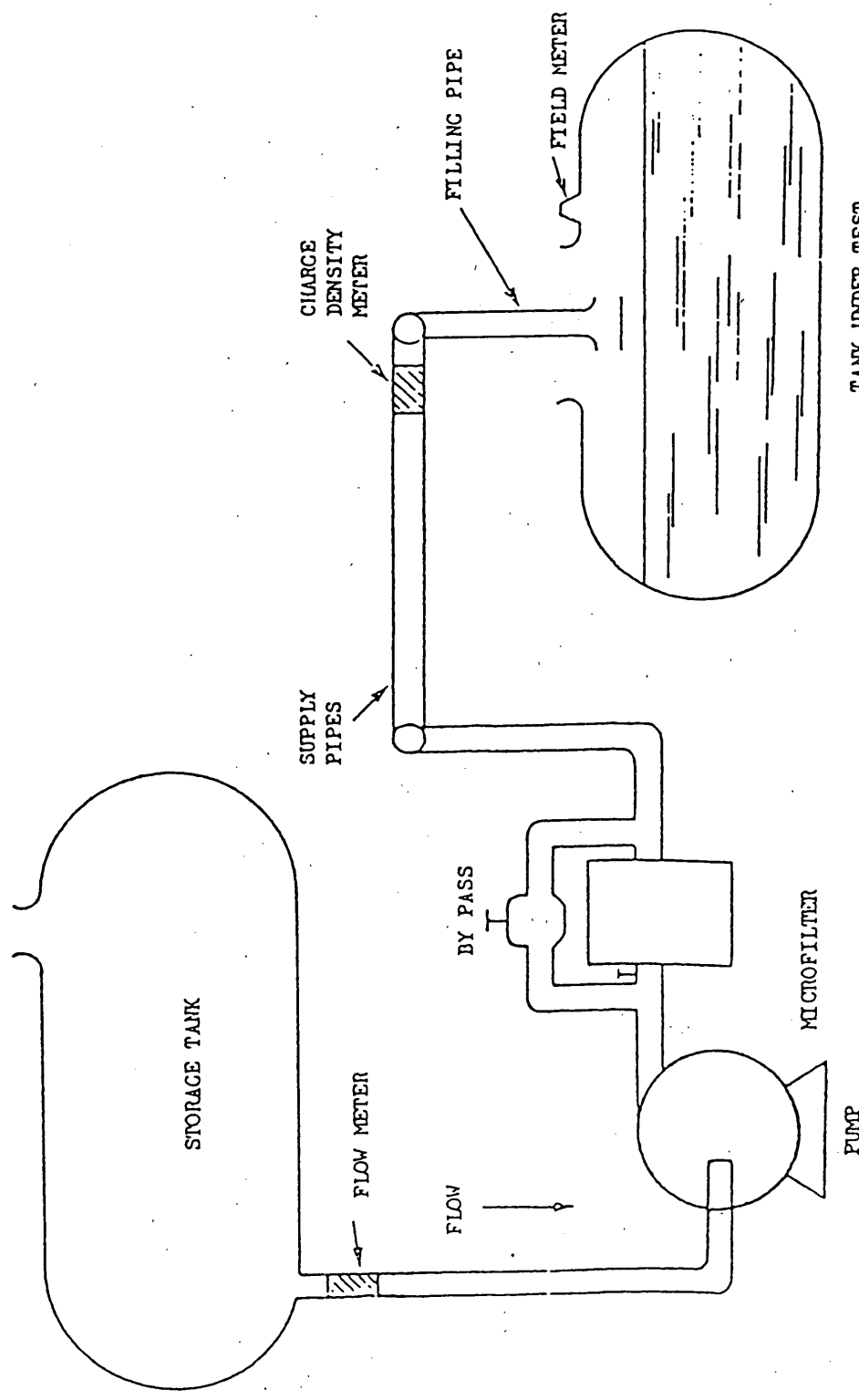


Figure 3

Schematic layout of RIC for comparative test



APPENDIX B.1d

REQUIREMENTS CONCERNING THE MATERIALS AND CONSTRUCTION OF FIXED WELDED TANKS, DEMOUNTABLE WELDED TANKS, AND WELDED SHELLS OF TANK-CONTAINERS FOR WHICH A TEST PRESSURE OF NOT LESS THAN 1 MPa (10 BAR) IS REQUIRED, AND OF FIXED WELDED TANKS, DEMOUNTABLE WELDED TANKS AND WELDED SHELLS OF TANK-CONTAINERS INTENDED FOR THE CARRIAGE OF DEEPLY-REFRIGERATED LIQUEFIED GASES OF CLASS 2

214 000-
214 249

1. Materials and shells

214 250 (1) Shells intended for the carriage of substances of Class 2, 1° to 6° and 9°, Class 4.2, 6° (a), 17° (a), 19° (a) and 31° (a) to 33° (a) or Class 8, 6°, shall be made of steel.

(2) For shells constructed of fine-grained steels for the carriage of:

— ammonia of marginal 2201, 3° (at) and 9° (at),

— other substances of Class 2 whose names in marginal 2201 are followed by the word '(corrosive)', and

— substances of marginal 2801, 6°,

the steel shall have a guaranteed yield strength of not more than 460 N/mm^2 and a maximum ultimate tensile strength of 725 N/mm^2. Such shells shall be heat-treated for thermal stress relief.

(3) Shells intended for the carriage of deeply-refrigerated liquefied gases of Class 2 shall be made of steel, aluminium, aluminium alloy, copper or copper alloy, e.g., brass. However, shells made of copper or copper alloy shall be allowed only for gases containing no acetylene; ethylene, however, may contain not more than 0,005 % acetylene.

(4) Only materials appropriate to the lowest and highest working temperatures of the shells and of their fittings and accessories may be used.

214 251 The following materials shall be allowed for the manufacture of shells:

(a) steels not subject to brittle fracture at the lowest working temperature (see marginal 214 265), the following may be used:

1. mild steels (except for gases of marginal 2201, 7° and 8°);
2. fine-grained unalloyed steels, down to a temperature of – 60 °C;
3. nickel steels (with a nickel content of 0,5 to 9 %), down to a temperature of – 196 °C, depending on the nickel content;
4. austenitic chrome-nickel steels, down to a temperature of – 270 °C;

(b) aluminium not less than 99,5 % pure, or aluminium alloys (see marginal 214 266);

(c) deoxidized copper not less than 99,9 % pure, or copper alloys having a copper content of over 56 % (see marginal 214 267).

214 252 (1) Shells made of steel, aluminium or aluminium alloys shall be either seamless or welded.

(2) Shells made of austenitic steel, copper or copper alloys may be hard-soldered.

214 253 The fittings and accessories may either be screwed to the shells or be secured thereto as follows:

(a) shells made of steel, aluminium or aluminium alloy: by welding;

(b) shells made of austenitic steel, of copper or of copper alloy: by welding or hard-soldering.

214 254 The construction of shells and their attachment to the vehicle, to the underframe or in the container frame shall be such as to preclude with certainty any such reduction in the temperature of the load-bearing components as would be likely to render them brittle. The means of attachment of shells shall themselves be so designed that even when the shell is at its lowest working temperature they still possess the necessary mechanical properties.

214 255-
214 264

2. Test requirements

(a) Steel shells

214 265 The materials used for the manufacture of shells and the weld beads shall, at their lowest working temperature, but at least at – 20 °C, meet at least the following requirements as to impact strength.

The tests shall be carried out with test-pieces having a V-shaped notch.

The minimum impact strength (see marginals 214 275 to 214 277) for test-pieces with their longitudinal axis at right angles to the direction of rolling and a V-shaped notch (conforming to ISO R 148) perpendicular to the plate surface, shall be 34 J/cm² for mild steel (which, because of existing ISO standards, may be tested with test-pieces having the longitudinal axis in the direction of rolling); fine-grained steel; ferritic alloy steel Ni < 5 %, ferritic alloy steel 5 % ≤ Ni ≤ 9 %; or austenitic Cr - Ni steel.

In the case of austenitic steels, only the weld bead need be subjected to an impact-strength test.

For working temperatures below – 196 °C the impact-strength test is not performed at the lowest working temperature, but at – 196 °C.

(b) Shells made of aluminium or aluminium alloy

214 266 The seams of shells shall meet the requirements laid down by the competent authority.

(c) Shells made of copper or copper alloy

214 267 It is not necessary to carry out tests to determine whether the impact strength is adequate.

214 268-
214 274

3. Test methods

(a) Impact-strength tests

214 275 For sheets less than 10 mm but not less than 5 mm thick, test-pieces having a cross-section of 10 mm × e mm, where 'e' represents the thickness of the sheet, shall be used. Machining to 7,5 mm or 5 mm is permitted if it is necessary. The minimum value of 34 J/cm² shall be required in every case.

Note: No impact-strength test shall be carried out on sheets less than 5 mm thick, or on their weld seams.

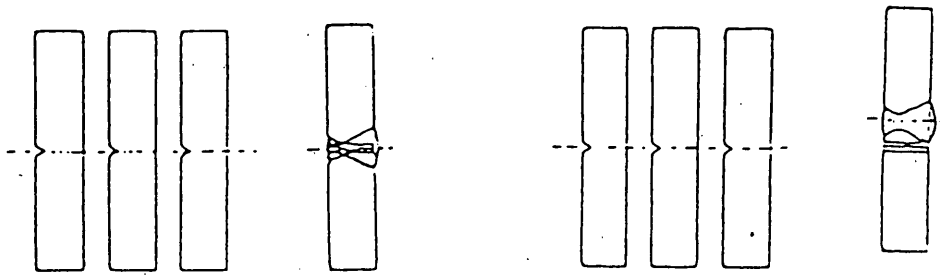
214 276 (1) For the purpose of testing sheets, the impact strength shall be determined on three test-pieces. Test-pieces shall be taken at right angles to the direction of rolling; however, for mild steel they may be taken in the direction of rolling.

(2) For testing weld seams the test-pieces shall be taken as follows:

when e ≤ 10 mm:

three test-pieces with the notch at the centre of the weld;

214 276 *(cont'd)* three test-pieces with the notch in the centre of the heat affected zone; (the V-notch to cross the fusion boundary at the centre of the specimen)

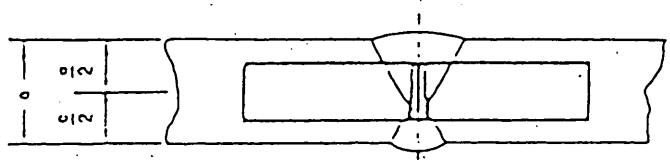


Centre of weld Heat affected zone

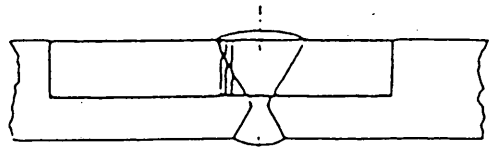
when 10 mm < e ≤ 20 mm:

three test-pieces from the centre of the weld;

three test-pieces from the heat affected zone; (the V-notch to cross the fusion boundary at the centre of the specimen)



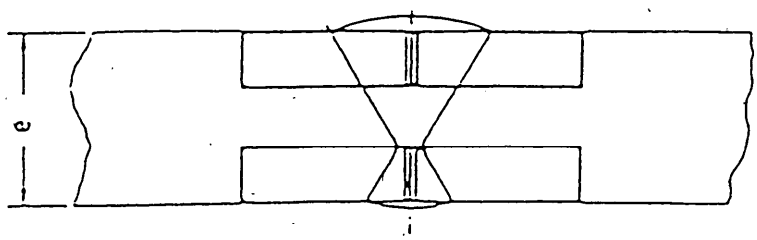
Centre of weld



Heat affected zone

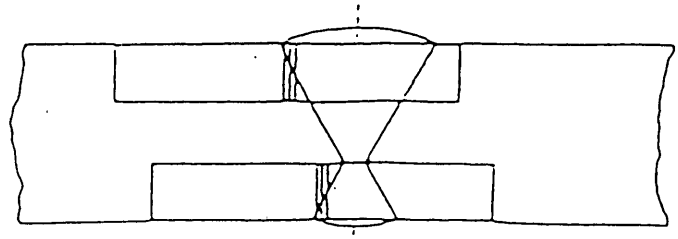
when e > 20 mm:

two sets of three test-pieces, one set on the upper face, one set on the lower face at each of the ponts indicated below (the V-notch to cross the fusion boundary at the centre of the specimen for those taken from the heat affected zone)



Centre of weld

214 276
(cont'd)



Heat affected zone

214 277 (1) For sheets, the average of the three tests shall meet the minimum value of 34 J/cm² indicated in marginal 214 265; not more than one of the individual values may be below the minimum value and then not below 24 J/cm².

(2) For welds, the average value obtained from the three test-pieces taken at the centre of the weld shall not be below the minimum value of 34 J/cm²; not more than one of the individual values may be below the minimum value and then not below 24 J/cm².

(3) For the heat affected zone (the V-notch to cross the fusion boundary at the centre of the specimen) the value obtained from not more than one of the three test-pieces may be below the minimum value of 34 J/cm², though not below 24 J/cm².

214 278 If the requirements prescribed in marginal 214 277 are not met, one retest only may be done if:

(a) the average value of the first three tests is below the minimum value of 34 J/cm², or

(b) more than one of the individual values is less than the minimum value of 34 J/cm² but not below 24 J/cm².

214 279 In a repeated impact test on sheets or welds, none of the individual values may be below 34 J/cm². The average value of all the results of the original test and of the retest should be equal to or more than the minimum of 34 J/cm².

On a repeated impact-strength test on the heat-affected zone, none of the individual values may be below 34 J/cm².

214 280-
219 999

APPENDIX B.2

UNIFORM PROVISIONS CONCERNING THE CONSTRUCTION OF VEHICLES INTENDED FOR THE CARRIAGE OF DANGEROUS GOODS INCLUDING PROVISIONS FOR THEIR TYPE APPROVAL WHERE APPROPRIATE

220 000-
220 099

SECTION 1

SCOPE

220 100 (1) The provisions of this Appendix apply to the construction of base vehicles of motor vehicles and their trailers intended for the carriage of dangerous goods, which are subject to approval according to marginals 10 282, 11 282, 10 283, and to 'type II' transport units according to marginal 11 204(2), and to their type approval.

220 100 *(cont'd)* (2) For the type-approval of a vehicle type in accordance with marginal 10 281, all sections of this Appendix shall apply.

(3) In the case of single vehicles which have not been subject to the type-approval procedure in accordance with marginal 10 281, only the provisions of section 5 of this Appendix apply.

220 101-
220 199

SECTION 2

DEFINITIONS

220 200 For the purpose of this Appendix:

(1) '*Vehicle*' means a chassis-cab vehicle, a tractor for semi-trailer or a trailer-chassis or a trailer with a self-supporting body intended for the transport of dangerous goods;

(2) '*Vehicle type*' means vehicles which do not differ essentially with regard to the constructional features specified in this Appendix.

220 201
220 299

SECTION 3

APPLICATION FOR TYPE-APPROVAL

220 300 The application for type-approval of a vehicle type with regard to its specific constructional features shall be submitted by the vehicle manufacturer or by his duly accredited representative.

220 301 The application for type-approval shall be accompanied by the under-mentioned documents in triplicate and by the following particulars:

(1) a detailed description of the vehicle type with respect to its relevant structure, engine (compression-ignition, positive-ignition), dimensions, configuration and constituent materials;

(2) the type of vehicle according to the dangerous goods which the vehicle is intended to transport, i.e.:

Type EX/II for vehicles intended for the carriage of explosives as type II transport units (see marginal 11 204);

Type EX/III for vehicles intended for the carriage of explosives as type III transport units (see marginal 11 204);

Type FL for vehicles intended for the carriage of liquids with a flashpoint of not more than 61 °C or flammable gases, in fixed tanks, demountable tanks or batteries of receptacles;

Type OX for vehicles intended for the carriage of substances of class 5.1, marginal 2501, item 1°(a), in fixed tanks, demountable tanks or batteries of receptacles;

Type AT for vehicles intended for the carriage of dangerous goods in tankcontainers with a capacity of more than 3 000 litres, or vehicles other than those of types EX/II, EX/III, FL or OX intended for the carriage of dangerous goods in fixed tanks, demountable tanks or batteries of receptacles;

(3) drawings of the vehicle; and

(4) particulars of:

(a) the technical maximum mass (kg);

(b) the type(s) of endurance braking system(s).

220 302 A vehicle representative of the type to be approved shall be submitted to the technical service responsible for conducting the approval tests.

220 303 The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

220 304-
220 399

SECTION 4

TYPE-APPROVAL

220 400 If the vehicle submitted for approval pursuant to this Appendix meets the provisions of Section 5 below, approval of that vehicle type shall be granted.

220 401 An approval number shall be assigned to each type approved. Its first two digits (00 for the Appendix in its present form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the provisions at the time of issue of the approval. The same Member State may not assign the same number to another vehicle type within the meaning of marginal 220 200 (2) above.

220 402 Notice of approval or of extension of approval of a vehicle type pursuant to this Appendix shall be communicated to the Member States by means of a form conforming to the model reproduced in marginal 221 000.

220 403 There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Appendix an international approval mark consisting of:

(1) a circle surrounding the letters 'ADR' followed by the distinguishing number of the State which has granted approval [1];

(2) the approval number to the right of the circle prescribed in paragraph (1); and

(3) an additional symbol separated from the approval number and consisting of the symbol identifying the vehicle type approved in accordance with marginal 220 301(2).

220 404 The approval mark shall be clearly legible and be indelible.

220 405 The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.

220 406-
220 499

SECTION 5

TECHNICAL PROVISIONS

220 500 Motor vehicles and trailers intended for use as transport units for dangerous goods shall, depending on their category and type, comply with the following provisions according to the table below.

[1] 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (free), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 (reserved), 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 and 30 (reserved), 31 for Bosnia Herzegovina.

220 500 *(cont'd)*

	Technical specifications	Type of vehicle according to marginal 220 301 (2)				
		EX/II	EX/III	AT	FL	OX
220 510	**Electrical equipment**					
220 511	— wiring		X	X	X	X
220 512	— battery master switch		X		X	
220 513	— batteries	X	X		X	
220 514	— tachographs		X		X	
220 515	— permanently energized installations		X		X	
220 516	— electrical installation behind cab		X		X	
220 520	**Braking**					
220 521	— Anti-lock		X	X	X	X
220 522	— endurance		X	X	X	X
220 530	**Fire risks**					
220 531	— cab: materials	X	X			
	— cab: thermal shield					X
220 532	— fuel tanks	X	X		X	X
220 533	— engine	X	X		X	X
220 534	— exhaust system	X	X		X	
220 535	— endurance braking system		X	X	X	X
220 536	— auxiliary heating	X	X			
220 540	**Speed limitation**	X	X	X	X	X

220 501-
220 509

ELECTRICAL EQUIPMENT

General provisions

220 510 The electrical installation as a whole shall meet the provisions of marginal 220 511 to 220 515 in accordance with the table of marginal 220 500.

Wiring

220 511 (1) The size of conductors shall be large enough to avoid overheating. Conductors shall be adequately insulated. All circuits shall be protected by fuses or automatic circuit breakers, except for the following:

— from the battery to cold start and stopping systems of the engine;

— from the battery to the alternator;

— from the alternator to the fuse or circuit breaker box;

— from the battery to the starter motor;

— from the battery to the power control housing of the endurance braking system (see marginal 220 522 below), if this system is electrical or electromagnetic.

The above unprotected circuits shall be as short as possible.

(2) Cables shall be securely fastened and positioned in such a way that the conductors are adequately protected against mechanical and thermal stresses.

Battery master switch

220 512 (1) A switch for breaking the electrical circuits shall be placed as close to the battery as possible.

220 512 *(cont'd)* (2) Direct or indirect control devices shall be installed, one in the driver's cab and a second on the outside of the vehicle. They shall be readily accessible and distinctively marked. The control device located in the driver's cab shall be within immediate reach of the driver seated in the driver's seat. It shall be protected against inadvertent operation by either adding a protective cover, or by using a dual movement control device or by other suitable means.

(3) It shall be possible to open the switch while the engine is running, without causing any dangerous excess voltage. Operation of the switch shall not constitute a fire hazard in an explosive atmosphere; this can be ensured by using a switch having a casing with protection degree IP65 in accordance with IEC Standard 529.

(4) The cable connections on the battery master switch shall have a protection degree IP54. However, this does not apply if these connections are contained in a housing which may be the battery box. In this case it is sufficient to insulate the connections against short circuits, for example with a rubber cap.

Batteries

220 513 The battery terminals shall be electrically insulated or covered by the insulating battery box cover. If the batteries are not located under the engine bonnet, they shall be fitted in a vented box.

Tachographs

220 514 The electrical supply to the tachograph shall be provided via a safety barrier connected directly to the battery. The electrical supply leads to and from the tachograph, which remain energized when the battery master-switch is open, shall be intrinsically safe according to the requirements of European Standard EN 50 020. The tachograph and the safety barrier shall meet the requirements for associated electrical equipment according to European Standard EN 50 020.

Permanently energized installations

220 515 Those parts of the electrical installation, other than the tachograph, which remain energized when the battery master-switch is open, shall be suitable for use in a hazardous area and shall meet the appropriate requirements of European Standard EN 50 014 and one of European Standards EN 50 015 to 50 020 or EN 50 028. The requirements for the relevant gas group according to the product being carried shall be met.

Provisions concerning that part of the electrical installation situated to the rear of the driver's cab

220 516 The whole installation shall be so designed, constructed and protected such that it cannot provoke any ignition or short-circuit under normal conditions of use of vehicles and that these risks can be minimized in the event of an impact or deformation. In particular:

(1) *Wiring*

The wiring located behind the driver's cab shall be protected against impact, abrasion and chafing during normal vehicle operation. Examples of appropriate protection are given in the figures 1, 2, 3 and 4 below. However, the sensor cables of anti-lock braking devices do not need additional protection.

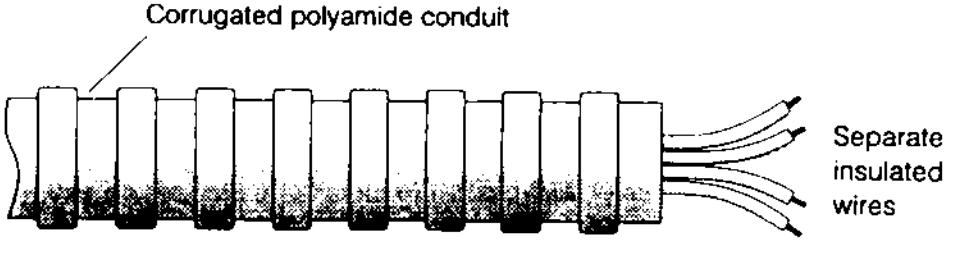


Figure No 1

220 516
(cont'd)

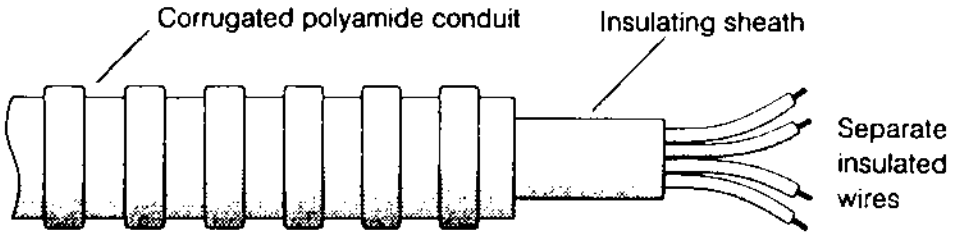


Figure No 2

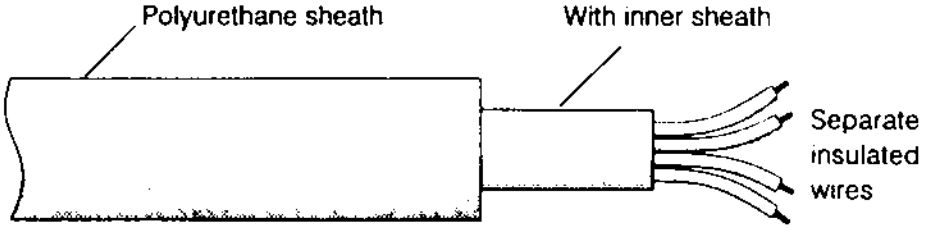


Figure No 3

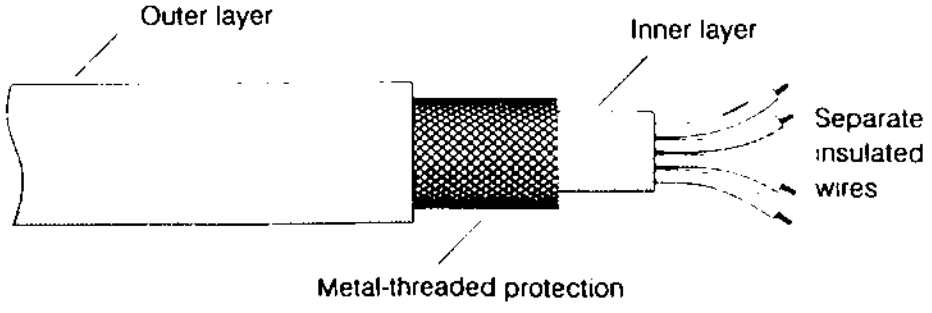


Figure No 4

(2) *Lighting*

Lamp bulbs with a screw cap shall not be used.

Electrical lifting mechanism

220 517 The electrical equipment of the mechanism for lifting a bogie axle shall be installed outside the chassis frame in a sealed housing.

220 518-
220 519

BRAKING EQUIPMENT

General provisions

220 520 In addition to the following technical provisions, to be applied in accordance with the table of marginal 220 500, motor vehicles and trailers intended for use as transport units for dangerous goods shall fulfil all relevant technical requirements of the ECE Regulation No 13 [1] or the Directive 71/320/EEC [1] their latest amended form applicable at the time of vehicle approval.

Anti-lock braking system

220 521 (1) Motor vehicles having a maximum mass exceeding 16 tonnes, or authorized to tow a trailer with a maximum mass exceeding 10 tonnes, shall be equipped with an anti-lock braking system of category 1 according to ECE Regulation No 13 [1], Annex 13, or to Directive 71/320/EEC [2].

(2) Trailers having a maximum mass exceeding 10 tonnes shall be equipped with an anti-lock braking system of category A according to ECE Regulation No 13 [1], Annex 13, or to Directive 71/320/EEC [2].

(3) Electrical connections between drawing vehicles and the trailers for the anti-lock system in the trailer shall be made by means of a connector conforming to ISO 7638:1985.

Endurance braking system

220 522 (1) Endurance braking system means a system intended to stabilize vehicle speed on a long descent, without the use of the service, secondary or parking braking systems.

(2) Motor vehicles having a maximum mass exceeding 16 tonnes or authorized to tow a trailer with a maximum mass exceeding 10 tonnes shall be fitted with an endurance braking system which complies with the following requirements:

(a) The endurance braking system may be a single device or a combination of several devices. Each device may have its own control.

(b) All three endurance braking control options provided for in ECE Regulation No 13 [1], , paragraph 2.14 or in Directive 71/320/EEC [2] shall be permitted, but, in the case of a failure of the anti-lock system, integrated or combined retarders shall be switched off automatically.

(c) The effectiveness of the endurance braking system shall be controlled by the anti-lock braking system such that the axle(s) braked by the endurance braking system cannot be locked by the endurance braking system at speeds above 15 km/h. However, this provision shall not apply to that part of the braking system constituted by natural engine braking.

(d) The endurance braking system shall comprise several stages of effectiveness, including a low stage appropriate for the unladen condition. Where the endurance braking system of a motor vehicle is constituted by its engine, the different gear ratios shall be considered to provide the different stages of effectiveness.

(e) The performance of the endurance braking system must be such that it fulfils the requirements of ECE Regulation No 13 [1], Annex 5 (Type II A test), or of the corresponding provisions in Directive 71/320/EEC [2], with a laden vehicle mass comprising the laden mass of the motor vehicle and its authorized maximum towed mass but not exceeding a total of 44 tonnes.

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[1] 'ECE Regulation No ...' means a regulation published as an addendum (in its latest amended form) to the Agreement concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts, done at Geneva on 20 March 1958.

[2] In its latest amended form (originally published in the Official Journal of the European Communities No L 202, 6. 9. 1971).

220 522 *(cont'd)* (f) If the motor vehicle does not fulfil the performance requirements for the endurance braking system as defined in paragraph (2) (e) above, it shall at least fulfil the requirements of ECE Regulation No 13 (1), Annex 5, or of the corresponding provisions in Directive 71/320/EEC (2), and shall be restricted to be coupled only to a trailer fitted with an endurance braking system. Such a motor vehicle must be fitted with a control device for the endurance braking system on the trailer.

(3) If a trailer is equipped with an endurance braking system it shall fulfil the requirements of ECE Regulation No 13 (1), Annex 5, or of the corresponding provisions in Directive 71/320/EEC (2), and the provisions of paragraphs (2) (a) to (2) (d) above.

220 523-
220 529

PREVENTION OF FIRE RISKS

General provisions

220 530 The following technical provisions shall apply in accordance with the table of marginal 220 500.

Vehicle cab

220 531 (1) Only material not readily flammable shall be used in the construction of the driver's cab. This provision will be deemed to be met if, in accordance with the procedure specified in ISO standard 3795:1989, samples of the following cab components have a burn rate not exceeding 100 mm/min: seat cushions, seat backs, safety belts, head lining, opening roofs, arm rests, all trim panels including door, front, rear, and side panels, compartment shelves, head restraints, floor coverings, sun visors, curtains, shades, wheel housing covers, engine compartment covers, mattress covers and any other interior materials, including padding and crash-deployed elements, that are designed to absorb energy on contact by occupants in the event of a crash.

(2) Unless the driver's cab is made of not readily flammable materials, a shield made of metal or other suitable material of the same width as the tank shall be fitted at the back of the cab. Any windows in the back of the cab or in the shield shall be hermetically closed and made of fire resistant safety glass with fire resistant frames. Furthermore, there shall be a clear space of not less than 15 cm between the tank and the cab or the shield.

Fuel tanks

220 532 The fuel tanks for supplying the engine of the vehicle shall meet the following requirements:

(1) The fuel tanks shall be so placed as to be protected as far as possible against any collision.

(2) In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load.

(3) Fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure with which the opening can be kept hermetically sealed.

(1) 'ECE Regulation No ...' means a regulation published as an addendum (in its latest amended form) to the Agreement concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts, done at Geneva on 20 March 1958.

(2) In its latest amended form (originally published in the Official Journal of the European Communities No L 202, 6. 9. 1971).

Engine

220 533 The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. In the case of transport of explosive substances or articles (vehicle types EX/II and EX/III) the engine shall be placed forward of the front wall of the body: it may nevertheless be placed under the body, provided this is done in such a way as to avoid any heating, even localized, of the load.

Exhaust sytem

220 534 The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield. In the case of transport of explosive substances or articles (vehicle types EX/II and EX/III) the exhaust system shall be placed forward of the front wall of the body or separated from the load-carrying part of the vehicle by a fire-resistant and heat-insulating screen. In this case the exhaust pipe outlet shall be directed outwards from the vehicle.

Vehicle endurance braking

220 535 Vehicles equipped with endurance braking systems emitting high temperatures placed behind the rear wall of the driver's cab shall be equipped with a thermal shield securely fixed and located between this system and the tank or load so as to avoid any heating, even local, of the tank shell or the load.

In addition, the thermal shield shall protect the braking system against any outflow or leakage, even accidental, of the load. For instance, a protection including a twin-shell shield shall be considered satisfactory.

Auxiliary heating device

220 536 Auxiliary heating for the cab shall be sufficiently secure from the standpoint of fire prevention and shall be placed forward of the protective wall (rear wall of the cab). The heating appliance shall be placed as far forward and as high as possible (at least 80 cm above ground level) and shall be fitted with devices preventing any object from being brought into contact with the hot surfaces of the appliance or its exhaust pipe. Only appliances with a means of rapidly restarting the combustion air ventilator (max. 20 s) may be used.

220 537-
220 539

Speed limitation device

220 540 Motor vehicles (rigid vehicles and tractors for semi-trailers) with a maximum mass exceeding 12 tonnes, shall be equipped in accordance with marginal 10 261 with a speed limitation device according to the provisions of ECE Regulation No 89 [1] or of Directives 92/6/EEC and 92/24/EEC. The set speed V as defined in paragraph 2.1.2 of ECE Regulation No 89 [1] shall not exceed 85 km/h.

220 541-
220 599

[1] 'ECE Regulation No ...' means a regulation published as an addendum (in its latest amended form) to the Agreement concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts, done at Geneva on 20 March 1958.

SECTION 6

MODIFICATION OF THE VEHICLE TYPE AND EXTENSION OF APPROVAL

220 600 Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:

(1) Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle still complies with the requirements, or

(2) Require a further test report from the technical service responsible for conducting the tests.

220 601 Confirmation or refusal of approval, specifying the alteration, shall be communicated by the procedure specified in marginal 220 402 to the Member States.

220 602 The competent authority issuing an extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other Parties by means of a communication form conforming to the model in marginal 221 000.

220 603-
220 699

SECTION 7

CONFORMITY OF PRODUCTION

Initial assessment

220 700 The approval authority of a Member State shall verify — before granting type approval — the existence of satisfactory arrangements and procedures for ensuring effective control so that vehicles when in production conform to the approved type.

220 701 The requirement in marginal 220 700 shall be verified to the satisfaction of the authority granting type approval but may also be verified, on behalf of the authority granting type approval, by the approval authority of another Member State. In that case, the latter approval authority prepares a statement of compliance outlining the areas and production facilities it has covered as relevant to the vehicle(s) to be type approved.

220 702 The approval authority shall also accept the manufacturer's registration to harmonized standard ISO 9002 (the scope of which/covers the vehicle(s) to be approved) or an equivalent accreditation standard as satisfying the requirements of marginal 220 700. The manufacturer shall provide details of the registration and undertake to inform the approval authority of any revisions to its validity or scope.

220 703 On receiving an application from the authority of another Member State the approval authority shall send forthwith the statement of compliance mentioned in the last sentence of marginal 220 701 or advise that it is not in a position to provide such a statement.

220 704-
220 709

Conformity of production

220 710 Every vehicle approved under this Appendix shall be so manufactured as to conform to the type approved by meeting the provisions set out in Section 5 above.

220 711 The approval authority of a Member State granting a type approval pursuant to this Appendix shall verify the existence of adequate arrangements and documented control plans, to be agreed with the manufacturer for each approval, to carry out at specified intervals those tests or associated checks necessary to verify continued conformity with the approved type including specifically, where applicable, tests specified in this Appendix.

220 712 The holder of the approval shall in particular:

(1) Ensure the existence of procedures for effective control of the conformity of vehicles to the type approval;

(2) Have access to the testing equipment necessary for checking the conformity to each approved type;

(3) Ensure that test results data are recorded and that annexed documents remain available for a period to be determined in agreement with the approval authority. This period shall not exceed 10 years;

(4) Analyse results of each type of test, in order to verify and ensure the stability of the vehicle characteristics, making allowance for variation of an industrial production;

(5) Ensure that for each type of vehicle, at least the checks and tests prescribed in this Appendix are carried out;

(6) Ensure that any set of samples or test pieces giving evidence of non-conformity in the type of test in question gives rise to a further sampling and test. All the necessary steps shall be taken to restore conformity of the corresponding production.

220 713 The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be consistent with the arrangements (if any) accepted under marginals 220 701 or 220 702 of this Appendix and be such as to ensure that the relevant controls are reviewed over a period consistent with the climate of trust established by the approval authority.

(1) At every inspection, the test records and production records shall be available to the visiting inspector.

(2) Where the nature of the test is appropriate, the inspector may select samples at random to be tested in the manufacturer's laboratory or by the Technical Service according to section 9 below. The minimum number of samples may be determined according to the results of the manufacturer's own verification.

(3) Where the level of control appears unsatisfactory, or when it seems necessary to verify the validity of the tests carried out in application of paragraph (2) above, the inspector shall select samples to be sent to the Technical Service which conducts the type approval tests.

(4) The approval authority may carry out any check or test prescribed in this Appendix.

(5) In cases where unsatisfactory results are found during an inspection, the approval authority shall ensure that all necessary steps are taken to restore conformity of production as rapidly as possible.

220 714-
220 719

Penalties for non-conformity of production

220 720 The approval granted in respect of a vehicle type pursuant to this Appendix may be withdrawn if the provisions laid down in section 5 above are not complied with.

220 721 If a Member State withdraws an approval it has previously granted, it shall forthwith so notify the other Member State by means of a communication form conforming to the model in marginal 221 000.

220 722-
220 799

SECTION 8

PRODUCTION DEFINITELY DISCONTINUED

220 800 If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Appendix, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties by means of a communication form conforming to the model in marginal 221 000.

220 801-
220 999

221 000

Communication
[maximum format: A4 (210 mm x 297 mm)]

ADR (1) issued by: Name of Administration:

.....

.....

concerning (2): Approval granted
Approval extended
Approval refused
Approval withdrawn
Production definitely discontinued of a vehicle type with regard to specific constructional features for the transport of dangerous goods

Approval No ..... Extension No .....

1. Trade name or mark of vehicle: .....

2. Vehicle type: Chassis-cab, tractor for semi-trailer, trailer, semi-trailer, trailer with self-supporting body (2) .....

3. Type of vehicle according to marginal 220 301 (2) (EX/II, EX/III, FL, OX, AT) .....

4. Manufacturer's name and address: .....

(1) Distinguishing number of the State which has granted/extended/refused/withdrawn approval (see footnote 1/ to marginal 220 403 (1)].
(2) Strike out what does not apply.

221 000 *(cont'd)*

5. If applicable, name and address of manufacturer's representative: .....

.....

6. Mass of vehicle:

6.1. Technical maximum mass of complete vehicle: .....

7. Specific equipment of vehicle:

7.1. The vehicle is/is not equipped with specific electrical devices.

Summary description: .....

7.2. The vehicle is/is not equipped with a brake anti-lock device.

Approval number: .....

Category of device: .....

7.3. The vehicle is/is not equipped with an endurance braking system.

Approval number: .....

Technical maximum mass of the vehicle corresponding to the performance of the endurance braking system system: .....

Summary description: .....

7.4. The vehicle is/is not equipped with devices for the prevention of fire risks.

Summary description: .....

7.5. In the case of a motor vehicle:

7.5.1. Type of engine: positive-ignition; compression ignition: .....

7.5.2. The vehicle is/is not equipped with a device to limit the speed by construction adjusted to a speed of ..... km/h.

Approval number: .....

8. Vehicle submitted for approval on: .....

9. Technical service responsible for carrying out approval inspections: .....

10. Date of report issued by that service: .....

11. Number of report issued by that service: .....

12. Approval granted/extended/withdrawn (1)

13. Position of approval mark on the vehicle: .....

14. Place: .....

15. Date: .....

16. Signature: .....

221 001-
229 999

(1) Strike out what does not apply.

APPENDIX B.3

CERTIFICATE OF APPROVAL FOR VEHICLES CARRYING CERTAIN DANGEROUS GOODS

(see marginal 10 282)

230 000

Note: The dimensions of the certificate shall be 210 x 297 mm (format A 4). Both front and back shall be used. The colour shall be white, with a pink diagonal stripe.

CERTIFICATE OF APPROVAL FOR VEHICLES CARRYING CERTAIN DANGEROUS GOODS

1. Certificate No

testifying that the vehicle specified below fulfils the conditions prescribed by the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) for its acceptance for the international carriage of dangerous goods by road.

2. Manufacturer and type of vehicle .....

.....

3. Registration number (if any) and Chassis number .....

.....

4. Name and business address of carrier, operator or owner .....

.....

5. The vehicle specified above has undergone the inspections prescribed in ADR, Annex B, marginals 10 282/10 283 (1)/ and fulfils the conditions required for its acceptance for the international carriage by road of dangerous goods of the following classes, items numbers and letters (where necessary the name of the substances or the substance identification number shall be given):

6. Remarks

.....

.....

7. Valid until	Stamp of issuing service at: Signature: Date:
8. Validity extended until	Stamp of issuing service at: Signature: Date:
9. Validity extended until	Stamp of issuing service at: Signature: Date:

(1) Delete if not applicable.

230 000 *(cont'd)*

10. Validity extended until	Stamp of issuing service at: Signature: Date:
11. Validity extended until	Stamp of issuing service at: Signature: Date:

Notes: 1. Every vehicle shall be the subject of a separate certificate unless otherwise required e.g. for Class 1.

2. This certificate must be returned to the issuing service when the vehicle is taken out of service; if the vehicle is transferred to another carrier, operator or owner, as specified in item 4; on expiry of the validity of the certificate; and if there is a material change in one or more essential characteristics of the vehicle.

230 001-
239 999

APPENDIX B.4

240 000-
249 999 Reserved

APPENDIX B.5

LIST OF SUBSTANCES AND IDENTIFICATION NUMBERS

250 000 (1) The hazard identification number consists of two or three figures. In general, the figures indicate the following hazards:

2 Emission of gas due to pressure or to chemical reaction

3 Flammability of liquids (vapours) and gases or self-heating liquid

4 Flammability of solids or self-heating solid

5 Oxidizing (fire-intensifying) effect

6 Toxicity or risk of infection

7 Radioactivity

8 Corrosivity

9 Risk of spontaneous violent reaction

Note: The risk of spontaneous violent reaction within the meaning of figure 9 include the possibility following from the nature of a substance of a risk of explosion, disintegration and polymerization reaction following the release of considerable heat or flammable and/or toxic gases.

Doubling of a figure indicates an intensification of that particular hazard.

Where the hazard associated with a substance can be adequately indicated by a single figure, this is followed by zero.

The following combinations of figures, however, have a special meaning: 22, 323, 333, 362, 382, 423, 44, 446, 462, 482, 539, 606, 623, 642, 823, 842 and 90, see (2) below.

250 000 *(cont'd)* If a hazard identification number is prefixed by the letter 'X', this indicates that the substance will react dangerously with water. For such substances, water may only be used by approval of experts.

(2) The hazard identification numbers listed in paragraph (3) have the following meanings:

20 inert gas

22 refrigerated gas

223 refrigerated flammable gas

225 refrigerated oxidizing (fire-intensifying) gas

23 flammable gas

236 flammable gas, toxic

239 flammable gas, which can spontaneously lead to violent reaction

25 oxidizing (fire-intensifying) gas

26 toxic gas

265 toxic gas, oxidizing (fire-intensifying)

266 highly toxic gas

268 toxic gas, corrosive

286 corrosive gas, toxic

30 — flammable liquid (flash-point between 23 °C and 61 °C, inclusive) or

— flammable liquid or solid in the molten state with a flash-point above 61 °C, heated to a temperature equal to or above its flash-point, or

— self-heating liquid

323 flammable liquid which reacts with water, emitting flammable gases

X323 flammable liquid which reacts dangerously with water, emitting flammable gases [1]

33 highly flammable liquid (flash-point below 23 °C)

333 pyrophoric liquid

X333 pyrophoric liquid which reacts dangerously with water [1]

336 highly flammable liquid, toxic

338 highly flammable liquid, corrosive

X338 highly flammable liquid, corrosive, which reacts dangerously with water [1]

339 highly flammable liquid which can spontaneously lead to violent reaction

36 flammable liquid (flash-point between 23 °C and 61 °C inclusive), slightly toxic, or self-heating liquid, toxic

362 flammable liquid, toxic, which reacts with water, emitting flammable gases

X362 flammable liquid toxic, which reacts dangerously with water, emitting flammable gases [1]

368 flammable liquid toxic, corrosive

38 flammable liquid (flash-point between 23 °C and 61 °C, inclusive), corrosive

382 flammable liquid, corrosive, which reacts with water, emitting flammable gases

[1] Water not to be used except by approval of experts.

250 000 *(cont'd)*	X382	flammable liquid, corrosive, which reacts dangerously with water, emitting flammable gases (1)
	39	flammable liquid, which can spontaneously lead to violent reaction
	40	flammable or self-heating solid
	423	solid which reacts with water, emitting flammable gases
	X423	flammable solid which reacts dangerously with water, emitting flammable gases (1)
	44	flammable solid, in the molten state at an elevated temperature
	446	flammable solid, toxic, in the molten state, at an elevated temperature
	46	flammable or self-heating solid, toxic
	462	toxic solid which reacts with water, emitting flammable gases
	48	flammable or self-heating solid, corrosive
	482	corrosive solid which reacts with water, emitting flammable gases
	50	oxidizing (fire-intensifying) substance
	539	flammable organic peroxide
	55	strongly oxidizing (fire-intensifying) substance
	556	strongly oxidizing (fire-intensifying) substance, toxic
	558	strongly oxidizing (fire-intensifying) substance, corrosive
	559	strongly oxidizing (fire-intensifying) substance, which can spontaneously lead to violent reaction
	56	oxidizing substance (fire-intensifying), toxic
	568	oxidizing substance (fire-intensifying), toxic, corrosive
	58	oxidizing substance (fire-intensifying), corrosive
	59	oxidizing substance (fire-intensifying) which can spontaneously lead to violent reaction
	60	toxic or slightly toxic substance
	606	infectious substance
	623	toxic liquid, which reacts with water, emitting flammable gases
	63	toxic substance, flammable (flash-point between 23 °C and 61 °C inclusive)
	638	toxic substance, flammable (flash-point between 23 °C and 61 °C inclusive), corrosive
	639	toxic substance, flammable (flash-point between 23 °C and 61 °C inclusive) which can spontaneously lead to violent reaction
	64	toxic solid, flammable or self-heating
	642	toxic solid, which reacts with water, emitting flammable gases
	65	toxic substance, oxidizing (fire-intensifying)
	66	highly toxic substance
	663	highly toxic substance, flammable (flash-point not above 61 °C)
	664	highly toxic solid, flammable or self-heating
	665	highly toxic substance, oxidizing (fire-intensifying)
	668	highly toxic substance, corrosive
	669	highly toxic substance which can spontaneously lead to violent reaction
	68	toxic substance, corrosive

(1) Water not to be used except by approval of experts.

250 000 *(cont'd)*

69	toxic or slightly toxic substance, which can spontaneously lead to violent reaction
70	radioactive material
72	radioactive gas
723	radioactive gas, flammable
73	radioactive liquid, flammable (flash-point not above 61 °C)
74	radioactive solid, flammable
75	radioactive material, oxidizing (fire-intensifying)
76	radioactive material, toxic
78	radioactive material, corrosive
80	corrosive or slightly corrosive substance
X80	corrosive or slightly corrosive substance, which reacts dangerously with water (1)
823	corrosive liquid which reacts with water, emitting flammable gases
83	corrosive or slightly corrosive substance, flammable (flash-point between 23 °C and 61 °C inclusive)
X83	corrosive or slightly corrosive substance, flammable, (flash-point between 23 °C and 61 °C inclusive), which reacts dangerously with water (1)
836	corrosive or slightly corrosive substance, flammable (flash-point between 23 °C and 61 °C), toxic
839	corrosive or slightly corrosive substance, flammable (flash-point between 23 °C and 61 °C inclusive) which can spontaneously lead to violent reaction
X839	corrosive or slightly corrosive substance, flammable (flash-point between 23 °C and 61 °C inclusive), which can spontaneously lead to violent reaction and which reacts dangerously with water (1)
84	corrosive solid, flammable or self-heating
842	corrosive solid which reacts with water, emitting flammable gases
85	corrosive or slightly corrosive substance, oxidizing (fire-intensifying)
856	corrosive or slightly corrosive substance, oxidizing (fire-intensifying) and toxic
86	corrosive or slightly corrosive substance, toxic
88	highly corrosive substance
X88	highly corrosive substance, which reacts dangerously with water (1)
883	highly corrosive substance, flammable (flash-point between 23 °C and 61 °C inclusive)
884	highly corrosive solid, flammable or self-heating
885	highly corrosive substance, oxidizing (fire-intensifying)
886	highly corrosive substance, toxic
X886	highly corrosive substance, toxic, which reacts dangerously with water (1)
89	corrosive or slightly corrosive substance, which can spontaneously lead to violent reaction
90	environmentally hazardous substance; miscellaneous dangerous substances

(3) The identification numbers referred to in marginal 10 500 are listed in Tables I, II and III below.

Note: 1. The identification numbers to be shown on the orange plates should be looked for first in Table I. If in the case of substances of classes 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 6.2, 7, 8 and 9 the name of the substance to be carried or the collective heading which covers it is not listed in Table I, the identification numbers are to be taken from Table II.

2. Table III contains all the entries in Tables I and II in substance identification number order.

(1) Water not to be used except by approval of experts.

250 000
(cont'd)

TABLE 1

List of substances described under their chemical names or under collective headings which are given a specific 'substance identification number' [column (b)]. [For solutions and mixtures of substances (such as preparations and wastes), see also marginal 2002 (8) and (9)]

This table also includes substances not shown in the class lists of substances, but which nevertheless fall within the classes and item numbers shown in column (e).

Note: For substances of Classes 3, 4.1, 4.2, 4.3, 5.1, 6.1, 6.2, 7, 8 and 9 not mentioned in this table, see Table II.

Substances are listed in alphabetical order.

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Acetal	1088	33	3	3, 3°(b)
Acetaldehyde	1089	33	3	3, 1°(a)
Acetaldehyde oxime	2332	30	3	3, 31°(c)
Acetic acid, glacial	2789	83	8+3	8, 32°(b)2.
Acetic acid, solution	2789	83	8+3	8, 32°(b)2.
Acetic acid, solution	2790	80	8	8, 32°(b)1.,(c)
Acetic anhydride	1715	83	8+3	8, 32°(b)2.
Acetone	1090	33	3	3, 3°(b)
Acetone cyanohydrin, stabilized	1541	66	6.1	6.1, 12°(a)
Acetone oils	1091	33	3	3, 3°(b)
Acetonitrile (methyl cyanide)	1648	33	3	3, 3°(b)
Acetyl bromide	1716	80	8	8, 35°(b)1.
Acetyl chloride	1717	X338	3+8	3, 25°(b)
Acetyl iodide	1898	80	8	8, 35°(b)1.
Acetyl methyl carbinol	2621	30	3	3, 31°(c)
Acridine	2713	60	6.1	6.1, 12°(c)
Acrolein, dimer, stabilized	2607	39	3	3, 31°(c)
Acrolein, inhibited	1092	663	6.1+3	6.1, 8°(a)
Acrylamide	2074	60	6.1	6.1, 12°(c)
Acrylic acid, inhibited	2218	839	8+3	8, 32°(b)2.
Acrylonitrile, inhibited	1093	336	3+6.1	3, 11°(a)
Adhesives	1133	33	3	3, 5°(a),(b),(c)
Adhesives	1133	30	3	3, 31°(c)
Adiponitrile	2205	60	6.1	6.1, 12°(c)
Air, compressed	1002	20	2	2, 2°(a)
Air, deeply-refrigerated	1003	225	2+05	2, 8°(a)
Alcoholic beverages	3065	30	3	3, 31°(c)
Alcoholic beverages	3065	33	3	3, 3°(b)
Aldol	2839	60	6.1	6.1, 14°(b)
Alkali metal amalgam	1389	X423	4.3	4.3, 11°(a)
Alkali metal amides	1390	423	4.3	4.3, 19°(b)
Alkali metal dispersion	1391	X423	4.3	4.3, 11°(a)
Alkaline earth metal amalgam	1392	X423	4.3	4.3, 11°(a)
Alkaline earth metal dispersion	1391	X423	4.3	4.3, 11°(a)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Alkylsulphonic acids, liquid	2584	80	8	8, 1°(b)
Alkylsulphonic acids, liquid	2586	80	8	8, 34°(c)
Alkylsulphonic acids, solid	2583	80	8	8, 1°(b)
Alkylsulphonic acids, solid	2585	80	8	8, 34°(c)
Alkylsulphuric acids	2571	80	8	8, 34°(b)
Allyl acetate	2333	336	3+6.1	3, 17°(b)
Allyl alcohol	1098	663	6.1+3	6.1, 8°(a)
Allyl bromide	1099	336	3+6.1	3, 16°(a)
Allyl chloride	1100	336	3+6.1	3, 16°(a)
Allyl chloroformate	1722	638	6.1+8+3	6.1, 28°(a)
Allyl ethyl ether	2335	336	3+6.1	3, 17°(b)
Allyl formate	2336	336	3+6.1	3. 17°(a)
Allyl glycidyl ether	2219	30	3	3, 31°(c)
Allyl iodide	1723	338	3+8	3, 25°(b)
Allyl isothiocyanate, inhibited	1545	639	6.1+3	6.1, 20°(b)
Allylamine	2334	663	6.1+3	6.1, 7°(a)2.
Allyltrichlorosilane, stabilised	1724	X839	8+3	8, 37°(b)
Aluminium alkyl halides	3052	X333	4.2+4.3	4.2, 32°(a)
Aluminium alkyl hydrides	3076	X333	4.2+4.3	4.2. 32°(a)
Aluminium alkyls	3051	X333	4.2+4.3	4.2, 31°(a)
Aluminium borohydride	2870	X333	4.2+4.3	4.2, 17°(a)
Aluminium borohydride in devices	2870	X333	4.2+4.3	4.2, 17°(a)
Aluminium bromide solution	2580	80	8	8, 5°(c)
Aluminium bromide, anhydrous	1725	80	8	8, 11°(b)
Aluminium carbide	1394	423	4.3	4.3, 17°(b)
Aluminium chloride solution	2581	80	8	8, 5°(c)
Aluminium chloride, anhydrous	1726	80	8	8, 11°(b)
Aluminium dross	3170	423	4.3	4.3, 13°(b),(c)
Aluminium ferrosilicon powder	1395	462	4.3+6.1	4.3, 15°(b)
Aluminium nitrate	1438	50	5.1	5.1, 22°(c)
Aluminium powder, coated	1309	40	4.1	4.1, 13°(b),(c)
Aluminium powder, uncoated	1396	423	4.3	4.3, 13°(b)
Aluminium resinate	2715	40	4.1	4.1, 12°(c)
Aluminium silicon powder, uncoated	1398	423	4.3	4.3, 13°(c)
2-Amino-4-chlorophenol	2673	60	6.1	6.1, 12°(b)
2-Amino-5-diethylaminopentane	2946	60	6.1	6.1, 12°(c)
2-(2-Aminoethoxy) ethanol	3055	80	8	8, 53°(c)
N-Aminoethylpiperazine	2815	80	8	8, 53°(c)
Aminophenols (o-, m-, p-)	2512	60	6.1	6.1, 12°(c)
Aminopyridines (o-, m-, p-)	2671	60	6.1	6.1, 12°(b)
Ammonia	1005	268	6.1	2, 3°(at)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Ammonia dissolved in water with more than 35 % but not more than 40 % ammonia	2073	268	6.1	2, 9°(at)
Ammonia dissolved in water with more than 40 % but not more than 50 % ammonia	2073	268	6.1	2, 9°(at)
Ammonia solution containing between 10 and 35 % ammonia	2672	80	8	8, 43°(c)
Ammonium arsenate	1546	60	6.1	6.1, 51°(b)
Ammonium dichromate	1439	50	5.1	5.1, 27°(b)
Ammonium dinitro-o-cresolate	1843	60	6.1	6.1, 12°(b)
Ammonium fluoride	2505	60	6.1	6.1, 63°(c)
Ammonium fluorosilicate	2854	60	6.1	6.1, 64°(c)
Ammonium hydrogendifluoride, solid	1727	80	8	8, 9°(b)
Ammonium hydrogendifluoride solution	2817	86	8+6.1	8, 7°(b),(c)
Ammonium hydrogen sulphate	2506	80	8	8, 13°(b)
Ammonium metavanadate	2859	60	6.1	6.1, 58°(b)
Ammonium nitrate	1942	50	5.1	5.1, 21°(c)
Ammonium nitrate fertilizers, type A1	2067	50	5.1	5.1, 21°(c)
Ammonium nitrate fertilizers, type A2	2068	50	5.1	5.1, 21°(c)
Ammonium nitrate fertilizers, type A3	2069	50	5.1	5.1, 21°(c)
Ammonium nitrate fertilizers, type A4	2070	50	5.1	5.1, 21°(c)
Ammonium nitrate, liquid, (hot concentrated solution)	2426	59	5.1	5.1, 20°
Ammonium persulphate	1444	50	5.1	5.1, 18°(c)
Ammonium polysulphide solution	2818	86	8+6.1	8, 45°(c)
Ammonium polysulphide solution	2818	86	8+6.1	8, 45°(b)1.
Ammonium polyvanadate	2861	60	6.1	6.1, 58°(b)
Ammonium sulphide, solution	2683	86	8+6.1+3	8, 45°(b)2.
Amyl acetates	1104	30	3	3, 31°(c)
Amyl acid phosphate	2819	80	8	8, 38°(c)
Amyl alcohols	1105	30	3	3, 31°(c)
Amyl alcohols	1105	33	3	3, 3°(b)
Amyl butyrates	2620	30	3	3, 31°(c)
Amyl chloride	1107	33	3	3, 3°(b)
Amyl formates	1109	30	3	3, 31°(c)
Amyl mercaptan	1111	33	3	3, 3°(b)
n-Amyl methyl ketone	1110	30	3	3, 31°(c)
Amyl nitrate	1112	30	3	3, 31°(c)
Amyl nitrite	1113	33	3	3, 3°(b)
Amylamines (n-amylamine, tert-amylamine)	1106	338	3+8	3, 22°(b)
Amylamine (sec-amylamine)	1106	38	3+8	3, 33°(c)
Amyltrichlorosilane	1728	X80	8	8, 36°(b)
Aniline	1547	60	6.1	6.1, 12°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Aniline hydrochloride	1548	60	6.1	6.1, 12°(c)
Anisidines	2431	60	6.1	6.1, 12°(c)
Anisole (phenyl methyl ether)	2222	30	3	3, 31°(c)
Anisoyl chloride	1729	80	8	8, 35°(b)1.
Antimony lactate	1550	60	6.1	6.1, 59°(c)
Antimony pentachloride solution	1731	80	8	8, 12°(b),(c)
Antimony pentachloride, liquid	1730	80	8	8, 12°(b)
Antimony pentafluoride	1732	86	8+6.1	8, 10°(b)
Antimony potassium tartrate	1551	60	6.1	6.1, 59°(c)
Antimony powder	2871	60	6.1	6.1, 59°(c)
Antimony trichloride	1733	80	8	8, 11°(b)
Argon, compressed	1006	20	2	2, 1°(a)
Argon, deeply-refrigerated	1951	22	2	2, 7°(a)
Arsenic	1558	60	6.1	6.1, 51°(b)
Arsenic acid, liquid	1553	66	6.1	6.1, 51°(a)
Arsenic acid, solid	1554	60	6.1	6.1, 51°(b)
Arsenic bromide	1555	60	6.1	6.1, 51°(b)
Arsenic pentoxide	1559	60	6.1	6.1, 51°(b)
Arsenic trichloride	1560	66	6.1	6.1, 51°(a)
Arsenic trioxide	1561	60	6.1	6.1, 51°(b)
Arsenical dust	1562	60	6.1	6.1, 51°(b)
Arylsulphonic acids, liquid	2584	80	8	8, 1°(b)
Arylsulphonic acids, liquid	2586	80	8	8, 34°(c)
Arylsulphonic acids, solid	2583	80	8	8, 1°(b)
Arylsulphonic acids, solid	2585	80	8	8, 34°(c)
Barium	1400	423	4.3	4.3, 11°(b)
Barium bromate	2719	56	5.1+6.1	5.1, 29°(b)
Barium chlorate	1445	56	5.1+6.1	5.1, 29°(b)
Barium hypochlorite	2741	56	5.1+6.1	5.1, 29°(b)
Barium nitrate	1446	56	5.1+6.1	5.1, 29°(b)
Barium oxide	1884	60	6.1	6.1, 60°(c)
Barium perchlorate	1447	56	5.1+6.1	5.1, 29°(b)
Barium permanganate	1448	56	5.1+6.1	5.1, 29°(b)
Barium peroxide	1449	56	5.1+6.1	5.1, 29°(b)
Battery fluid, alkali	2797	80	8	8, 42°(b)
Battery fluid, acid	2796	80	8	8, 1°(b)
Benzene	1114	33	3	3, 3°(b)
Benzenesulphonyl chloride	2225	80	8	8, 35°(c)
Benzidine	1885	60	6.1	6.1, 12°(b)
Benzonitrile	2224	60	6.1	6.1, 12°(b)
Benzoquinone	2587	60	6.1	6.1, 14°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Benzotrichloride	2226	80	8	8, 66°(b)
Benzotrifluoride	2338	33	3	3, 3°(b)
Benzoyl chloride	1736	80	8	8, 35°(b)1.
Benzyl bromide	1737	68	6.1+8	6.1, 27°(b)
Benzyl chloride	1738	68	6.1+8	6.1, 27°(b)
Benzyl chloroformate	1739	88	8	8, 64°(a)
Benzyl iodide	2653	60	6.1	6.1, 15°(b)
Benzyldimethylamine	2619	83	8+3	8, 54°(b)
Benzylidene chloride	1886	60	6.1	6.1, 15°(b)
Beryllium nitrate	2464	56	5.1+6.1	5.1, 29°(b)
Beryllium powder	1567	64	6.1+4.1	6.1, 54°(b)1.
Bisulphates, aqueous solution	2837	80	8	8, 1°(b),(c)
Blue asbestos (Crocidolite)	2212	90	9	9, 1°(b)
Borneol	1312	40	4.1	4.1, 6°(c)
Boron tribromide (boron bromide)	2692	X88	8	8, 12°(a)
Boron trifluoride	1008	26	6.1	2, 1°(at)
Boron trifluoride acetic acid complex	1742	80	8	8, 33°(b)
Boron trifluoride diethyl etherate	2604	883	8+3	8, 33°(a)
Boron trifluoride dihydrate	2851	80	8	8, 10°(b)
Boron trifluoride dimethyl etherate	2965	382	4.3+3+8	4.3, 2°(a)
Boron trifluoride propionic acid complex	1743	80	8	8, 33°(b)
Bromine or bromine solution	1744	886	8+6.1	8, 14°
Bromine pentafluoride	1745	568	5.1+6.1+8	5.1, 5°
Bromine trifluoride	1746	568	5.1+6.1+8	5.1, 5°
2-Bromo-2-nitropropane-1,3-diol	3241	60	6.1	6.1, 17°(c)
1-Bromo-3-chloropropane	2688	60	6.1	6.1, 15°(c)
1-Bromo-3-methylbutane	2341	30	3	3, 31°(c)
Bromoacetic acid	1938	80	8	8, 31°(b)
Bromoacetone	1569	63	6.1+3	6.1, 16°(b)
Bromoacetyl bromide	2513	X80	8	8, 35°(b)1.
Bromobenzene	2514	30	3	3, 31°(c)
Bromobenzyl cyanides	1694	66	6.1	6.1, 17°(a)
1-Bromobutane	1126	33	3	3, 3°(b)
2-Bromobutane	2339	33	3	3, 3°(b)
Bromochlorodifluoromethane (R 12B1)	1974	20	2	2, 3°(a)
Bromochloromethane	1887	60	6.1	6.1, 15°(c)
2-Bromoethyl ethyl ether	2340	33	3	3, 3°(b)
Bromoform	2515	60	6.1	6.1, 15°(c)
Bromomethylpropanes	2342	33	3	3, 3°(b)
2-Bromopentane	2343	33	3	3, 3°(b)
Bromopropanes	2344	33	3	3, 3°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3-Bromopropyne	2345	33	3	3, 3°(b)
Bromotrifluoromethane (R 13 B1)	1009	20	2	2, 5°(a)
Brown asbestos (Amosite or Mysorite)	2212	90	9	9, 1°(b)
Brucine	1570	66	6.1	6.1, 90°(a)
1,3-Butadiene	1010	239	3	2, 3°(c)
1,2-Butadiene	1010	239	3	2, 3°(c)
Butane, technically-pure	1011	23	3	2, 3°(b)
Butanedione (diacetyl)	2346	33	3	3, 3°(b)
Butanols	1120	33	3	3, 3°(b)
Butanols	1120	30	3	3, 31°(c)
Butoxyl	2708	30	3	3, 31°(c)
Butyl acetates	1123	30	3	3, 31°(c)
Butyl acetates	1123	33	3	3, 3°(b)
Butyl acid phosphate	1718	80	8	8, 38°(c)
Butyl acrylate, inhibited	2348	39	3	3, 31°(c)
n-Butyl bromide	1126	33	3	3, 3°(b)
n-Butyl chloroformate	2743	638	6.1+3+8	6.1, 28°(b)
n-Butyl formate	1128	33	3	3, 3°(b)
tert-Butyl isocyanate	2484	663	6.1+3	6.1, 6°(a)
n-Butyl isocyanate	2485	663	6.1+3	6.1, 6°(a)
Butyl mercaptan	2347	33	3	3, 3°(b)
n-Butyl methacrylate, inhibited	2227	39	3	3, 31°(c)
Butyl methyl ether	2350	33	3	3, 3°(b)
Butyl nitrites	2351	33	3	3, 3°(b)
Butyl nitrites	2351	30	3	3, 31°(c)
Butyl propionate	1914	30	3	3, 31°(c)
Butyl vinyl ether, inhibited	2352	339	3	3, 3°(b)
n-Butylamine	1125	338	3+8	3, 22°(b)
N-Butylaniline	2738	60	6.1	6.1, 12°(b)
Butylbenzenes	2709	30	3	3, 31°(c)
tert-Butylcyclohexyl chloroformate	2747	60	6.1	6.1, 17°(c)
1-Butylene (1-Butene)	1012	23	3	2, 3°(b)
cis-2-Butylene (cis-2-Butene)	1012	23	3	2, 3°(b)
trans-2-Butylene (trans-2-Butene)	1012	23	3	2, 3°(b)
1,2-Butylene oxide, stabilized	3022	339	3	3, 3°(b)
N,n-Butylimidazole	2690	60	6.1	6.1, 12°(b)
Butyltoluenes	2667	60	6.1	6.1, 25°(c)
Butyltrichlorosilane	1747	X83	8+3	8, 37°(b)
1,4-Butynediol	2716	60	6.1	6.1, 14°(c)
Butyraldehyde	1129	33	3	3, 3°(b)
Butyraldoxime	2840	30	3	3, 31°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Butyric acid	2820	80	8	8, 32°(c)
Butyric anhydride	2739	80	8	8, 32°(c)
Butyronitrile	2411	336	3+6.1	3, 11°(b)
Butyryl chloride	2353	338	3+8	3, 25°(b)
Cacodylic acid	1572	60	6.1	6.1, 51°(b)
Cadmium compound	2570	66	6.1	6.1, 61°(a)
Cadmium compound	2570	60	6.1	6.1, 61°(b),(c)
Caesium	1407	X423	4.3	4.3, 11°(a)
Caesium hydroxide	2682	80	8	8, 41°(b)
Caesium hydroxide, solution	2681	80	8	8, 42°(b),(c)
Caesium nitrate	1451	50	5.1	5.1, 22°(c)
Calcium	1401	423	4.3	4.3, 11°(b)
Calcium arsenate	1573	60	6.1	6.1, 51°(b)
Calcium arsenate and calcium arsenite mixture, solid	1574	60	6.1	6.1, 51°(b)
Calcium carbide	1402	423	4.3	4.3, 17°(b)
Calcium chlorate	1452	50	5.1	5.1, 11°(b)
Calcium chlorate, aqueous solution	2429	50	5.1	5.1, 11°(b)
Calcium chlorite	1453	50	5.1	5.1, 14°(b)
Calcium cyanamide	1403	423	4.3	4.3, 19°(c)
Calcium dithionite	1923	40	4.2	4.2, 13°(b)
Calcium hypochlorite mixture, dry	2208	50	5.1	5.1, 15°(c)
Calcium hypochlorite, dry	1748	50	5.1	5.1, 15°(b)
Calcium hypochlorite, hydrated	2880	50	5.1	5.1, 15°(b)
Calcium hypochlorite, hydrated mixture	2880	50	5.1	5.1, 15°(b)
Calcium hypochlorite, mixture, dry	1748	50	5.1	5.1, 15°(b)
Calcium manganese silicon	2844	423	4.3	4.3, 12°(c)
Calcium nitrate	1454	50	5.1	5.1, 22°(c)
Calcium perchlorate	1455	50	5.1	5.1, 13°(b)
Calcium permanganate	1456	50	5.1	5.1, 17°(b)
Calcium peroxide	1457	50	5.1	5.1, 25°(b)
Calcium resinate	1313	40	4.1	4.1, 12°(c)
Calcium resinate, fused	1314	40	4.1	4.1, 12°(c)
Calcium silicide	1405	423	4.3	4.3, 12°(b),(c)
Camphor oil	1130	30	3	3, 31°(c)
Camphor, synthetic	2717	40	4.1	4.1, 6°(c)
Caproic acid	2829	80	8	8, 32°(c)
Carbon	1361	40	4.2	4.2, 1°(b),(c)
Carbon black	1361	40	4.2	4.2, 1°(b),(c)
Carbon dioxide	1013	20	2	2, 5°(a)
Carbon dioxide containing not more than 35 % ethylene oxide by mass	1041	239	3	2, 6°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Carbon dioxide containing not less than 1 % and not more than 10 % oxygen by mass	1014	20	2	2, 6°(a)
Carbon dioxide containing not more than 35 % ethylene oxide by mass	1952	239	3	2, 6°(c)
Carbon dioxide, deeply-refrigerated	2187	22	2	2, 7°(a)
Carbon disulphide	1131	336	3+6.1	3, 18°(a)
Carbon monoxide	1016	236	6.1+3	2, 1°(bt)
Carbon tetrabromide	2516	60	6.1	6.1, 15°(c)
Carbon tetrachloride	1846	60	6.1	6.1, 15°(b)
Carbon sulphide	1131	336	3+6.1	3, 18°(a)
Carbon, activated	1362	40	4.2	4.2, 1°(c)
Cerium	3078	423	4.3	4.3, 13°(b)
Chloral, anhydrous, inhibited	2075	60	6.1	6.1, 17°(b)
Chlorate and borate mixture	1458	50	5.1	5.1, 11°(b)
Chlorate and magnesium chloride mixture	1459	50	5.1	5.1, 11°(b)
Chloric acid, aqueous solution	2626	50	5.1	5.1, 4°(b)
Chlorine	1017	266	6.1+8	2, 3°(at)
Chlorite solution with not less than 16 % available chlorine	1908	80	8	8, 61°(b),(c)
1-Chloro-1,1-difluoroethane (R 142b)	2517	23	3	2, 3°(b)
1-Chloro-1,2,2,2-tetrafluoroethane (R 124)	1021	20	2	2, 3°(a)
1-Chloro-2,2,2-trifluoroethane (R 133a)	1983	20	2	2, 3°(a)
3-Chloro-4-methylphenyl isocyanate	2236	60	6.1	6.1, 19°(b)
4-Chloro-o-toluidine hydrochloride	1579	60	6.1	6.1, 17°(c)
Chloroacetaldehyde	2232	66	6.1	6.1, 17°(a)
Chloroacetic acid solution	1750	68	6.1+8	6.1, 27°(b)
Chloroacetic acid, molten	3250	68	6.1+8	6.1, 24°(b)
Chloroacetic acid, solid	1751	68	6.1+8	6.1, 27°(b)
Chloroacetone, stabilized	1695	60	6.1	6.1, 17°(b)
Chloroacetonitrile	2668	63	6.1+3	6.1, 11°(b)
Chloroacetophenone	1697	60	6.1	6.1, 17°(b)
Chloroacetyl chloride	1752	668	6.1+8	6.1, 27°(a)
Chloroanilines, liquid	2019	60	6.1	6.1, 12°(b)
Chloroanilines, solid	2018	60	6.1	6.1, 12°(b)
Chloroanisidines	2233	60	6.1	6.1, 17°(c)
Chlorobenzene	1134	30	3	3, 31°(c)
Chlorobenzotrifluorides (o-, m-, p-)	2234	30	3	3, 31°(c)
Chlorobenzyl chlorides	2235	60	6.1	6.1, 17°(c)
Chlorobutanes	1127	33	3	3, 3°(b)
Chlorocresols	2669	60	6.1	6.1, 14°(b)
Chlorodifluoromethane (R 22)	1018	20	2	2, 3°(a)
Chlorodinitrobenzenes	1577	60	6.1	6.1, 12°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Chloroform	1888	60	6.1	6.1, 15°(c)
Chloromethyl chloroformate	2745	68	6.1+8	6.1, 27°(b)
Chloromethyl ethyl ether	2354	336	3+6.1	3, 16°(b)
Chloronitroanilines	2237	60	6.1	6.1, 17°(c)
Chloronitrobenzenes	1578	60	6.1	6.1, 12°(b)
Chloronitrotoluenes	2433	60	6.1	6.1, 17°(c)
Chloropentafluoroethane (R 115)	1020	20	2	2, 3°(a)
Chlorophenolates, liquid	2904	80	8	8, 62°(c)
Chlorophenolates, solid	2905	80	8	8, 62°(c)
Chlorophenols, liquid	2021	60	6.1	6.1, 17°(c)
Chlorophenols, solid	2020	60	6.1	6.1, 17°(c)
Chlorophenyltrichlorosilane	1753	X80	8	8, 36°(b)
Chloropicrin	1580	66	6.1	6.1, 17°(a)
Chloroplatinic acid, solid	2507	80	8	8, 16°(c)
Chloroprene, inhibited	1991	336	3+6.1	3, 16°(a)
2-Chloropropane	2356	33	3	3, 2°(a)
1-Chloropropane (Propyl chloride)	1278	33	3	3, 2°(b)
3-Chloropropanol-1	2849	60	6.1	6.1, 17°(c)
2-Chloropropene	2456	33	3	3, 1°(a)
2-Chloropropionic acid	2511	80	8	8, 32°(c)
2-Chloropyridine	2822	60	6.1	6.1, 12°(b)
Chlorosulphonic acid	1754	88	8	8, 12°(a)
Chlorotoluenes (o-, m-, p-)	2238	30	3	3, 31°(c)
Chlorotoluidines	2239	60	6.1	6.1, 17°(c)
Chlorotrifluoromethane (R 13)	1022	20	2	2, 5°(a)
Chromic acid, solution	1755	80	8	8, 17°(b),(c)
Chromic fluoride, solid	1756	80	8	8, 9°(b)
Chromic fluoride, solution	1757	80	8	8, 8°(b),(c)
Chromium nitrate	2720	50	5.1	5.1, 22°(c)
Chromium oxychloride	1758	88	8	8, 12°(a)
Chromium trioxide, anhydrous	1463	58	5.1+8	5.1, 31°(b)
Chromosulphuric acid	2240	88	8	8, 1°(a)
Coal tar distillates	1136	33	3	3, 3°(b)
Coal tar distillates	1136	30	3	3, 31°(c)
Coating solution	1139	33	3	3, 5°(a),(b),(c)
Coating solution	1139	30	3	3, 31°(c)
Cobalt naphthenates, powder	2001	40	4.1	4.1, 12°(c)
Cobalt resinate, precipitated	1318	40	4.1	4.1, 12°(c)
Copper acetoarsenite	1585	60	6.1	6.1, 51°(b)
Copper arsenite	1586	60	6.1	6.1, 51°(b)
Copper chlorate	2721	50	5.1	5.1, 11°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Copper chloride	2802	80	8	8, 11°(c)
Copper cyanide	1587	60	6.1	6.1, 41°(b)
Copra	1363	40	4.2	4.2, 2°(c)
Cotton waste, oily	1364	40	4.2	4.2, 3° (c)
Cotton, wet	1365	40	4.2	4.2, 3° (c)
Cresols (o-, m-, p-)	2076	68	6.1. + 8	6.1, 27°(b)
Cresylic acid	2022	68	6.1. + 8	6.1, 27°(b)
Crotonaldehyde, stabilized	1143	663	6.1. + 3	6.1, 8° (a)
Crotonic acid	2823	80	8	8, 31°(c)
Crotonylene (2-Butyne)	1144	339	3	3, 1° (a)
Cupriethylenediamine, solution	1761	86	8+6.1	8,53°(b)(c)
Cyanogen bromide	1889	668	6.1+8	6.1, 27°(a)
Cyanuric chloride	2670	80	8	8,39°(b)
Cyclobutyl chloroformate	2744	638	6.1+3+8	6.1, 28°(b)
1,5,9-Cyclododecatriene	2518	60	6.1	6.1, 25°(c)
Cycloheptane	2241	33	3	3, 3°(b)
Cycloheptatriene	2603	336	3+6.1	3, 19°(b)
Cycloheptene	2242	33	3	3, 3°(b)
Cyclohexane	1145	33	3	3, 3°(b)
Cycloheptene	2242	33	3	3, 3°(b)
Cyclohexanone	1915	30	3	3, 31°(c)
Cyclohexene	2256	33	3	3, 3°(b)
Cyclohexenyltrichlorosilane	1762	X80	8	8, 36°(b)
Cyclohexyl acetate	2243	30	3	3, 31°(c)
Cyclohexyl isocyanate	2488	63	6.1+3	6.1, 18°(b)
Cyclohexyl mercaptan	3054	30	3	3, 31°(c)
Cyclohexylamine	2357	83	8+3	8, 54°(b)
Cyclohexyltrichlorosilane	1763	X80	8	8, 36°(b)
Cyclooctadienes	2520	30	3	3, 31°(c)
Cyclooctatetraene	2358	33	3	3, 3°(b)
Cyclopentane	1146	33	3	3, 3°(b)
Cyclopentanol	2244	30	3	3, 31°(c)
Cyclopentanone	2245	30	3	3, 31°(c)
Cyclopentene	2246	33	3	3, 2°(b)
Cyclopropane	1027	23	3	2, 3°(b)
Cymenes (o-, m-, p-) (Methyl isopropyl benzenes)	2046	30	3	3, 31°(c)
Decaborane	1868	46	4.1+6.1	4.1, 16°(b)
Decahydronaphthalene	1147	30	3	3, 31°(c)
n-Decane	2247	30	3	3, 31°(c)
Deuterium	1957	23	3	2, 1°(b)
1,2-Di-(dimethylamino) ethane	2372	33	3	3, 3°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Di-n-amylamine	2841	36	3+6.1	3, 32°(c)
Di-n-butylamine	2248	83	8+3	8, 54°(b)
Di-n-propyl ether	2384	33	3	3, 3°(b)
Diacetone alcohol, chemically pure	1148	30	3	3, 31°(c)
Diacetone alcohol, technically-pure	1148	33	3	3, 3°(b)
Diallyl ether	2360	336	3+6.1	3, 17°(b)
Diallylamine	2359	338	3+8+6.1	3, 27°(b)
4,4'-Diaminodiphenylmethane	2651	60	6.1	6.1, 12°(c)
Dibenzyldichlorosilane	2434	X80	8	8, 36°(b)
Dibromobenzene	2711	30	3	3, 31°(c)
1,2-Dibromobutan-3-one	2648	60	6.1	6.1, 17°(b)
Dibromochloropropanes	2872	60	6.1	6.1, 15°(c)
Dibromomethane	2664	60	6.1	6.1, 15°(c)
Dibutyl ethers	1149	30	3	3, 31°(c)
Dibutylaminoethanol	2873	60	6.1	6.1, 12°(c)
1,2-Dichloro-1,1,2,2-tetrafluoroethane (R 114)	1958	20	2	2, 3°(a)
1,1-Dichloro-1-nitroethane	2650	60	6.1	6.1, 17°(b)
Dichloroacetic acid	1764	80	8	8, 32°(b)1.
1,3-Dichloroacetone	2649	60	6.1	6.1,17°(b)
Dichloroacetyl chloride	1765	X80	8	8, 35°(b)1.
Dichloroanilines	1590	60	6.1	6.1, 12°(b)
o-Dichlorobenzene	1591	60	6.1	6.1, 15°(c)
2,2'-Dichlorodiethyl ether	1916	63	6.1+3	6.1, 16°(b)
Dichlorodifluoromethane (R 12)	1028	20	2	2, 3°(a)
Dichlorodifluoromethane and ethylene oxide mixture with not more than 12 % ethylene oxide by mass	3070	26	6.1	2, 4°(at)
1,2-Dichloroethane (Ethylene dichloride)	1184	336	3+6.1	3, 16°(b)
1,1-Dichloroethane (Ethylidene chloride)	2362	33	3	3, 3°(b)
1,2-Dichloroethylene	1150	33	3	3, 3°(b)
Dichlorofluoromethane (R 21)	1029	20	2	2, 3°(a)
Dichloroisocyanuric acid salts	2465	50	5.1	5.1, 26°(b)
Dichloroisocyanuric acid, dry	2465	50	5.1	5.1, 26°(b)
Dichloroisopropyl ether	2490	60	6.1	6.1, 17°(b)
Dichloromethane	1593	60	6.1	6.1, 15°(c)
Dichloropentanes	1152	30	3	3, 31°(c)
Dichlorophenyl isocyanates	2250	60	6.1	6.1, 19°(b)
Dichlorophenyltrichlorosilane	1766	X80	8	8, 36°(b)
1,2-Dichloropropane	1279	33	3	3, 3°(b)
1,3-Dichloropropanol-2	2750	60	6.1	6.1, 17°(b)
Dichloropropenes	2047	30	3	3, 31°(c)
Dichloropropenes	2047	33	3	3, 3°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Dicyclohexylamine	2565	80	8	8, 53°(c)
Dicyclohexylammonium nitrite	2687	40	4.1	4.1, 11°(c)
Dicyclopentadiene	2048	30	3	3, 31°(c)
Didymium nitrate	1465	50	5.1	5.1, 22°(c)
Diesel fuel	1202	30	3	3, 31°(c)
Diethoxymethane	2373	33	3	3, 3°(b)
3,3-Diethoxypropene	2374	33	3	3, 3°(b)
Diethyl carbonate (Ethyl carbonate)	2366	30	3	3, 31°(c)
Diethyl ether (ethyl ether)	1155	33	3	3, 2°(a)
Diethyl ketone	1156	33	3	3, 3°(b)
Diethyl sulphate	1594	60	6.1	6.1, 14°(b)
Diethyl sulphide	2375	33	3	3, 3°(b)
Diethylamine	1154	338	3+8	3, 22°(b)
Diethylaminoethanol	2686	30	3	3, 31°(c)
Diethylaminopropylamine	2684	38	3+8	3, 33°(c)
N,N-Diethylaniline	2432	60	6.1	6.1, 12°(c)
Diethylbenzenes (o-, m-, p-)	2049	30	3	3, 31°(c)
Diethyldichlorosilane	1767	X83	8+3	8, 37°(b)
Diethylenetriamine	2079	80	8	8, 53°(b)
N,N-Diethylethylenediamine	2685	83	8+3	8, 54°(b)
Diethylthiophosphoryl chloride	2751	80	8	8, 35°(b)1.
Diethylzinc	1366	X333	4.2+4.3	4.2, 31°(a)
1,1-Difluoroethane (R 152a)	1030	23	3	2, 3°(b)
1,1-Difluoroethylene (Vinylidene fluoride)	1959	239	3	2, 5°(c)
Difluorophosphoric acid, anhydrous	1768	80	8	8, 8°(b)
2,3-Dihydropyran	2376	33	3	3, 3°(b)
Diisobutyl ketone	1157	30	3	3, 31°(c)
Diisobutylamine	2361	38	3+8	3, 33°(c)
Diisobutylene, isomeric compounds	2050	33	3	3, 3°(b)
Diisooctyl acid phosphate	1902	80	8	8, 38°(c)
Diisopropyl ether	1159	33	3	3, 3°(b)
Diisopropylamine	1158	338	3+8	3, 22°(b)
Diketene, inhibited	2521	663	6.1+3	6.1, 13°(a)
1,2-Dimethoxyethane	2252	33	3	3, 3°(b)
1,1-Dimethoxyethane	2377	33	3	3, 3°(b)
Dimethyl carbonate	1161	33	3	3, 3°(b)
Dimethyl disulphide	2381	33	3	3, 3°(b)
Dimethyl ether	1033	23	3	2, 3°(b)
Dimethyl sulphate	1595	668	6.1+8	6.1, 27°(a)
Dimethyl sulphide	1164	33	3	3, 2°(b)
Dimethyl thiophosphoryl chloride	2267	68	6.1+8	6.1, 27°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Dimethylamine, anhydrous	1032	236	3+6.1	2, 3°(bt)
Dimethylamine aqueous solution	1160	338	3+8	3, 22°(b)
2-Dimethylaminoacetonitrile	2378	336	3+6.1	3, 11°(b)
2-Dimethylaminoethanol	2051	83	8+3	8, 54°(b)
Dimethylaminoethyl methacrylate	2522	69	6.1	6.1, 12°(b)
N,N-Dimethylaniline	2253	60	6.1	6.1, 12°(b)
2,3-Dimethylbutane	2457	33	3	3, 3°(b)
1,3-Dimethylbutylamine	2379	338	3+8	3, 22°(b)
Dimethylcarbamoyl chloride	2262	80	8	8, 35°(b)1.
Dimethylcyclohexanes	2263	33	3	3, 3°(b)
Dimethylcyclohexylamine	2264	83	8+3	8, 54°(b)
Dimethyldichlorosilane	1162	X338	3+8	3, 21°(b)
Dimethyldiethoxysilane	2380	33	3	3, 3°(b)
Dimethyldioxanes	2707	33	3	3, 3°(b)
Dimethyldioxanes	2707	30	3	3, 31°(c)
N,N-Dimethylformamide	2265	30	3	3, 31°(c)
Dimethylhydrazine, symmetrical	2382	663	6.1+3	6.1, 7°(a)2.
Dimethylhydrazine, unsymmetrical	1163	663	6.1+3+8	6.1, 7°(a)1.
Dimethyl-N-propylamine	2266	338	3+8	3, 22°(b)
Dimethylzinc	1370	X333	4.2+4.3	4.2, 31°(a)
Dinitro-o-cresol	1598	60	6.1	6.1, 12°(b)
Dinitroanilines	1596	60	6.1	6.1, 12°(b)
Dinitrobenzenes	1597	60	6.1	6.1, 12°(b)
Dinitrophenol solutions	1599	60	6.1	6.1, 12°(b),(c)
Dinitrotoluenes	2038	60	6.1	6.1, 12°(b)
Dinitrotoluenes, molten	1600	60	6.1	6.1, 24°(b)1.
Dioxane	1165	33	3	3, 3°(b)
Dioxolane	1166	33	3	3, 3°(b)
Dipentene	2052	30	3	3, 31°(c)
Diphenylamine chloroarsine	1698	66	6.1	6.1, 34°(a)
Diphenylchloroarsine	1699	66	6.1	6.1, 34°(a)
Diphenyldichlorosilane	1769	X80	8	8, 36°(b)
Diphenylmethane-4,4'-diisocyanate	2489	60	6.1	6.1, 19°(c)
Diphenylmethyl bromide	1770	80	8	8, 65°(b)
Dipropyl ketone	2710	30	3	3, 31°(c)
Dipropylamine	2383	338	3+8	3, 22°(b)
Disodium trioxosilicate pentahydrate	3253	80	8	8, 41°(c)
Divinyl ether inhibited	1167	339	3	3, 2°(a)
Dodecyltrichlorosilane	1771	X80	8	8, 36°(b)
Epibromohydrin	2558	663	6.1+3	6.1, 16°(a)
Epichlorohydrin	2023	63	6.1+3	6.1, 16°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1,2-Epoxy-3-ethoxypropane	2752	30	3	3, 31°(c)
Ethane	1035	23	3	2, 5°(b)
Ethane, deeply-refrigerated	1961	223	3	2, 7°(b)
Ethanol (Ethyl alcohol) or ethanol (Ethyl alcohol) solution containing more than 70 vol.-% alcohol	1170	33	3	3, 3°(b)
Ethanolamine or ethanolamine solution	2491	80	8	8, 53°(c)
Ethanol solution (Ethyl alcohol solution) containing more than 24 vol.-% and not more than 70 vol.-% alcohol	1170	30	3	3, 31°(c)
Ethyl acetate	1173	33	3	3, 3°(b)
Ethyl acrylate, inhibited	1917	339	3	3, 3°(b)
Ethyl amyl ketones	2271	30	3	3, 31°(c)
Ethyl borate	1176	33	3	3, 3°(b)
Ethyl bromide	1891	60	6.1	6.1, 15°(b)
Ethyl bromoacetate	1603	63	6.1+3	6.1, 16°(b)
Ethyl butyl ether	1179	33	3	3, 3°(b)
Ethyl butyrate	1180	30	3	3, 31°(c)
Ethyl chloride	1037	236	3+6.1	2, 3°(bt)
Ethyl chloroacetate	1181	63	6.1+3	6.1, 16°(b)
Ethyl chloroformate	1182	663	6.1+3+8	6.1, 10°(a)
Ethyl chlorothioformate	2826	83	8+3	8, 64°(b)
Ethyl crotonate	1862	33	3	3, 3°(b)
Ethyl cyanoacetate	2666	60	6.1	6.1, 12°(c)
Ethyl formate	1190	33	3	3, 3°(b)
Ethyl isobutyrate	2385	33	3	3, 3°(b)
Ethyl lactate	1192	30	3	3, 31°(c)
Ethyl mercaptan	2363	33	3+6.1	3, 2°(a)
Ethyl methacrylate	2277	339	3	3, 3°(b)
Ethyl methyl ketone (methyl ethyl ketone)	1193	33	3	3, 3°(b)
Ethyl nitrite solution	1194	336	3+6.1	3, 15°(a)
Ethyl orthoformate	2524	30	3	3, 31°(c)
Ethyl oxalate	2525	60	6.1	6.1, 14°(c)
Ethyl propionate	1195	33	3	3, 3°(b)
Ethyl propyl ether	2615	33	3	3, 3°(b)
Ethyl 2-chloropropionate	2935	30	3	3, 31°(c)
N-Ethyl-N-benzylaniline	2274	60	6.1	6.1, 12°(c)
Ethylamine, anhydrous	1036	236	3+6.1	2, 3°(bt)
Ethylamine, aqueous solution	2270	338	3+8	3, 22°(b)
N-Ethylaniline	2272	60	6.1	6.1, 12°(c)
2-Ethylaniline	2273	60	6.1	6.1, 12°(c)
Ethylbenzene	1175	33	3	3, 3°(b)
N-Ethylbenzyltoluidines	2753	60	6.1	6.1, 12°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2-Ethylbutanol	2275	30	3	3, 31°(c)
Ethylbutyl acetate	1177	30	3	3, 31°(c)
2-Ethylbutyraldehyde	1178	33	3	3, 3°(b)
Ethyldichloroarsine	1892	66	6.1	6.1, 34°(a)
Ethyldichlorosilane	1183	X338	4.3+3+8	4.3, 1°(a)
Ethylene	1962	23	3	2, 5°(b)
Ethylene chlorohydrin	1135	663	6.1+3	6.1, 16°(a)
Ethylene dibromide	1605	66	6.1	6.1, 15°(a)
Ethylene glycol diethyl ether	1153	30	3	3, 31°(c)
Ethylene glycol monobutyl ether	2369	60	6.1	6.1, 14°(c)
Ethylene glycol monoethyl ether	1171	30	3	3, 31°(c)
Ethylene glycol monoethyl ether acetate	1172	30	3	3, 31°(c)
Ethylene glycol monomethyl ether	1188	30	3	3, 31°(c)
Ethylene glycol monomethyl ether acetate	1189	30	3	3, 31°(c)
Ethylene oxide and propylene oxide mixture	2983	336	3+6.1	3, 17°(a)
Ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide	1041	236	3+6.1	2, 6°(ct)
Ethylene oxide containing not more than 10 % carbon dioxide by mass	1041	236	3+6.1	2, 4°(ct)
Ethylene oxide with nitrogen	1040	236	3+6.1	2, 4°(ct)
Ethylene, acetylene and propylene in mixture, refrigerated liquid	3138	223	3	2, 8°(b)
Ethylene, deeply-refrigerated	1038	223	3	2, 7°(b)
Ethylenediamine	1604	83	8+3	8, 54°(b)
Ethyleneimine, inhibited	1185	663	6.1+3	6.1, 4°
2-Ethylhexyl chloroformate	2748	68	6.1+8	6.1, 27°(b)
2-Ethylhexylamine	2276	38	3+8	3, 33°(c)
Ethylphenyldichlorosilane	2435	X80	8	8, 36°(b)
1-Ethylpiperidine	2386	338	3+8	3, 23°(b)
N-Ethyltoluidines	2754	60	6.1	6.1, 12°(b)
Ethyltrichlorosilane	1196	X338	3+8	3, 21°(b)
Extracts, aromatic, liquid	1169	30	3	3, 31°(c)
Extracts, aromatic, liquid	1169	33	3	3, 5°(a),(b),(c)
Extracts, flavouring, liquid	1197	33	3	3, 5°(a),(b),(c)
Extracts, flavouring, liquid	1197	30	3	3, 31°(c)
Ferric arsenate	1606	60	6.1	6.1, 51°(b)
Ferric arsenite	1607	60	6.1	6.1, 51°(b)
Ferric chloride, anhydrous	1773	80	8	8, 11°(c)
Ferric chloride solution	2582	80	8	8, 5°(c)
Ferric nitrate	1466	50	5.1	5.1, 22°(c)
Ferrocerium	1323	40	4.1	4.1, 13°(b)
Ferrosilicon	1408	462	4.3+6.1	4.3, 15°(c)

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Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Ferrous arsenate	1608	60	6.1	6.1, 51°(b)
Ferrous metal borings, shavings, turnings or cuttings	2793	40	4.2	4.2, 12°(c)
Fluoroboric acid	1775	80	8	8, 8°(b)
Fluoroacetic acid	2642	66	6.1	6.1, 17°(a)
Fluoroanilines	2941	60	6.1	6.1, 12°(c)
Fluorobenzene	2387	33	3	3, 3°(b)
Fluorophosphoric acid, anhydrous	1776	80	8	8, 8°(b)
Fluorosilicic acid	1778	80	8	8, 8°(b)
Fluorosulphonic acid	1777	88	8	8, 8°(a)
Fluorotoluenes	2388	33	3	3, 3°(b)
Formaldehyde solution	2209	80	8	8, 63°(c)
Formaldehyde solution, flammable	1198	38	3+8	3, 33°(c)
Formic acid	1779	80	8	8, 32°(b)1.
Fuel, aviation, turbine engine	1863	33	3	3, 1°(a), 2°(a),(b), 3°(b)
Fuel, aviation, turbine engine	1863	30	3	3, 31°(c)
Fumaryl chloride	1780	80	8	8, 35°(b)1.
Furan	2389	33	3	3, 1°a)
Furfural (furfuraldehyde)	1199	30	3	3, 31°(c)
Furfuryl alcohol	2874	60	6.1	6.1, 14°c)
Furfurylamine	2526	38	3+8	3, 33°(c)
Fusel oil	1201	33	3	3, 3°(b)
Fusel oil	1201	30	3	3, 31°(c)
Gallium	2803	80	8	8, 65°(c)
Gas mixture R 500	2602	20	2	2, 4°(a)
Gas mixture R 502	1973	20	2	2, 4°(a)
Gas mixture R 503	2599	20	2	2, 6°(a)
Gas oil	1202	30	3	3, 31°(c)
Glycerol alpha-monochlorohydrin	2689	60	6.1	6.1, 17°(c)
Glycidaldehyde	2622	336	3+6.1	3, 17°(b)
Guanidine nitrate	1467	50	5.1	5.1, 22°(c)
Hafnium powder, dry	2545	40	4.2	4.2, 12°(b),(c)
Hafnium powder, wetted	1326	40	4.1	4.1, 13°(b)
Heating oil (light)	1202	30	3	3, 31°(c)
Helium, compressed	1046	20	2	2, 1°(a)
Helium, deeply-refrigerated	1963	22	2	2, 7°(a)
n-Heptaldehyde	3056	30	3	3, 31°(c)
Heptanes	1206	33	3	3, 3°(b)
n-Heptene	2278	33	3	3, 3°(b)
Hexachloroacetone	2661	60	6.1	6.1, 17°(c)
Hexachlorobenzene	2729	60	6.1	6.1, 15°(c)

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Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Hexachlorobutadiene	2279	60	6.1	6.1, 15°(c)
Hexachlorocyclopentadiene	2646	66	6.1	6.1, 15°(a)
Hexachlorophene	2875	60	6.1	6.1, 17°(c)
Hexadecyltrichlorosilane	1781	X80	8	8, 36°(b)
Hexadiene	2458	33	3	3, 3°(b)
Hexaethyl tetraphosphate	1611	60	6.1	6.1, 23°(b)
Hexafluoroacetone hydrate	2552	60	6.1	6.1, 17°(b)
Hexafluoroethane (R 116)	2193	20	2	2, 5°(a)
Hexafluorophosphoric acid	1782	80	8	8, 8°(b)
Hexafluoropropylene (R 1216)	1858	26	6.1	2, 3°(at)
Hexaldehyde	1207	30	3	3, 31°(c)
Hexamethylene diisocyanate	2281	60	6.1	6.1, 19°(b)
Hexamethylenediamine, solid	2280	80	8	8, 52°(c)
Hexamethylenediamine, solution	1783	80	8	8, 53°(b), (c)
Hexamethyleneimine	2493	338	3+8	3, 23°(b)
Hexamethylenetetramine	1328	40	4.1	4.1, 6°(c)
Hexanes	1208	33	3	3, 3°(b)
Hexanols	2282	30	3	3, 31°(c)
1-Hexene	2370	33	3	3, 3°(b)
Hexyltrichlorosilane	1784	X80	8	8, 36°(b)
Hydrazine, aqueous solution	2030	86	8+6.1	8, 44°(b)
Hydrazine hydrate	2030	86	8+6.1	8, 44°(b)
Hydrazine, aqueous solution	3293	60	6.1	6.1, 65°(c)
Hydriodic acid, solution	1787	80	8	8, 5°(b),(c)
Hydrobromic acid, solution	1788	80	8	8, 5°(b),(c)
Hydrochloric acid, solution	1789	80	8	8, 5°(b),(c)
Hydrofluoric acid and sulphuric acid mixture	1786	886	8+6.1	8, 7°(a)
Hydrofluoric acid solution containing between 60 and 85 % hydrogen fluoride	1790	886	8+6.1	8, 7°(a)
Hydrofluoric acid solution containing less than 60 % hydrogen fluoride	1790	86	8+6.1	8, 7°(b)
Hydrofluoric acid solution containing more than 85 % hydrogen fluoride	1790	886	8+6.1	8, 6°
Hydrogen bromide	1048	286	8+6.1	2, 3°(at)
Hydrogen chloride	1050	286	8+6.1	2, 5°(at)
Hydrogen cyanide, aqueous solution (Hydrocyanic acid)	1613	663	6.1+3	6.1, 2°
Hydrogen cyanide, solution in alcohol	3294	663	6.1+3	6.1, 2°
Hydrogen fluoride, anhydrous	1052	886	8+6.1	8, 6°
Hydrogen peroxide and peroxyacetic acid mixture, stabilized	3149	58	5.1+8	5.1, 1°(b)
Hydrogen peroxide, aqueous solution	2014	58	5.1+8	5.1, 1°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Hydrogen peroxide, aqueous solution	2984	50	5.1	5.1, 1°(c)
Hydrogen peroxide, aqueous solution, stabilized	2015	559	5.1+8	5.1, 1°(a)
Hydrogen peroxide, stabilized	2015	559	5.1+8	5.1, 1°(a)
Hydrogen sulphide	1053	236	3+6.1	2, 3°(bt)
Hydrogen, compressed	1049	23	3	2, 1°(b)
Hydrogen, deeply-refrigerated	1966	223	3	2, 7°(b)
Hydroquinone	2662	60	6.1	6.1, 14°(c)
Hydroxylamine sulphate	2865	80	8	8, 16°(c)
Hypochlorite solution with between 5 and 16 % active chlorine	1791	80	8	8, 61°(b),(c)
3,3'-Iminodipropylamine	2269	80	8	8, 53°(c)
Iodine monochloride	1792	80	8	8, 12°(b)
Iodine pentafluoride	2495	568	5.1+6.1+8	5.1, 5°
2-Iodobutane	2390	33	3	3, 3°(b)
Iodomethylpropanes	2391	33	3	3, 3°(b)
Iodopropanes	2392	30	3	3, 31°(c)
Iron oxide, spent	1376	40	4.2	4.2, 16°(c)
Iron pentacarbonyl	1994	663	6.1+3	6.1, 3°
Iron sponge, spent	1376	40	4.2	4.2, 16°(c)
Isobutane	1969	23	3	2, 3°(b)
Isobutanol	1212	30	3	3, 31°(c)
Isobutyl acetate	1213	33	3	3, 3°(b)
Isobutyl acrylate, inhibited	2527	39	3	3, 31°(c)
Isobutyl formate	2393	33	3	3, 3°(b)
Isobutyl isobutyrate	2528	30	3	3, 31°(c)
Isobutyl isocyanate	2486	336	3+6.1	3, 14°(b)
Isobutyl methacrylate, inhibited	2283	39	3	3, 31°(c)
Isobutyl propionate	2394	33	3	3, 3°(b)
Isobutylamine	1214	338	3+8	3, 22°(b)
Isobutylene	1055	23	3	2, 3°(b)
Isobutyraldehyde	2045	33	3	3, 3°(b)
Isobutyric acid	2529	38	3+8	3, 33°(c)
Isobutyric anhydride	2530	38	3+8	3, 33°(c)
Isobutyronitrile	2284	336	3+6.1	3, 11°(b)
Isobutyryl chloride	2395	338	3+8	3, 25°(b)
Isocyanatobenzotrifluorides	2285	63	6.1+3	6.1, 18°(b)
Isoheptene	2287	33	3	3, 3°(b)
Isohexene	2288	33	3	3, 3°(b)
Isooctenes	1216	33	3	3, 3°(b)
Isopentenes	2371	33	3	3, 1°(a)
Isophorone diisocyanate	2290	60	6.1	6.1, 19°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Isophoronediamine	2289	80	8	8, 53°(c)
Isoprene, inhibited	1218	339	3	3, 2°(a)
Isopropanol (Isopropyl alcohol)	1219	33	3	3, 3°(b)
Isopropenyl acetate	2403	33	3	3, 3°(b)
Isopropenylbenzene	2303	30	3	3, 31°(c)
Isopropyl 2-chloropropionate	2934	30	3	3, 31°(c)
Isopropyl acetate	1220	33	3	3, 3°(b)
Isopropyl acid phosphate	1793	80	8	8, 38°(c)
Isopropyl butyrate	2405	30	3	3, 31°(c)
Isopropyl chloroacetate	2947	30	3	3, 31°(c)
Isopropyl isobutyrate	2406	33	3	3, 3°(b)
Isopropyl isocyanate	2483	336	3+6.1	3, 14°(a)
Isopropyl propionate	2409	33	3	3, 3°(b)
Isopropylamine	1221	338	3+8	3, 22°(a)
Isopropylbenzene (Cumene)	1918	30	3	3, 31°(c)
Kerosene	1223	30	3	3, 31°(c)
Krypton, compressed	1056	20	2	2, 1°(a)
Krypton, deeply-refrigerated	1970	22	2	2, 7°(a)
Lead acetate	1616	60	6.1	6.1, 62°(c)
Lead arsenates	1617	60	6.1	6.1, 51°(b)
Lead arsenites	1618	60	6.1	6.1, 51°(b)
Lead cyanide	1620	60	6.1	6.1, 41°(b)
Lead dioxide	1872	56	5.1+6.1	5.1, 29°(c)
Lead nitrate	1469	56	5.1+6.1	5.1, 29°(c)
Lead perchlorate	1470	56	5.1+6.1	5.1, 29°(b)
Lead phosphite, dibasic	2989	40	4.1	4.1, 11°(b),(c)
Lead sulphate	1794	80	8	8, 1°(b)
Lithium	1415	X423	4.3	4.3, 11°(a)
Lithium alkyls	2445	X333	4.2+4.3	4.2, 31°(a)
Lithium ferrosilicon	2830	423	4.3	4.3, 12°(b)
Lithium hydride, fused solid	2805	423	4.3	4.3, 16°(b)
Lithium hydroxide, monohydrate	2680	80	8	8, 41°(b)
Lithium hydroxide, solution	2679	80	8	8, 42°(b),(c)
Lithium hypochlorite, mixture or dry	1471	50	5.1	5.1, 15°(b)
Lithium nitrate	2722	50	5.1	5.1, 22°(c)
Lithium peroxide	1472	50	5.1	5.1, 25°(b)
Lithium silicon	1417	423	4.3	4.3, 12°(b)
London purple	1621	60	6.1	6.1, 51°(b)
Magnesium	1869	40	4.1	4.1, 13°(c)
Magnesium alkyls	3053	X333	4.2+4.3	4.2, 31°(a)
Magnesium alloys	1869	40	4.1	4.1, 13°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Magnesium arsenate	1622	60	6.1	6.1, 51°(b)
Magnesium bromate	1473	50	5.1	5.1, 16°(b)
Magnesium chlorate	2723	50	5.1	5.1, 11°(b)
Magnesium diamide	2004	40	4.2	4.2, 16°(b)
Magnesium diphenyl	2005	X333	4.2+4.3	4.2, 31°(a)
Magnesium fluorosilicate	2853	60	6.1	6.1, 64°(c)
Magnesium granules, coated	2950	423	4.3	4.3, 11°(c)
Magnesium nitrate	1474	50	5.1	5.1, 22°(c)
Magnesium perchlorate	1475	50	5.1	5.1, 13°(b)
Magnesium peroxide	1476	50	5.1	5.1, 25°(b)
Magnesium powder	1418	423	4.3+4.2	4.3, 14°(b)
Magnesium silicide	2624	423	4.3	4.3, 12°(b)
Maleic anhydride	2215	80	8	8, 31°(c)
Malononitrile	2647	60	6.1	6.1, 12°(b)
Maneb	2210	40	4.2+4.3	4.2, 16°(c)
Maneb preparation	2210	40	4.2+4.3	4.2, 16°(c)
Maneb preparation, stabilized	2968	423	4.3	4.3, 20°(c)
Maneb, stabilized	2968	423	4.3	4.3, 20°(c)
Manganese nitrate	2724	50	5.1	5.1, 22°(c)
Manganese resinate	1330	40	4.1	4.1, 12°(c)
Mercuric arsenate	1623	60	6.1	6.1, 51°(b)
Mercuric chloride	1624	60	6.1	6.1, 52°(b)
Mercuric nitrate	1625	60	6.1	6.1, 52°(b)
Mercurous nitrate	1627	60	6.1	6.1, 52°(b)
Mercury	2809	80	8	8, 66°(c)
Mercury acetate	1629	60	6.1	6.1, 52°(b)
Mercury ammonium chloride	1630	60	6.1	6.1, 52°(b)
Mercury benzoate	1631	60	6.1	6.1, 52°(b)
Mercury bromides	1634	60	6.1	6.1, 52°(b)
Mercury cyanide	1636	60	6.1	6.1, 41°(b)
Mercury gluconate	1637	60	6.1	6.1, 52°(b)
Mercury iodide	1638	60	6.1	6.1, 52°(b)
Mercury nucleate	1639	60	6.1	6.1, 52°(b)
Mercury oleate	1640	60	6.1	6.1, 52°(b)
Mercury oxide	1641	60	6.1	6.1, 52°(b)
Mercury oxycyanide, desensitized	1642	60	6.1	6.1, 41°(b)
Mercury potassium iodide	1643	60	6.1	6.1, 52°(b)
Mercury salicylate	1644	60	6.1	6.1, 52°(b)
Mercury sulphate	1645	60	6.1	6.1, 52°(b)
Mercury thiocyanate	1646	60	6.1	6.1, 52°(b)
Mesityl oxide	1229	30	3	3, 31°(c)

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Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Metal catalyst, dry	2881	40	4.2	4.2, 12°(b),(c)
Metal catalyst, wetted	1378	40	4.2	4.2, 12°(b)
Metaldehyde	1332	40	4.1	4.1, 6°(c)
Methacrylaldehyde, inhibited	2396	336	3+6.1	3, 17°(b)
Methacrylic acid, inhibited	2531	89	8	8, 32°(c)
Methacrylonitrile, inhibited	3079	336	3+6.1	3, 11°(a)
Methallyl alcohol	2614	30	3	3, 31°(c)
Methane, compressed	1971	23	3	2, 1°(b)
Methane, deeply-refrigerated	1972	223	3	2, 7°(b)
Methanesulphonyl chloride	3246	668	6.1+8	6.1, 27°(a)
Methanol	1230	336	3+6.1	3, 17°(b)
1-Methoxy-2-propanol	3092	30	3	3, 31°(c)
4-Methoxy-4-methylpentan-2-one	2293	30	3	3, 31°(c)
Methoxymethyl isocyanate	2605	336	3+6.1	3, 14°(a)
Methyl acetate	1231	33	3	3, 3°(b)
Methyl acrylate, inhibited	1919	339	3	3, 3°(b)
Methyl benzoate	2938	60	6.1	6.1, 14°(c)
Methyl bromide	1062	26	6.1	2, 3°(at)
Methyl bromide and ethylene dibromide mixture, liquid	1647	66	6.1	6.1, 15°(a)
Methyl bromoacetate	2643	60	6.1	6.1, 17°(b)
Methyl butyrate	1237	33	3	3, 3°(b)
Methyl chloride	1063	236	3+6.1	2, 3°(bt)
Methyl chloroacetate	2295	63	6.1+3	6.1, 16°(b)
Methyl chloroformate	1238	663	6.1+3+8	6.1, 10°(a)
Methyl chloromethyl ether	1239	663	6.1+3	6.1, 9°(a)
Methyl dichloroacetate	2299	60	6.1	6.1, 17°(c)
Methyl formate	1243	33	3	3, 1°(a)
Methyl iodide	2644	60	6.1	6.1, 15°(b)
Methyl isobutyl carbinol	2053	30	3	3, 31°(c)
Methyl isobutyl ketone	1245	33	3	3, 3°(b)
Methyl isopropenyl ketone, inhibited	1246	339	3	3, 3°(b)
Methyl isothiocyanate	2477	63	6.1+3	6.1, 20°(b)
Methyl isovalerate	2400	33	3	3, 3°(b)
Methyl magnesium bromide in ethyl ether	1928	X323	4.3+3	4.3, 3°(a)
Methyl mercaptan	1064	236	3+6.1	2, 3°(bt)
Methyl methacrylate monomer, inhibited	1247	339	3	3, 3°(b)
Methyl orthosilicate (Tetramethoxysilane)	2606	663	6.1+3	6.1, 8°(a)
Methyl propionate	1248	33	3	3, 3°(b)
Methyl propyl ether	2612	33	3	3, 2°(b)
Methyl propyl ketone	1249	33	3	3, 3°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Methyl tert-butyl ether	2398	33	3	3, 3°(b)
Methyl trichloroacetate	2533	60	6.1	6.1, 17°(c)
Methyl vinyl ether	1087	236	3+6.1	2, 3°(ct)
Methyl vinyl ketone	1251	339	3	3, 3°(b)
2-Methyl-1-butene	2459	33	3	3, 1°(a)
3-Methyl-1-butene (Isopropylethylene)	2561	33	3	3, 1°(a)
2-Methyl-2-butene	2460	33	3	3, 2°(b)
Methyl 2-chloropropionate	2933	30	3	3, 31°(c)
2-Methyl-5-ethylpyridine	2300	60	6.1	6.1, 12°(c)
Methylal	1234	33	3	3, 2°(b)
Methylallyl chloride	2554	33	3	3, 3°(b)
Methylamine, anhydrous	1061	236	3+6.1	2, 3°(bt)
Methylamine, aqueous solution	1235	338	3+8	3, 22°(b)
Methylamyl acetate	1233	30	3	3, 31°(c)
N-Methylaniline	2294	60	6.1	6.1, 12°(c)
alpha-Methylbenzyl alcohol	2937	60	6.1	6.1, 14°(c)
3-Methylbutan-2-one	2397	33	3	3, 3°(b)
N-Methylbutylamine	2945	338	3+8	3, 22°(b)
Methylcyclohexane	2296	33	3	3, 3°(b)
Methylcyclohexanols	2617	30	3	3, 31°(c)
Methylcyclohexanones	2297	30	3	3, 31°(c)
Methylcyclopentane	2298	33	3	3, 3°(b)
Methyldichlorosilane	1242	X338	4.3+3+8	4.3, 1°(a)
2-Methylfuran	2301	33	3	3, 3°(b)
5-Methylhexan-2-one	2302	30	3	3, 31°(c)
Methylhydrazine	1244	663	6.1+3+8	6.1, 7°(a)1.
Methylmorpholine	2535	338	3+8	3, 23°(b)
Methylpentadiene	2461	33	3	3, 3°(b)
2-Methylpentan-2-ol	2560	30	3	3, 31°(c)
Methylphenyldichlorosilane	2437	X80	8	8, 36°(b)
1-Methylpiperidine	2399	338	3+8	3, 23°(b)
Methyltetrahydrofuran	2536	33	3	3, 3°(b)
Methyltrichlorosilane	1250	X338	3+8	3, 21°(a)
alpha-Methylvaleraldehyde	2367	33	3	3, 3°(b)
Mixtures F1, F2 and F3	1078	20	2	2, 4°(a)
Mixtures of 1,3-butadiene and hydrocarbons	1010	239	3	2, 4°(c)
Mixtures of hydrocarbons (liquefied gases) (Mixtures A, A0, A1, B and C)	1965	23	3	2, 4°(b)
Mixtures of methyl bromide and chloropicrin (liquefied gas)	1581	26	6.1	2, 4°(at)
Mixtures of methyl bromide and ethylene bromide	1647	236	3+6.1	2, 4°(bt)
Mixtures of methyl chloride and chloropicrin (liquefied gas)	1582	236	3+6.1	2, 4°(bt)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Mixtures of methyl chloride and methylene chloride (liquefied gas)	1912	236	3+6.1	2, 4°(bt)
Mixtures of methylacetylene and propadiene with hydrocarbons	1060	239	3	2, 4°(c)
Molybdenum pentachloride	2508	80	8	8, 11°(c)
Morpholine	2054	30	3	3, 31°(c)
Motor fuel anti-knock mixture	1649	66	6.1	6.1, 31°(a)
Motor spirit	1203	33	3	3, 3°(b)
Naphthalene, crude or refined	1334	40	4.1	4.1, 6°(c)
Naphthalene, molten	2304	44	4.1	4.1, 5°
beta-Naphthylamine	1650	60	6.1	6.1, 12°(b)
alpha-Naphthylamine	2077	60	6.1	6.1, 12°(c)
Naphthylthiourea	1651	60	6.1	6.1, 21°(b)
Naphthylurea	1652	60	6.1	6.1, 12°(b)
Natural gas, compressed	1971	23	3	2, 2°(b)
Natural gas, deeply-refrigerated	1972	223	3	2, 8°(b)
Neon, compressed	1065	20	2	2, 1°(a)
Neon, deeply-refrigerated	1913	22	2	2, 7°(a)
Nickel carbonyl	1259	663	6.1+3	6.1, 3°
Nickel cyanide	1653	60	6.1	6.1, 41°(b)
Nickel nitrate	2725	50	5.1	5.1, 22°(c)
Nickel nitrite	2726	50	5.1	5.1, 23°(c)
Nicotine	1654	60	6.1	6.1, 90°(b)
Nicotine hydrochloride or nicotine hydrochloride solution	1656	60	6.1	6.1, 90°(b)
Nicotine salicylate	1657	60	6.1	6.1, 90°(b)
Nicotine sulphate, solid	1658	60	6.1	6.1, 90°(b)
Nicotine sulphate, solution	1658	60	6.1	6.1, 90°(b)
Nicotine tartrate	1659	60	6.1	6.1, 90°(b)
Nitrating acid mixture, spent, containing less than 50 % nitric acid	1826	80	8	8, 3°(b)
Nitrating acid mixture, spent, containing more than 50 % nitric acid	1826	885	8+05	8, 3°(a)
Nitrating acid, mixture containing less than 50 % nitric acid	1796	80	8	8, 3°(b)
Nitrating acid, mixture containing more than 50 % nitric acid	1796	885	8+05	8, 3°(a)
Nitric acid containing less than 70 % pure acid	2031	80	8	8, 2°(b)
Nitric acid containing more than 70 % pure acid	2031	885	8	8, 2°(a)1.
Nitric acid, red fuming	2032	856	8+05+6.1	8, 2°(a)2.
3-Nitro-4-chlorobenzotrifluoride	2307	60	6.1	6.1, 12°(b)
Nitroanilines (o-, m-, p-)	1661	60	6.1	6.1, 12°(b)
Nitroanisole	2730	60	6.1	6.1, 12°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Nitrobenzene	1662	60	6.1	6.1, 12°(b)
Nitrobenzenesulphonic acid	2305	80	8	8, 34°(b)
Nitrobenzotrifluorides	2306	60	6.1	6.1, 12°(b)
Nitrobromobenzene	2732	60	6.1	6.1, 12°(c)
Nitrocellulose solution, flammable	2059	33	3	3, 4°(a),(b)
Nitrocellulose solution, flammable	2059	30	3	3, 34°(c)
Nitrocresols (o-, m-, p-)	2446	60	6.1	6.1, 12°(c)
Nitroethane	2842	30	3	3, 31°(c)
Nitrogen dioxide (NO_2)	1067	265	6.1+05	2, 3°(at)
Nitrogen, compressed	1066	20	2	2, 1°(a)
Nitrogen, deeply-refrigerated	1977	22	2	2, 7°(a)
Nitronaphthalene	2538	40	4.1	4.1, 6°(c)
Nitrophenols	1663	60	6.1	6.1, 12°(c)
Nitropropanes	2608	30	3	3, 31°(c)
p-Nitrosodimethylaniline	1369	40	4.2	4.2, 5°(b)
Nitrosylsulphuric acid	2308	80	8	8, 1°(b)
Nitrotoluenes (o-, m-, p-)	1664	60	6.1	6.1, 12°(b)
Nitrotoluidines (mono)	2660	60	6.1	6.1, 12°(c)
Nitrous oxide (N_2O)	1070	25	2+05	2, 5°(a)
Nitrous oxide, deeply-refrigerated	2201	225	2+05	2, 7°(a)
Nitroxylenes (o-, m-, p-)	1665	60	6.1	6.1, 12°(b)
Nonanes	1920	30	3	3, 31°(c)
Nonyltrichlorosilane	1799	X80	8	8, 36°(b)
2,5-Norbornadiene (Dicycloheptadiene), inhibited	2251	339	3	3, 3°(b)
Octadecyltrichlorosilane	1800	X80	8	8, 36°(b)
Octadiene	2309	33	3	3, 3°(b)
Octafluorocyclobutane (RC 318)	1976	20	2	2, 3°(a)
Octanes	1262	33	3	3, 3°(b)
Octyl aldehydes (ethyl hexaldehydes)	1191	30	3	3, 31°(c)
tert-Octyl mercaptan	3023	63	6.1+3	6.1, 20°(b)
Octyltrichlorosilane	1801	X80	8	8, 36°(b)
Oxygen, compressed	1072	20	2+05	2, 1°(a)
Oxygen, deeply-refrigerated	1073	225	2+05	2, 7°(a)
Paint	1263	30	3	3, 31°(c)
Paint	1263	33	3	3, 5°(a),(b),(c)
Paint or paint related material	3066	80	8	8, 66°(b),(c)
Paint related material	1263	30	3	3, 31°(c)
Paint related material	1263	33	3	3, 5°(a),(b),(c)
Paper, unsaturated oil treated	1379	40	4.2	4.2, 3°(c)
Paraformaldehyde	2213	40	4.1	4.1, 6°(c)
Paraldehyde	1264	30	3	3, 31°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Pentaborane	1380	333	4.2+6.1	4.2, 19°(a)
Pentachloroethane	1669	60	6.1	6.1, 15°(b)
Pentachlorophenol	3155	60	6.1	6.1, 17°(b)
Pentafluoroethane (R 125)	3220	20	2	2, 5°(a)
Pentamethylheptane (Isododecane)	2286	30	3	3, 31°(c)
Pentan-2,4-dione	2310	30	3	3, 31°(c)
Pentanes, liquid	1265	33	3	3, 1°(a)
Pentanes, liquid	1265	33	3	3, 2°(b)
1-Pentene (n-Amylene)	1108	33	3	3, 1°(a)
1-Pentol	2705	80	8	8, 66°(b)
Perchloric acid	1802	85	8	8, 4°(b)
Perchloric acid, with more than 50 % but not more than 72 % acid, by mass	1873	558	5.1+8	5.1, 3°(a)
Perchloromethyl mercaptan	1670	66	6.1	6.1, 17°(a)
Perfumery products	1266	33	3	3, 5°(a),(b),(c)
Perfumery products	1266	30	3	3, 31°(c)
Petroleum crude oil	1267	33	3	3, 1°(a), 2°(a),(b), 3°(b)
Petroleum crude oil	1267	30	3	3, 31°(c)
Phenacyl bromide	2645	60	6.1	6.1, 17°(b)
Phenetidines	2311	60	6.1	6.1, 12°(c)
Phenol solution	2821	60	6.1	6.1, 14°(b),(c)
Phenol, molten	2312	60	6.1	6.1, 24°(b)
Phenol, solid	1671	60	6.1	6.1, 14°(b)
Phenolates, liquid	2904	80	8	8, 62°(c)
Phenolates, solid	2905	80	8	8, 62°(c)
Phenolsulphonic acid, liquid	1803	80	8	8, 34°(b)
Phenyl chloroformate	2746	68	6.1+8	6.1, 27°(b)
Phenyl isocyanate	2487	63	6.1+3	6.1, 18°(b)
Phenyl mercaptan	2337	663	6.1+3	6.1, 20°(a)
Phenylacetonitrile, liquid	2470	60	6.1	6.1, 12°(c)
Phenylacetyl chloride	2577	80	8	8, 35°(b)1.
Phenylcarbylamine chloride	1672	66	6.1	6.1, 17°(a)
Phenylenediamines (o-, m-, p-)	1673	60	6.1	6.1, 12°(c)
Phenylhydrazine	2572	60	6.1	6.1, 12°(b)
Phenylmercuric acetate	1674	60	6.1	6.1, 33°(b)
Phenylmercuric hydroxide	1894	60	6.1	6.1, 33°(b)
Phenylmercuric nitrate	1895	60	6.1	6.1, 33°(b)
Phenylphosphorus dichloride	2798	80	8	8, 35°(b)1.
Phenylphosphorus thiodichloride	2799	80	8	8, 35°(b)1.
Phenyltrichlorosilane	1804	X80	8	8, 36°(b)
Phosgene	1076	266	6.1+8	2, 3°(at)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
9-Phosphabicyclononanes (cyclooctadiene phosphines)	2940	40	4.2	4.2, 5°(b)
Phosphoric acid	1805	80	8	8, 17°(c)
Phosphorous acid	2834	80	8	8, 16°(c)
Phosphorus oxychloride	1810	80	8	8, 12°(b)
Phosphorus, white or yellow, dry	1381	46	4.2+6.1	4.2, 11°(a)
Phosphorus heptasulphide	1339	40	4.1	4.1, 11°(b)
Phosphorus oxybromide	1939	80	8	8, 11°(b)
Phosphorus oxybromide, molten	2576	80	8	8, 15°
Phosphorus pentabromide	2691	80	8	8, 11°(b)
Phosphorus pentachloride	1806	80	8	8, 11°(b)
Phosphorus pentasulphide	1340	423	4.3	4.3, 20°(b)
Phosphorus pentoxide	1807	80	8	8, 16°(b)
Phosphorus sesquisulphide	1341	40	4.1	4.1, 11°(b)
Phosphorus tribromide	1808	80	8	8, 12°(b)
Phosphorus trichloride	1809	886	8+6.1	8, 12°(a)
Phosphorus trioxide	2578	80	8	8, 16°(c)
Phosphorus trisulphide	1343	40	4.1	4.1, 11°(b)
Phosphorus, amorphous	1338	40	4.1	4.1, 11°(c)
Phosphorus, white or yellow, molten	2447	446	4.2+6.1	4.2, 22°
Phthalic anhydride	2214	80	8	8, 31°(c)
Picolines	2313	30	3	3, 31°(c)
Pine oil	1272	30	3	3, 31°(c)
alpha-Pinene	2368	30	3	3, 31°(c)
Piperazine	2579	80	8	8, 52°(c)
Piperidine	2401	338	3+8	3, 23°(b)
Polychlorinated biphenyls	2315	90	9	9, 2°(b)
Polyhalogenated biphenyls, liquid	3151	90	9	9, 2°(b)
Polyhalogenated biphenyls, solid	3152	90	9	9, 2°(b)
Polyhalogenated terphenyls, liquid	3151	90	9	9, 2°(b)
Polyhalogenated terphenyls, solid	3152	90	9	9, 2°(b)
Polymeric beads, expandable	2211	90	9	9, 4°(c)
Potassium	2257	X423	4.3	4.3, 11°(a)
Potassium arsenate	1677	60	6.1	6.1, 51°(b)
Potassium arsenite	1678	60	6.1	6.1, 51°(b)
Potassium bromate	1484	50	5.1	5.1, 16°(b)
Potassium chlorate	1485	50	5.1	5.1, 11°(b)
Potassium chlorate aqueous solution	2427	50	5.1	5.1, 11°(b)
Potassium cuprocyanide	1679	60	6.1	6.1, 41°(b)
Potassium dithionite	1929	40	4.2	4.2, 13°(b)
Potassium fluoride	1812	60	6.1	6.1, 63°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Potassium fluoroacetate	2628	66	6.1	6.1, 17°(a)
Potassium fluorosilicate	2655	60	6.1	6.1, 64°(c)
Potassium hydrogen sulphate	2509	80	8	8, 13°(b)
Potassium hydrogendifluoride	1811	86	8+6.1	8, 9°(b)
Potassium hydroxide solution	1814	80	8	8, 42°(b),(c)
Potassium hydroxide, solid	1813	80	8	8, 41°(b)
Potassium metal alloys	1420	X423	4.3	4.3, 11°(a)
Potassium metavanadate	2864	60	6.1	6.1, 58°(b)
Potassium monoxide	2033	80	8	8, 41°(b)
Potassium nitrate	1486	50	5.1	5.1, 22°(c)
Potassium nitrate and sodium nitrite mixtures	1487	50	5.1	5.1, 24°(b)
Potassium nitrite	1488	50	5.1	5.1, 23°(b)
Potassium perchlorate	1489	50	5.1	5.1, 13°(b)
Potassium permanganate	1490	50	5.1	5.1, 17°(b)
Potassium persulphate	1492	50	5.1	5.1, 18°(c)
Potassium sodium alloys	1422	X423	4.3	4.3, 11°(a)
Potassium sulphide, anhydrous	1382	40	4.2	4.2, 13°(b)
Potassium sulphide, hydrated	1847	80	8	8, 45°(b)1.
Potassium sulphide, with less than 30 % water of crystallisation	1382	40	4.2	4.2, 13°(b)
Printing ink	1210	33	3	3,5°(a),(b), (c)
Printing ink	1210	30	3	3,31°(c)
Propane, technically-pure	1978	23	3	2, 3°(b)
Propanethiols (propyl mercaptans)	2402	33	3	3, 3°(b)
n-Propanol	1274	33	3	3, 3°(b)
n-Propanol	1274	30	3	3, 31°(c)
Propionaldehyde	1275	33	3	3, 3°(b)
Propionic acid	1848	80	8	8, 32°(c)
Propionic anhydride	2496	80	8	8, 32°(c)
Propionitrile	2404	336	3+6.1	3, 11°(b)
Propionyl chloride	1815	338	3+8	3, 25°(b)
n-Propyl acetate	1276	33	3	3, 3°(b)
n-Propyl chloroformate	2740	668	6.1+8+3	6.1, 28°(a)
Propyl formates	1281	33	3	3, 3°(b)
n-Propyl isocyanate	2482	663	6.1+3	6.1, 6°(a)
Propylamine	1277	338	3+8	3, 22°(b)
n-Propylbenzene	2364	30	3	3, 31°(c)
Propylene	1077	23	3	2, 3°(b)
Propylene chlorohydrin	2611	63	6.1+3	6.1, 16°(b)
Propylene oxide, inhibited	1280	339	3	3, 2°(a)
Propylene tetramer	2850	30	3	3, 31°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1,2-Propylenediamine	2258	83	8+3	8, 54°(b)
Propyleneimine, inhibited	1921	336	3+6.1	3, 12°
Propyltrichlorosilane	1816	X83	8+3	8, 37°(b)
Pyridine	1282	33	3	3, 3°(b)
Pyrosulphuryl chloride	1817	80	8	8, 12°(b)
Pyrrolidine	1922	338	3+8	3, 23°(b)
Quinoline	2656	60	6.1	6.1, 12°(c)
Resin solution, flammable	1866	33	3	3, 5°(a),(b),(c)
Resin solution, flammable	1866	30	3	3, 31°(c)
Resorcinol	2876	60	6.1	6.1, 14°(c)
Rosin oil	1286	30	3	3, 31°(c)
Rosin oil	1286	33	3	3, 5°(a),(b),(c)
Rubber scrap or shoddy	1345	40	4.1	4.1, 1°(b)
Rubber solution	1287	33	3	3, 5°(a),(b),(c)
Rubber solution	1287	30	3	3, 31°(c)
Rubidium	1423	X423	4.3	4.3, 11°(a)
Rubidium hydroxide	2678	80	8	8, 41°(b)
Rubidium hydroxide solution	2677	80	8	8, 42°(b),(c)
Seed cake	1386	40	4.2	4.2, 2°(c)
Seed cake	2217	40	4.2	4.2, 2°(c)
Selenium disulphide	2657	60	6.1	6.1, 55°(b)
Selenium oxychloride	2879	886	8+6.1	8, 12°(a)
Selenium powder	2658	60	6.1	6.1, 55°(c)
Shale oil	1288	30	3	3, 31°(c)
Shale oil	1288	33	3	3, 3°(b)
Silicon powder, amorphous	1346	40	4.1	4.1, 13°(c)
Silicon tetrachloride	1818	80	8	8, 12°(b)
Silver arsenite	1683	60	6.1	6.1, 51°(b)
Silver cyanide	1684	60	6.1	6.1, 41°(b)
Silver nitrate	1493	50	5.1	5.1, 22°(b)
Sludge acid	1906	80	8	8, 1°(b)
Soda lime	1907	80	8	8, 41°(c)
Sodium	1428	X423	4.3	4.3, 11°(a)
Sodium aluminate, solution	1819	80	8	8, 42°(b),(c)
Sodium aluminium hydride	2835	423	4.3	4.3, 16°(b)
Sodium ammonium vanadate	2863	60	6.1	6.1, 58°(b)
Sodium arsanilate	2473	60	6.1	6.1, 34°(c)
Sodium arsenate	1685	60	6.1	6.1, 51°(b)
Sodium arsenite, aqueous solution	1686	60	6.1	6.1, 51°(b),(c)
Sodium arsenite, solid	2027	60	6.1	6.1, 51°(b)
Sodium bromate	1494	50	5.1	5.1, 16°(b)

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Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Sodium cacodylate	1688	60	6.1	6.1, 51°(b)
Sodium chlorate	1495	50	5.1	5.1, 11°(b)
Sodium chlorate, aqueous solution	2428	50	5.1	5.1, 11°(b)
Sodium chlorite	1496	50	5.1	5.1, 14°(b)
Sodium chloroacetate	2659	60	6.1	6.1, 17°(c)
Sodium cuprocyanide solution	2317	66	6.1	6.1, 41°(a)
Sodium dithionite (Sodium hydrosulphite)	1384	40	4.2	4.2, 13°(b
Sodium fluoride	1690	60	6.1	6.1, 63°(c)
Sodium fluoroacetate	2629	66	6.1	6.1, 17°(a)
Sodium fluorosilicate	2674	60	6.1	6.1, 64°(c)
Sodium hydrogendifluoride	2439	80	8	8, 9°(b)
Sodium hydrosulphide hydrated	2318	40	4.2	4.2, 13°(b)
Sodium hydrosulphide	2949	80	8	8, 45°(b)1.
Sodium hydroxide solution	1824	80	8	8, 42°(b),(c)
Sodium hydroxide, solid	1823	80	8	8, 41°(b)
Sodium methylate	1431	48	4.2+8	4.2, 15°(b)
Sodium methylate solution	1289	338	3+8	3, 24°(b)
Sodium methylate solution	1289	38	3+8	3, 33°(c)
Sodium monoxide	1825	80	8	8, 41°(b)
Sodium nitrate	1498	50	5.1	5.1, 22°(c)
Sodium nitrate and potassium nitrate mixture	1499	50	5.1	5.1, 22°(c)
Sodium nitrite	1500	50	5.1	5.1, 23°(c)
Sodium pentachlorophenate	2567	60	6.1	6.1, 17°(b)
Sodium percarbonates	2467	50	5.1	5.1, 19°(c)
Sodium perchlorate	1502	50	5.1	5.1, 13°(b)
Sodium permanganate	1503	50	5.1	5.1, 17°(b)
Sodium peroxoborate, anhydrous	3247	50	5.1	5.1, 27°(b)
Sodium persulphate	1505	50	5.1	5.1, 18°(c)
Sodium sulphide, anhydrous	1385	40	4.2	4.2, 13°(b)
Sodium sulphide, hydrated	1849	80	8	8, 45°(b)1.
Sodium sulphide, with less than 30 % water of crystallisation	1385	40	4.2	4.2, 13°(b)
Stannic chloride pentahydrate	2440	80	8	8, 11°(c)
Stannic chloride, anhydrous	1827	80	8	8, 12°(b)
Strontium arsenite	1691	60	6.1	6.1, 51°(b)
Strontium chlorate	1506	50	5.1	5.1, 11°(b)
Strontium nitrate	1507	50	5.1	5.1, 22°(c)
Strontium perchlorate	1508	50	5.1	5.1, 13°(b)
Strontium peroxide	1509	50	5.1	5.1, 25°(b)
Strychnine or strychnine, salts	1692	66	6.1	6.1, 90°(a)
Styrene monomer, inhibited (Vinylbenzene)	2055	39	3	3, 31°(c)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Sulphamic acid	2967	80	8	8, 16°(c)
Sulphur	1350	40	4.1	4.1, 11°(c)
Sulphur chlorides	1828	X88	8	8, 12°(a)
Sulphur dioxide	1079	26	6.1	2, 3°(at)
Sulphur hexafluoride	1080	20	2	2, 5°(a)
Sulphur trioxide, inhibited	1829	X88	8	8, 1°(a)
Sulphur, molten	2448	44	4.1	4.1, 15°
Sulphuric acid, containing more than 51 % acid	1830	80	8	8, 1°(b)
Sulphuric acid, fuming	1831	X886	8+6.1	8, 1°(a)
Sulphuric acid, spent	1832	80	8	8, 1°(b)
Sulphuric acid, with more than 51 % acid	2796	80	8	8, 1°(b)
Sulphurous acid	1833	80	8	8, 1°(b)
Sulphuryl chloride	1834	X88	8	8, 12°(a)
Synthesis gas	2600	236	3+6.1	2, 2°(bt)
Tars, liquid	1999	30	3	3, 31°(c)
Tars, liquid	1999	33	3	3, 5°(b),(c)
Terpinolene	2541	30	3	3, 31°(c)
Tetrabromoethane	2504	60	6.1	6.1, 15°(c)
1,1,2,2-Tetrachloroethane	1702	60	6.1	6.1, 15°(b)
Tetrachloroethylene	1897	60	6.1	6.1, 15°(c)
Tetraethyl dithiopyrophosphate	1704	60	6.1	6.1, 23°(b)
Tetraethyl silicate	1292	30	3	3, 31°(c)
Tetraethylenepentamine	2320	80	8	8, 53°(c)
1,1,1,2-Tetrafluorethane (R 134a)	3159	20	2	2, 3°(a)
Tetrafluoromethane (R 14)	1982	20	2	2, 1°(a)
1,2,3,6-Tetrahydrobenzaldehyde	2498	30	3	3, 31°(c)
Tetrahydrofuran	2056	33	3	3, 3°(b)
Tetrahydrofurfurylamine	2943	30	3	3, 31°(c)
Tetrahydrophthalic anhydrides	2698	80	8	8, 31°(c)
1,2,3,6-Tetrahydropyridine	2410	33	3	3, 3°(b)
Tetrahydrothiophene (thiolanne)	2412	33	3	3, 3°(b)
Tetramethylammonium hydroxide	1835	80	8	8, 51°(b)
Tetramethylsilane	2749	33	3	3, 1°(a)
Tetranitromethane	1510	559	5.1+6.1	5.1, 2°(a)
Tetrapropyl orthotitanate	2413	30	3	3, 31°(c)
Thallium chlorate	2573	56	5.1+6.1	5.1, 29°(b)
Thallium nitrate	2727	65	6.1+05	6.1, 68°(b)
Thioacetic acid	2436	33	3	3, 3°(b)
Thioglycol	2966	60	6.1	6.1, 21°(b)
Thioglycolic acid	1940	80	8	8, 32°(b)1.
Thiolactic acid	2936	60	6.1	6.1, 21°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Thionyl chloride	1836	X88	8	8, 12°(a)
4-Thiapentanal	2785	60	6.1	6.1, 21°(c)
Thiophene	2414	33	3	3, 3°(b)
Thiophosgene	2474	60	6.1	6.1, 21°(b)
Thiophosphoryl chloride	1837	80	8	8, 12°(b)
Tinctures, medicinal	1293	30	3	3, 31°(c)
Tinctures, medicinal	1293	33	3	3, 3°(b)
Titanium disulphide	3174	40	4.2	4.2, 13°(c)
Titanium hydride	1871	40	4.1	4.1, 14°(b)
Titanium powder, dry	2546	40	4.2	4.2, 12°(b),(c)
Titanium powder, wetted	1352	40	4.1	4.1, 13°(b)
Titanium sponge, powder or granules	2878	40	4.1	4.1, 13°(c)
Titanium tetrachloride	1838	80	8	8, 12°(b)
Titanium trichloride mixture	2869	80	8	8, 11°(b),(c)
Toluene	1294	33	3	3, 3°(b)
Toluene diisocyanate	2078	60	6.1	6.1, 19°(b)
Toluidines	1708	60	6.1	6.1, 12°(b)
2,4-Toluylenediamine	1709	60	6.1	6.1, 12°(c)
Town gas	2600	236	3+6.1	2, 2°(bt)
Triallyl borate	2609	60	6.1	6.1, 14°(c)
Triallylamine	2610	38	3+8	3, 33°(c)
Tributylamine	2542	80	8	8, 53°(c)
Trichloroacetic acid	1839	80	8	8, 31°(b)
Trichloroacetic acid solution	2564	80	8	8, 32°(c)
Trichloroacetic acid solution	2564	80	8	8, 32°(b)1.
Trichloroacetyl chloride	2442	X80	8	8, 35°(b)1.
Trichlorobenzenes, liquid	2321	60	6.1	6.1, 15°(c)
Trichlorobutene	2322	60	6.1	6.1, 15°(b)
1,1,1-Trichloroethane	2831	60	6.1	6.1, 15°(c)
Trichloroethylene	1710	60	6.1	6.1, 15°(c)
Trichloroisocyanuric acid, dry	2468	50	5.1	5.1, 26°(b)
Trichlorosilane	1295	X338	4.3+3+8	4.3, 1°(a)
Tricresyl phosphate	2574	60	6.1	6.1, 23°(b)
Triethyl phosphite	2323	30	3	3, 31°(c)
Triethylamine	1296	338	3+8	3, 22°(b)
Triethylenetetramine	2259	80	8	8, 53°(b)
Trifluoroacetic acid	2699	88	8	8, 32°(a)
Trifluorochloroethylene (R 1113)	1082	236	3+6.1	2, 3°(ct)
1,1,1-Trifluoroethane	2035	23	3	2, 3°(b)
Trifluoromethane (R 23)	1984	20	2	2, 5°(a)
2-Trifluoromethylaniline	2942	60	6.1	6.1, 12°(c)
3-Trifluoromethylaniline	2948	60	6.1	6.1, 17°(b)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Tris-(1-aziridinyl) phosphine oxide solution	2501	60	6.1	6.1, 23°(b),(c)
Triisobutylene (Isobutylene trimer)	2324	30	3	3, 31°(c)
Triisocyanatoisocyanurate of isophoronediisocyanate, solution	2906	30	3	3, 31°(c)
Triisopropyl borate	2616	30	3	3, 31°(c)
Triisopropyl borate	2616	33	3	3, 3°(b)
Trimethyl borate	2416	33	3	3, 3°(b)
Trimethyl phosphite	2329	30	3	3, 31°(c)
Trimethylacetyl chloride	2438	663	6.1+3+8	6.1, 10°(a)
Trimethylamine, anhydrous	1083	236	3+6.1	2, 3°(bt)
Trimethylamine, aqueous solution	1297	338	3+8	3, 22°(a),(b)
Trimethylamine, aqueous solution	1297	38	3+8	3, 33°(c)
1,3,5-Trimethylbenzene	2325	30	3	3, 31°(c)
Trimethylchlorosilane	1298	X338	3+8	3, 21°(b)
Trimethylcyclohexylamine	2326	80	8	8, 53°(c)
Trimethylhexamethylene diisocyanate	2328	60	6.1	6.1, 19°(c)
Trimethylhexamethylenediamine	2327	80	8	8, 53°(c)
Tripropylamine	2260	38	3+8	3, 33°(c)
Tripropylene	2057	33	3	3, 3°(b)
Tripropylene	2057	30	3	3, 31°(c)
Turpentine	1299	30	3	3, 31°(c)
Turpentine substitute	1300	33	3	3, 3°(b)
Turpentine substitute	1300	30	3	3, 31°(c)
Undecane	2330	30	3	3, 31°(c)
Uranyl nitrate hexahydrate solution	2980	78	7A,7B or 7C+8	7, Sch 5,6 or 13
Urea hydrogen peroxide	1511	58	5.1+8	5.1, 31°(c)
Valeraldehyde	2058	33	3	3, 3°(b)
Valeryl chloride	2502	83	8+3	8, 35°(b)2.
Vanadium oxytrichloride	2443	80	8	8, 12°(b)
Vanadium pentoxide	2862	60	6.1	6.1, 58°(b)
Vanadium tetrachloride	2444	88	8	8, 12°(a)
Vanadium trichloride	2475	80	8	8, 11°(c)
Vanadyl sulphate	2931	60	6.1	6.1, 58°(b)
Vinyl acetate, inhibited	1301	339	3	3, 3°(b)
Vinyl bromide	1085	236	3+6.1	2, 3°(ct)
Vinyl butyrate, inhibited	2838	339	3	3, 3°(b)
Vinyl chloride	1086	239	3	2, 3°(c)
Vinyl chloroacetate	2589	63	6.1+3	6.1, 16°(b)
Vinyl ethyl ether, inhibited	1302	339	3	3, 2°(a)
Vinyl fluoride	1860	239	3	2, 5°(c)
Vinyl isobutyl ether, inhibited	1304	339	3	3, 3°(b)
Vinylidene chloride, inhibited	1303	339	3	3, 1°(a)

250 000 *(cont'd)*

Name of substance	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Vinyltoluene, inhibited (o-, m-, p-)	2618	39	3	3, 31°(c)
Vinylpyridines, inhibited	3073	639	6.1+3	6.1, 11°(b)
Vinyltrichlorosilane, inhibited	1305	X338	3+8	3, 21°(a)
Water gas	2600	236	3+6.1	2, 2°(bt)
White asbestos (Actinolite, Anthophyllite, Chrysotile or Tremolite)	2590	90	9	9, 1°(c)
Wood preservatives, liquid	1306	33	3	3, 5°(b),(c)
Wood preservatives, liquid	1306	30	3	3, 31°(c)
Xenon	2036	20	2	2, 5°(a)
Xenon, deeply-refrigerated	2591	22	2	2, 7°(a)
Xylenes	1307	30	3	3, 31°(c)
Xylenes	1307	33	3	3, 3°(b)
Xylenols	2261	60	6.1	6.1, 14°(b)
Xylidines	1711	60	6.1	6.1, 12°(b)
Xylyl bromide	1701	60	6.1	6.1, 15°(b)
Zinc ammonium nitrite	1512	50	5.1	5.1, 23°(b)
Zinc arsenate	1712	60	6.1	6.1, 51°(b)
Zinc arsenate and zinc arsenite mixture	1712	60	6.1	6.1, 51°(b)
Zinc arsenite	1712	60	6.1	6.1, 51°(b)
Zinc ashes	1435	423	4.3	4.3, 13°(c)
Zinc bromate	2469	50	5.1	5.1, 16°(c)
Zinc chlorate	1513	50	5.1	5.1, 11°(b)
Zinc chloride solution	1840	80	8	8, 5°(c)
Zinc chloride, anhydrous	2331	80	8	8, 11°(c)
Zinc cyanide	1713	66	6.1	6.1, 41°(a)
Zinc dust	1436	423	4.3+4.2	4.3, 14°(b),(c)
Zinc fluorosilicate	2855	60	6.1	6.1, 64°(c)
Zinc nitrate	1514	50	5.1	5.1, 22°(b)
Zinc permanganate	1515	50	5.1	5.1, 17°(b)
Zinc peroxide	1516	50	5.1	5.1, 25°(b)
Zinc powder	1436	423	4.3+4.2	4.3, 14°(b),(c)
Zinc resinate	2714	40	4.1	4.1, 12°(c)
Zirconium hydride	1437	40	4.1	4.1, 14°(b)
Zirconium nitrate	2728	50	5.1	5.1, 22°(c)
Zirconium powder, dry	2008	40	4.2	4.2, 12°(b),(c)
Zirconium powder, wetted	1358	40	4.1	4.1, 13°(b)
Zirconium scrap	1932	40	4.2	4.2, 12°(c)
Zirconium suspended in a flammable liquid	1308	33	3	3, 1°(a), 2°(a),(b), 3°(b)
Zirconium suspended in a flammable liquid	1308	30	3	3, 31°(c)
Zirconium tetrachloride	2503	80	8	8, 11°(c)
Zirconium, dry	2858	40	4.1	4.1, 13°(c)

250 000
(cont'd)

TABLE 2

List of collective headings or n.o.s. entries which are not listed by name, or which do not fall under a collective heading in Table 1

This table includes two types of collective headings or n.o.s. entries:

— specific collective headings or n.o.s. entries applicable to groups of chemical compounds of the same type;

— general collective headings or n.o.s. entries applicable to groups of substances which present similar primary and secondary hazards.

Substances may only be classified under a general collective heading or n.o.s. entry if they cannot be classified under a specific collective heading or n.o.s. entry.

Note: This table applies only to substances not included in Table 1.

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Class 3: Flammable liquids				
Specific n.o.s. entries or specific collective headings				
Petroleum distillates, n.o.s.	1268	33	3	3, 1°(a)
	1268	33	3	3, 2°(a)
	1268	33	3	3, 2°(b)
	1268	33	3	3, 3°(b)
	1268	30	3	3, 31°(c)
Petroleum products, n.o.s.	1268	33	3	3, 1°(a)
	1268	33	3	3, 2°(a)
	1268	33	3	3, 2°(b)
	1268	33	3	3, 3°(b)
	1268	30	3	3, 31°(c)
Hydrocarbons, liquid, n.o.s.	3295	33	3	3, 1°(a)
	3295	33	3	3, 2°(a)
	3295	33	3	3, 2°(b)
	3295	33	3	3, 3°(b)
	3295	30	3	3, 31°(c)
Aldehydes, flammable, n.o.s.	1989	33	3	3, 2°(b)
	1989	33	3	3, 3°(b)
	1989	30	3	3, 31°(c)
Alcohols, flammable, n.o.s.	1987	33	3	3, 2°(b)
	1987	33	3	3, 3°(b)
	1987	30	3	3, 31°(c)
Ketones, n.o.s.	1224	33	3	3, 2°(b)
	1224	33	3	3, 3°(b)
	1224	30	3	3, 31°(c)
Ethers, n.o.s.	3271	33	3	3, 3°(b)
	3271	30	3	3, 31°(c)
Esters, n.o.s.	3272	33	3	3, 3°(b)
	3272	30	3	3, 31°(c)
Nitriles, flammable, toxic, n.o.s.	3273	336	3+6.1	3, 11°(a),(b)
Isocyanates or isocyanate solution, flammable, toxic, n.o.s.	2478	336	3+6.1	3, 14°(b)
	2478	36	3+6.1	3, 32°(c)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Alcohols, flammable, toxic, n.o.s.	1986 1986	336 36	3+6.1 3+6.1	3, 17°(a),(b) 3, 32°(c)
Aldehydes, flammable, toxic, n.o.s.	1988 1988	336 36	3+6.1 3+6.1	3, 17°(a),(b) 3, 32°(c)
Mercaptans or mercaptan mixture, liquid, flammable, toxic, n.o.s.	1228 1228	336 36	3+6.1 3+6.1	3, 18°(b) 3, 32°(c)
Medicine, liquid, flammable, toxic, n.o.s.	3248 3248	336 36	3+6.1 3+6.1	3, 19°(b) 3, 32°(c)
Chlorosilanes, flammable, corrosive, n.o.s.	2985	338	3+8	3, 21°(b)
Amines or polyamines, flammable, corrosive, n.o.s.	2733 2733	338 38	3+8 3+8	3, 22°(a),(b) 3, 33°(c)
Alcoholates solution, n.o.s.	3274	338	3+8	3, 24°(b)
Terpene hydrocarbons, n.o.s.	2319	30	3	3, 31°(c)
Pesticides				
Organophosphorous pesticide, liquid, flammable, toxic	2784	336	3+6.1	3, 41°(a),(b)
Organochlorine pesticide, liquid, flammable, toxic	2762	336	3+6.1	3, 42°(a),(b)
Phenoxy pesticide, liquid, flammable, toxic	2766	336	3+6.1	3, 43°(a),(b)
Carbamate pesticide, liquid, flammable, toxic	2758	336	3+6.1	3, 44°(a),(b)
Mercury based pesticide, liquid, flammable, toxic	2778	336	3+6.1	3, 45°(a),(b)
Organotin pesticide, liquid, flammable, toxic	2787	336	3+6.1	3, 46°(a),(b)
Coumarin derivative pesticide, liquid, flammable, toxic	3024	336	3+6.1	3, 47°(a),(b)
Bipyridilium pesticide, liquid, flammable, toxic	2782	336	3+6.1	3, 48°(a),(b)
Arsenical pesticide, liquid, flammable, toxic	2760	336	3+6.1	3, 49°(a),(b)
Copper based pesticide, liquid, flammable, toxic	2776	336	3+6.1	3, 50°(a),(b)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Substituted nitrophenol pesticide, liquid, flammable, toxic	2780	336	3+6.1	3, 51°(a),(b)
Triazine pesticide, liquid, flammable, toxic	2764	336	3+6.1	3, 52°(a),(b)
Benzoic derivative pesticide, liquid, flammable, toxic	2770	336	3+6.1	3, 53°(a),(b)
Phthalimide derivative pesticide, liquid, flammable, toxic	2774	336	3+6.1	3, 54°(a),(b)
Phenyl urea pesticide, liquid, flammable, toxic	2768	336	3+6.1	3, 55°(a),(b)
Dithiocarbamate pesticide, liquid, flammable, toxic	2772	336	3+6.1	3, 56°(a),(b)
Pesticide, liquid, flammable, toxic, n.o.s.	3021	336	3+6.1	3, 57°(a),(b)
General n.o.s. entries				
Flammable liquid, n.o.s.	1993	33	3	3, 1°(a)
	1993	33	3	3, 2°(a)
	1993	33	3	3, 2°(b)
	1993	33	3	3, 3°(b)
	1993	33	3	3, 5°(c)
	1993	30	3	3, 31°(c)
Flammable liquid, toxic, n.o.s.	1992	336	3+6.1	3, 19°(a),(b)
	1992	36	3+6.1	3, 32°(c)
Flammable liquid, corrosive, n.o.s.	2924	338	3+8	3, 26°(a),(b)
	2924	38	3+8	3, 33°(c)
Flammable liquid, toxic, corrosive, n.o.s.	3286	368	3+6.1+8	3, 27°(a),(b)
Elevated temperature liquid, flammable, n.o.s.	3256	30	3	3, 61°(c)
Class 4.1: Flammable solids				
Specific n.o.s. entries				
Metal hydrides, flammable, n.o.s.	3182	40	4.1	4.1, 14°(b),(c)
General n.o.s. entries				
Solids containing flammable liquid, n.o.s.	3175	40	4.1	4.1, 4°(c)
Flammable solid, organic, molten, n.o.s.	3176	44	4.1	4.1, 5°
Flammable solid, organic, n.o.s.	1325	40	4.1	4.1, 6°(b),(c)
Flammable solid, toxic, organic, n.o.s.	2926	46	4.1+6.1	4.1, 7°(b),(c)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Flammable solid, corrosive, organic, n.o.s.	2925	48	4.1+8	4.1, 8°(b),(c)
Flammable solid, inorganic, n.o.s.	3178	40	4.1	4.1, 11°(b),(c)
Metal salts of organic compounds, flammable, n.o.s.	3181	40	4.1	4.1, 12°(b),(c)
Metal powder, flammable, n.o.s.	3089	40	4.1	4.1, 13°(b),(c)
Flammable solid, toxic, inorganic, n.o.s.	3179	46	4.1+6.1	4.1, 16°(b),(c)
Flammable solid, corrosive, inorganic, n.o.s.	3180	48	4.1+8	4.1, 17°(b),(c)
Class 4.2: Substances liable to spontaneous combustion				
Specific n.o.s. entries				
Fibres, animal, vegetable or synthetic n.o.s.	1373	40	4.2	4.2, 3°(c)
Alkaline earth metal alcoholates, n.o.s.	3205	40	4.2	4.2, 14°(b),(c)
Alkali metal alcoholates, n.o.s.	3206	48	4.2+8	4.2, 15°(b),(c)
Metal alkyls, n.o.s. or metal aryls, n.o.s.	2003	X333	4.2+4.3	4.2, 31°(a)
Metal alkyl halides, n.o.s. or metal aryl halides, n.o.s.	3049	X333	4.2+4.3	4.2, 32°(a)
Metal alkyl hydrides, n.o.s. or metal aryl hydrides, n.o.s.	3050	X333	4.2+4.3	4.2, 32°(a)
General n.o.s. entries				
Self-heating solid, organic, n.o.s.	3088	40	4.2	4.2, 5°(b),(c)
Pyrophoric liquid, organic, n.o.s.	2845	333	4.2	4.2, 6°(a)
Self-heating liquid, organic, n.o.s.	3183	30	4.2	4.2, 6°(b),(c)
Self-heating solid, toxic, organic, n.o.s.	3128	46	4.2+6.1	4.2, 7°(b),(c)
Self-heating liquid, toxic, organic, n.o.s.	3184	36	4.2+6.1	4.2, 8°(b),(c)
Self-heating solid, corrosive, organic, n.o.s.	3126	48	4.2+8	4.2, 9°(b),(c)
Self-heating liquid, corrosive, organic, n.o.s.	3185	38	4.2+8	4.2, 10°(b),(c)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Self-heating metal powder, n.o.s.	3189	40	4.2	4.2, 12°(b),(c)
Self-heating solid, inorganic, n.o.s.	3190	40	4.2	4.2, 16°(b),(c)
Pyrophoric liquid, inorganic, n.o.s.	3194	333	4.2	4.2, 17°(a)
Self-heating liquid, inorganic, n.o.s.	3186	30	4.2	4.2, 17°(b),(c)
Self-heating solid, toxic, inorganic, n.o.s.	3191	46	4.2+6.1	4.2, 18°(b),(c)
Self-heating liquid, toxic, inorganic, n.o.s.	3187	36	4.2+6.1	4.2, 19°(b),(c)
Self-heating solid, corrosive, inorganic, n.o.s.	3192	48	4.2+8	4.2, 20°(b),(c)
Self-heating liquid, corrosive, inorganic, n.o.s.	3188	38	4.2+8	4.2, 21°(b),(c)
Pyrophoric organometallic compound, n.o.s.	3203	X333	4.2+4.3	4.2, 33°(a)
Class 4.3: Substances, which, in contact with water, emit flammable gases				
Specific n.o.s. entries				
Chorosilanes, water-reactive, flammable, corrosive, n.o.s.	2988	X338	4.3+3+8	4.3, 1°(a)
Alkali metal alloy, liquid, n.o.s.	1421	X423	4.3	4.3, 11°(a)
Alkaline earth metal alloy, n.o.s.	1393	423	4.3	4.3, 11°(b)
Metal hydrides, water-reactive, n.o.s.	1409	423	4.3	4.3, 16°(b)
General n.o.s. entries				
Organometallic compound or solution or dispersion, water-reactive, flammable, n.o.s.	3207 3207	X323 323	4.3+3 4.3+3	4.3, 3°(a) 4.3, 3°(b),(c)
Metallic substance, water-reactive, n.o.s.	3208	423	4.3	4.3, 13°(b),(c)
Metallic substance, water-reactive, self-heating, n.o.s.	3209	423	4.3+4.2	4.3, 14°(b),(c)
Water-reactive solid, n.o.s.	2813	423	4.3	4.3, 20°(b),(c)
Water reactive liquid, n.o.s.	3148 3148	X323 323	4.3 4.3	4.3, 21°(a) 4.3, 21°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Water-reactive solid, toxic, n.o.s.	3134	462	4.3+6.1	4.3, 22°(b),(c)
Water-reactive liquid, toxic, n.o.s.	3130 3130	X362 362	4.3+6.1 4.3+6.1	4.3, 23°(a) 4.3, 23°(b),(c)
Water-reactive solid, corrosive, n.o.s.	3131	482	4.3+8	4.3, 24°(b),(c)
Water-reactive liquid, corrosive, n.o.s.	3129 3129	X382 382	4.3+8 4.3+8	4.3, 25°(a) 4.3, 25°(b),(c)
Class 5.1: Oxidizing substances				
Specific n.o.s. entries				
Chlorates, inorganic, n.o.s.	1461	50	5.1	5.1, 11°(b)
Chlorates, inorganic, aqueous solution n.o.s.	3210	50	5.1	5.1, 11°(b)
Perchlorates, inorganic, n.o.s.	1481	50	5.1	5.1, 13°(b)
Perchlorates, inorganic, aqueous solution, n.o.s.	3211	50	5.1	5.1, 13°(b)
Chlorites, inorganic, n.o.s.	1462	50	5.1	5.1, 14°(b)
Hypochlorites, inorganic, n.o.s.	3212	50	5.1	5.1, 15°(b)
Bromates, inorganic, n.o.s.	1450	50	5.1	5.1, 16°(b)
Bromates, inorganic, aqueous solution n.o.s.	3213	50	5.1	5.1, 16°(b),(c)
Permanganates, inorganic, n.o.s.	1482	50	5.1	5.1, 17°(b)
Permanganates, inorganic, aqueous solution, n.o.s.	3214	50	5.1	5.1, 17°(b)
Persulphates, inorganic, n.o.s.	3215	50	5.1	5.1, 18°(c)
Persulphates, inorganic, aqueous solution, n.o.s.	3216	50	5.1	5.1, 18°(c)
Percarbonates, inorganic, n.o.s.	3217	50	5.1	5.1, 19°(c)
Nitrates, inorganic, n.o.s.	1477	50	5.1	5.1, 22°(b),(c)
Nitrates, inorganic, aqueous solution, n.o.s.	3218	50	5.1	5.1, 22°(b),(c)
Nitrites, inorganic, n.o.s.	2627	50	5.1	5.1, 23°(b)
Nitrites, inorganic, aqueous solution, n.o.s.	3219	50	5.1	5.1, 23°(b),(c)
Peroxides, inorganic, n.o.s.	1483	50	5.1	5.1, 25°(b)
General n.o.s. entries				
Oxidizing solid, n.o.s.	1479	50	5.1	5.1, 27°(b),(c)
Oxidizing solid, toxic, n.o.s.	3087	56	5.1+6.1	5.1, 29°(b),(c)
Oxidizing solid, corrosive, n.o.s.	3085	58	5.1+8	5.1, 31°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Class 5.2: Organic peroxides				
Specific collective headings				
Organic peroxide, type F, liquid	3109	539	5.2+(8)	5.2, 9°(b)
Organic peroxide, type F, liquid, temperature controlled	3119	539	5.2	5.2, 19°(b)
Organic peroxide, type F, solid	3110	539	5.2	5.2, 10°(b)
Organic peroxide, type F, solid, temperature controlled	3120	539	5.2	5.2, 20°(b)
Class 6.1: Toxic substances				
Specific n.o.s. entries or Specific collective headings				
Organic substances				
Nitriles, toxic, flammable, n.o.s.	3275	663	6.1+3	6.1, 11°(a)
	3275	63	6.1+3	6.1, 11°(b)
Nitriles, toxic, n.o.s.	3276	66	6.1	6.1, 12°(a)
	3276	60	6.1	6.1, 12°(b),(c)
Chloropicrin mixture, n.o.s.	1583	66	6.1	6.1, 17°(a)
	1583	60	6.1	6.1, 17°(b),(c)
Halogenated irritating liquid, n.o.s.	1610	66	6.1	6.1, 17°(a)
	1610	60	6.1	6.1, 17°(b),(c)
Chloroformates, toxic, corrosive, n.o.s.	3277	68	6.1+8	6.1, 27°(b)
Chloroformates, toxic, corrosive, flammable, n.o.s.	2742	638	6.1+3+8	6.1, 28°(b)
Isocyanates, toxic, flammable, n.o.s.	3080	63	6.1+3	6.1, 18°(b)
Isocyanate solution, toxic, flammable, n.o.s.	3080	63	6.1+3	6.1, 18°(b)
Isocyanates, toxic, n.o.s.	2206	60	6.1	6.1, 19°(b),(c)
Isocyanate solution, toxic, n.o.s.	2206	60	6.1	6.1, 19°(b),(c)
Mercaptans, liquid, toxic, flammable, n.o.s.	3071	63	6.1+3	6.1, 20°(b)
Mercaptans mixture, liquid, toxic, flammable, n.o.s.	3071	63	6.1+3	6.1, 20°(b)
Organophosphorus compound, toxic, flammable, n.o.s.	3279	663	6.1+3	6.1, 22°(a)
	3279	663	6.1+3	6.1, 22°(b)
Organophosphorus compound, toxic, n.o.s.	3278	66	6.1	6.1, 23°(a)
	3278	60	6.1	6.1, 23°(b),(c)
Disinfectant, liquid, toxic, n.o.s.	3142	66	6.1	6.1, 25°(a)
	3142	60	6.1	6.1, 25°(b),(c)
Disinfectant, solid, toxic, n.o.s.	1601	66	6.1	6.1, 25°(a)
	1601	60	6.1	6.1, 25°(b),(c)
Dye, liquid, toxic, n.o.s.	1602	66	6.1	6.1, 25°(a)
	1602	60	6.1	6.1, 25°(b),(c)
Dye, intermediate, liquid, toxic, n.o.s.	1602	66	6.1	6.1, 25°(a)
	1602	60	6.1	6.1, 25°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Dye, solid, toxic, n.o.s.	3143	66	6.1	6.1, 25°(a)
	3143	60	6.1	6.1, 25°(b),(c)
Dye intermediate, solid, toxic, n.o.s.	3143	66	6.1	6.1, 25°(a)
	3143	60	6.1	6.1, 25°(b),(c)
Tear gas substance, liquid or solid, n.o.s.	1693	66	6.1	6.1, 25°(a)
	1693	60	6.1	6.1, 25°(b)
Organometallic substances				
Organotin compound, liquid, n.o.s.	2788	66	6.1	6.1, 32°(a)
	2788	60	6.1	6.1, 32°(b),(c)
Organotin compound, solid, n.o.s.	3146	66	6.1	6.1, 32°(a)
	3146	60	6.1	6.1, 32°(b),(c)
Phenylmercuric compound, n.o.s.	2026	66	6.1	6.1, 33°(a)
	2026	60	6.1	6.1, 33°(b),(c)
Organoarsenic compound, n.o.s.	3280	66	6.1	6.1, 34°(a)
	3280	60	6.1	6.1, 34°(b),(c)
Metal carbonyls, n.o.s.	3281	66	6.1	6.1, 36°(a)
	3281	60	6.1	6.1, 36°(b),(c)
Inorganic substances				
Cyanides, inorganic, solid, n.o.s.	1588	66	6.1	6.1, 41°(a)
	1588	60	6.1	6.1, 41°(b),(c)
Cyanide solution, n.o.s.	1935	66	6.1	6.1, 41°(a)
	1935	60	6.1	6.1, 41°(b),(c)
Arsenic compound, liquid, n.o.s. (arsenates, arsenites and arsenic sulphides)	1556	66	6.1	6.1, 51°(a)
	1556	60	6.1	6.1, 51°(b),(c)
Arsenic compound, solid, n.o.s. (arsenates, arsenites and arsenic sulphides)	1557	66	6.1	6.1, 51°(a)
	1557	60	6.1	6.1, 51°(b),(c)
Mercury compound, liquid, n.o.s.	2024	66	6.1	6.1, 52°(a)
	2024	60	6.1	6.1, 52°(b),(c)
Mercury compound, solid, n.o.s.	2025	66	6.1	6.1, 52°(a)
	2025	60	6.1	6.1, 52°(b),(c)
Thallium compound, n.o.s.	1707	60	6.1	6.1, 53°(b)2.
Beryllium compound, n.o.s.	1566	60	6.1	6.1, 54°(b)2.,(c)
Selenium compound, n.o.s.	3283	66	6.1	6.1, 55°(a)
	3283	60	6.1	6.1, 55°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Tellurium compound, n.o.s.	3284	60	6.1	6.1, 57°(b),(c)
Vanadium compound, n.o.s.	3285	60	6.1	6.1, 58°(b),(c)
Antimony compound, inorganic, liquid, n.o.s.	3141	60	6.1	6.1, 59°(c)
Antimony compound, inorganic, solid, n.o.s.	1549	60	6.1	6.1, 59°(c)
Barium compound, n.o.s.	1564	60	6.1	6.1, 60°(b),(c)
Lead compound, soluble, n.o.s.	2291	60	6.1	6.1, 62°(c)
Fluorosilicates, n.o.s.	2856	60	6.1	6.1, 64°(c)
Cadmium compound	2570 2570	66 60	6.1 6.1	6.1, 61°(a) 6.1, 61°(b),(c)
Pesticides				
Organophosphorus pesticide, solid, toxic	2783 2783	66 60	6.1 6.1	6.1, 71°(a) 6.1, 71°(b),(c)
Organophosphorus pesticide, liquid, toxic, flammable	3017 3017	663 63	6.1+3 6.1+3	6.1, 71°(a) 6.1, 71°(b),(c)
Organophosphorus pesticide, liquid, toxic	3018 3018	66 60	6.1 6.1	6.1, 71°(a) 6.1, 71°(b),(c)
Organochlorine pesticide, solid, toxic	2761 2761	66 60	6.1 6.1	6.1, 72°(a) 6.1, 72°(b),(c)
Organochlorine pesticide, liquid, toxic, flammable	2995 2995	663 63	6.1+3 6.1+3	6.1, 72°(a) 6.1, 72°(b),(c)
Organochlorine pesticide, liquid, toxic	2996 2996	66 60	6.1 6.1	6.1, 72°(a) 6.1, 72°(b),(c)
Phenoxy pesticide, solid, toxic	2765 2765	66 60	6.1 6.1	6.1, 73°(a) 6.1, 73°(b),(c)
Phenoxy pesticide, liquid, toxic, flammable	2999 2999	63 63	6.1+3 6.1+3	6.1, 73°(a) 6.1, 73°(b),(c)
Phenoxy pesticide, liquid, toxic	3000 3000	66 60	6.1 6.1	6.1, 73°(a) 6.1, 73°(b),(c)
Carbamate pesticide, solid, toxic	2757 2757	66 60	6.1 6.1	6.1, 74°(a) 6.1, 74°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Carbamate pesticide, liquid, toxic flammable	2991	663	6.1+3	6.1, 74°(a)
	2991	63	6.1+3	6.1, 74°(b),(c)
Carbamate pesticide, liquid, toxic	2992	66	6.1	6.1, 74°(a)
	2992	60	6.1	6.1, 74°(b),(c)
Mercury based pesticide, solid, toxic	2777	66	6.1	6.1, 75°(a)
	2777	60	6.1	6.1, 75°(b),(c)
Mercury based pesticide, liquid, toxic, flammable	3011	663	6.1+3	6.1, 75°(a)
	3011	63	6.1+3	6.1, 75°(b),(c)
Mercury based pesticide, liquid, toxic	3012	66	6.1	6.1, 75°(a)
	3012	60	6.1	6.1, 75°(b),(c)
Organotin pesticide, solid, toxic	2786	66	6.1	6.1, 76°(a)
	2786	60	6.1	6.1, 76°(b),(c)
Organotin pesticide, liquid, toxic, flammable	3019	663	6.1+3	6.1, 76°(a)
	3019	63	6.1+3	6.1, 76°(b),(c)
Organotin pesticide, liquid, toxic	3020	66	6.1	6.1, 76°(a)
	3020	60	6.1	6.1, 76°(b),(c)
Coumarin derivative pesticide, liquid, toxic, flammable	3025	663	6.1+3	6.1, 77°(a)
	3025	63	6.1+3	6.1, 77°(b),(c)
Coumarin derivative pesticide, liquid, toxic	3026	66	6.1	6.1, 77°(a)
	3026	60	6.1	6.1, 77°(b),(c)
Coumarin derivative pesticide, solid, toxic	3027	66	6.1	6.1, 77°(a)
	3027	60	6.1	6.1, 77°(b),(c)
Bipyridilium pesticide, solid, toxic	2781	66	6.1	6.1, 78°(a)
	2781	60	6.1	6.1, 78°(b),(c)
Bipyridilium pesticide, liquid, toxic, flammable	3015	663	6.1+3	6.1, 78°(a)
	3015	63	6.1+3	6.1, 78°(b),(c)
Bipyridilium pesticide, liquid, toxic	3016	66	6.1	6.1, 78°(a)
	3016	60	6.1	6.1, 78°(b),(c)
Arsenical pesticide, solid, toxic	2759	66	6.1	6.1, 79°(a)
	2759	60	6.1	6.1, 79°(b),(c)
Arsenical pesticide, liquid, toxic, flammable	2993	663	6.1+3	6.1, 79°(a)
	2993	63	6.1+3	6.1, 79°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Arsenical pesticide, liquid, toxic	2994 2994	66 60	6.1 6.1	6.1, 79°(a) 6.1, 79°(b),(c)
Copper based pesticide, solid, toxic	2775 2775	66 60	6.1 6.1	6.1, 80°(a) 6.1, 80°(b),(c)
Copper based pesticide, liquid, toxic, flammable	3009 3009	663 63	6.1+3 6.1+3	6.1, 80°(a) 6.1, 80°(b),(c)
Copper based pesticide, liquid, toxic	3010 3010	66 60	6.1 6.1	6.1, 80°(a) 6.1, 80°(b),(c)
Substituted nitrophenol pesticide, solid, toxic	2779 2779	66 60	6.1 6.1	6.1, 81°(a) 6.1, 81°(b),(c)
Substituted nitrophenol pesticide, liquid, toxic, flammable	3013 3013	663 63	6.1+3 6.1+3	6.1, 81°(a) 6.1, 81°(b),(c)
Substituted nitrophenol pesticide, liquid, toxic	3014 3014	66 60	6.1 6.1	6.1, 81°(a) 6.1, 81°(b),(c)
Triazine pesticide, solid, toxic	2763 2763	66 60	6.1 6.1	6.1, 82°(a) 6.1, 82°(b),(c)
Triazine pesticide, liquid, toxic, flammable	2997 2997	663 63	6.1+3 6.1+3	6.1, 82°(a) 6.1, 82°(b),(c)
Triazine pesticide, liquid, toxic	2998 2998	66 60	6.1 6.1	6.1, 82°(a) 6.1, 82°(b),(c)
Benzoic derivative pesticide, solid, toxic	2769 2769	66 60	6.1 6.1	6.1, 83°(a) 6.1, 83°(b),(c)
Benzoic derivative pesticide, liquid, toxic, flammable	3003 3003	663 63	6.1+3 6.1+3	6.1, 83°(a) 6.1,83°(b),(c)
Benzoic derivative pesticide, liquid toxic	3004 3004	66 60	6.1 6.1	6.1,83°(a) 6.1, 83°(b),(c)
Phthalimide derivative pesticide, liquid, toxic	2773 2773	66 60	6.1 6.1	6.1, 84°(a) 6.1, 84°(b),(c)
Phthalimide derivative pesticide, liquid, toxic, flammable	3007 3007	663 63	6.1+3 6.1+3	6.1, 84°(a) 6.1, 84°(b),(c)
Phthalimide derivative pesticide, liquid, toxic	3008 3008	66 60	6.1 6.1	6.1, 84°(a) 6.1, 84°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Phenyl urea pesticide, solid, toxic	2767 2767	66 60	6.1 6.1	6.1, 85°(a) 6.1, 85°(b),(c)
Phenyl urea pesticide, liquid, toxic, flammable	3001 3001	663 63	6.1+3 6.1+3	6.1, 85°(a) 6.1, 85°(b),(c)
Phenyl urea pesticide, liquid, toxic	3002 3002	66 60	6.1 6.1	6.1, 85°(a) 6.1, 85°(b),(c)
Dithiocarbamate pesticide, solid, toxic	2771 2771	66 60	6.1 6.1	6.1, 86°(a) 6.1, 86°(b),(c)
Dithiocarbamate pesticide, liquid, toxic, flammable	3005 3005	663 63	6.1+3 6.1+3	6.1, 86°(a) 6.1, 86°(b),(c)
Dithiocarbamate pesticide, liquid, toxic	3006 3006	66 60	6.1 6.1	6.1, 86°(a) 6.1, 86°(b),(c)
Pesticide solid, toxic, n.o.s.	2588 2588	66 60	6.1 6.1	6.1, 87°(a) 6.1, 87°(b),(c)
Pesticide liquid, toxic, n.o.s.	2902 2902	66 60	6.1 6.1	6.1, 87°(a) 6.1, 87°(b),(c)
Pesticide liquid, toxic, flammable, n.o.s.	2903 2903	663 63	6.1+3 6.1+3	6.1, 87°(a) 6.1, 87°(b),(c)
Actives substances				
Alkaloids or Alkaloid salts, liquid, n.o.s.	3140 3140	66 60	6.1 6.1	6.1, 90°(a) 6.1, 90°(b),(c)
Alkaloids or Alkaloid salts, solid, n.o.s.	1544 1544	66 60	6.1 6.1	6.1, 90°(a) 6.1, 90°(b),(c)
Nicotine compound or nicotine preparation, liquid, n.o.s.	3144 3144	66 60	6.1 6.1	6.1, 90°(a) 6.1, 90°(b),(c)
Nicotine compound or nicotine preparation, solid, n.o.s.	1655 1655	66 60	6.1 6.1	6.1, 90°(b),(c) 6.1,90°(b),(c)

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Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Toxins, extracted from living sources, n.o.s.	3172	66	6.1	6.1, 90°(a)
	3172	60	6.1	6.1, 90°(b),(c)
Medicine, liquid, toxic, n.o.s.	1851	60	6.1	6.1, 90°(b),(c)
Medicine, solid, toxic, n.o.s.	3249	60	6.1	6.1, 90°(b),(c)
General n.o.s. entries				
Organic substances				
Toxic liquid, organic, n.o.s.	2810	66	6.1	6.1, 25°(a)
	2810	60	6.1	6.1, 25°(b),(c)
Toxic solid, organic, n.o.s.	2811	66	6.1	6.1, 25°(a)
	2811	60	6.1	6.1, 25°(b),(c)
Toxic liquid, flammable, organic, n.o.s.	2929	663	6.1+3	6.1, 26°(a)1
	2929	63	6.1+3	6.1, 26°(b)1.
Toxic solid, flammable, organic, n.o.s.	2930	664	6.1+4.1	6.1, 26°(a)2
	2930	64	6.1+4.1	6.1, 26°(b)2.
Toxic liquid, corrosive, organic, n.o.s.	2927	668	6.1+8	6.1, 27°(a)
	2927	68	6.1+8	6.1, 27°(b)
Toxic solid, corrosive, organic, n.o.s.	2928	668	6.1+8	6.1, 27°(a)
	2928	68	6.1+8	6.1, 27°(b)
Organometallic substances				
Organometallic compound toxic, n.o.s.	3282	66	6.1	6.1, 35°(a)
	3282	60	6.1	6.1, 35°(b),(c)
Inorganic substances				
Toxic liquid, water-reactive, n.o.s.	3123	623	6.1+4.3	6.1, 44°(b),(c)
Toxic solid, water-reactive, n.o.s.	3125	642	6.1+4.3	6.1, 44°(b),(c)
Solids containing toxic liquid, n.o.s.	3243	60	6.1	6.1, 65°(b)
Toxic liquid, inorganic, n.o.s.	3287	66	6.1	6.1, 65°(a)
	3287	60	6.1	6.1, 65°(b),(c)
Toxic solid, inorganic, n.o.s.	3288	66	6.1	6.1, 65°(a)
	3288	60	6.1	6.1, 65°(b),(c)
Toxic solid, self-heating, n.o.s.	3124	664	6.1+4.2	6.1, 66°(a)
	3124	64	6.1+4.2	6.1, 66°(b)
Toxic liquid, corrosive, inorganic, n.o.s.	3289	668	6.1+8	6.1, 67°(a)
	3289	68	6.1+8	6.1, 67°(b)
Toxic solid, corrosive, inorganic, n.o.s.	3290	668	6.1+8	6.1, 67°(a)
	3290	68	6.1+8	6.1, 67°(b)
Toxic liquid, oxidizing, n.o.s.	3122	665	6.1+05	6.1, 68°(a)
	3122	65	6.1+05	6.1, 68°(b)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Toxic solid, oxidizing, n.o.s.	3086 3086	665 65	6.1+05 6.1+05	6.1, 68°(a) 6.1, 68°(b)
Class 6.2: Infectious substances				
Specific collective headings				
Infectious substance, affecting humans	2814	606	6.2	6.2, 3°(b)
Infectious substance, affecting animals only	2900	606	6.2	6.2, 3°(b)
General n.o.s. entries				
Clinical waste, unspecified, n.o.s.	3291	606	6.2	6.2, 4°(b)
Class 7: Radioactive material				
Specific n.o.s. entries				
Radioactive material, low specific activity (LSA), n.o.s.	2912	70	7A, 7B or 7C	7, Sch 5, 6 or 13
gas		72	7A, 7B or 7C	
gas, flammable		723	7A, 7B or 7C+3	
liquid, flammable with flash-point not above 61 °C		73	7A, 7B or 7C+3	
solid, flammable		74	7A, 7B or 7C+4.1	
oxidizing		75	7A, 7B or 7C+05	
toxic		76	7A, 7B or 7C+6.1	
corrosive		78	7A, 7B or 7C+8	
General n.o.s. entries				
Radioactive material, n.o.s.	2928	70	7A, 7B or 7C	7, Sch 9, 10, 11 or 13
gas		72	7A, 7B or 7C	
gas, flammable		723	7A, 7B or 7C+3	
liquid, flammable with flash-point not above 61 °C		73	7A, 7B or 7C+3	
solid, flammable		74	7A, 7B or 7C+4.1	
oxidizing		75	7A, 7B or 7C+05	
toxic		76	7A, 7B or 7C+6.1	
corrosive		78	7A, 7B or 7C+8	

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Class 8: Corrosive substances				
Specific n.o.s. entries Inorganic substances				
Hydrogendifluorides, n.o.s.	1740	80	8	8, 9°(b),(c)
Bisulphites, aqueous solution, n.o.s.	2693	80	8	8, 17°(c)
Organic substances				
Chlorosilanes, corrosive, n.o.s.	2987	80	8	8, 36°(b)
Chlorosilanes, corrosive, flammable, n.o.s.	2986	X83	8+3	8, 37°(b)
Alkylphenols, solid, n.o.s.	2430 2430	88 80	8 8	8, 39°(a) 8, 39°(b),(c)
Alkylphenols, liquid, n.o.s.	3145 3145	88 80	8 8	8, 40°(a) 8, 40°(b),(c)
Amines or polyamines, solid, corrosive, n.o.s.	3259 3259	88 80	8 8	8, 52°(a) 8, 52°(b),(c)
Amines or polyamines, liquid, corrosive, n.o.s.	2735 2735	88 80	8 8	8, 53°(a) 8, 53°(b),(c)
Amines or polyamines, liquid, corrosive, flammable, n.o.s.	2734 2734	883 83	8+3 8+3	8, 54°(a) 8, 54°(b)
Dye or dye intermediate, solid, corrosive, n.o.s.	3147	80	8	8, 65°(b),(c)
Dye or dye intermediate, liquid, corrosive, n.o.s.	2801	80	8	8, 66°(b),(c)
Disinfectant, liquid, corrosive, n.o.s.	1903 1903	88 80	8 8	8, 66°(a) 8, 66°(b),(c)
General n.o.s. entries				
Acid substances				
Corrosive solid, acidic, inorganic, n.o.s.	3260 3260	88 80	8 8	8, 16°(a) 8,16°(b),(c)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Corrosive liquid, acidic, inorganic, n.o.s.	3264	88	8	8, 17°(a)
	3264	80	8	8, 17°(b),(c)
Organic substances				
Corrosive solid, acidic, organic, n.o.s.	3261	88	8	8, 39°(a)
	3261	80	8	8, 39°(b),(c)
Corrosive liquid, acidic, organic, n.o.s.	3265	88	8	8, 40°(a)
	3265	80	8	8, 40°(b),(c)
Basic substances				
Inorganic substances				
Caustic alkali liquid, n.o.s.	1719	80	8	8, 42°(b),(c)
Corrosive solid, basic, inorganic, n.o.s.	3262	88	8	8, 46°(a)
	3262	80	8	8, 46°(b),(c)
Corrosive liquid, basic, inorganic, n.o.s.	3266	88	8	8, 47°(a)
	3266	80	8	8, 47°(b),(c)
Organic substances				
Corrosive solid, basic, organic, n.o.s.	3263	88	8	8, 55°(a)
	3263	80	8	8, 55°(b),(c)
Corrosive liquid, basic, organic, n.o.s.	3267	88	8	8, 56°(a)
	3267	80	8	8, 56°(b),(c)
Other corrosive substances				
Solids containing corrosive liquid, n.o.s.	3244	80	8	8, 65°(b)
Corrosive solid, n.o.s.	1759	88	8	8, 65°(a)
	1759	80	8	8, 65°(b),(c)
Corrosive liquid, n.o.s.	1760	88	8	8, 66°(a)
	1760	80	8	8, 66°(b),(c)
Corrosive solid, flammable, n.o.s.	2921	884	8+4.1	8, 67°(a)
	2921	84	8+4.1	8, 67°(b)
Corrosive liquid, flammable, n.o.s.	2920	883	8+3	8, 68°(a)
	2920	83	8+3	8, 68°(b)
Corrosive solid, self-heating, n.o.s.	3095	84	8+4.2	8, 69°(b)
Corrosive liquid, self-heating, n.o.s.	3301	884	8+4.2	8, 70°(a)
	3301	84	8+4.2	8, 70°(b)
Corrosive solid, water-reactive, n.o.s.	3096	842	8+4.3	8, 71°(b)
Corrosive liquid, water-reactive, n.o.s.	3094	823	8+4.3	8, 72°(a),(b)

250 000 *(cont'd)*

Group of substances	Substance Identification No (Lower part)	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
Corrosive solid, oxidizing, n.o.s.	3084	885	8+05	8, 73°(a)
	3084	85	8+05	8, 73°(b)
Corrosive liquid, oxidizing, n.o.s.	3093	885	8+05	8, 74°(a)
	3093	85	8+05	8, 74°(b)
Corrosive solid, toxic, n.o.s.	2923	886	8+6.1	8, 75°(a)
	2923	86	8+6.1	8, 75°(b),(c)
Corrosive liquid, toxic, n.o.s.	2922	886	8+6.1	8, 76°(a)
	2922	86	8+6.1	8, 76°(b),(c)
Class 9: Miscellaneous dangerous substances and articles				
Environmentally hazardous substances				
Environmentally hazardous substance, liquid, n.o.s.	3082	90	9	9, 11°(c)
Environmentally hazardous substance, solid, n.o.s.	3077	90	9	9, 12°(c)

TABLE 3

Numerical list — this table contains all the entries of tables 1 and 2 in substance identification number order

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1002	Air, compressed	20	2	2, 2°(a)
1003	Air, deeply-refrigerated	225	2+05	2, 8°(a)
1005	Ammonia	268	6.1	2, 3°(at)
1006	Argon, compressed	20	2	2, 1°(a)
1008	Boron trifluoride	26	6.1	2, 1°(at)
1009	Bromotrifluoromethane (R 13 B1)	20	2	2, 5°(a)
1010	1,3-Butadiene	239	3	2, 3°(c)
1010	Mixtures of 1,3-butadiene and hydrocarbons	239	3	2, 4°(c)
1010	1,2-Butadiene	239	3	2, 3°(c)
1011	Butane, technically-pure	23	3	2, 3°(b)
1012	1-Butylene (1-Butene)	23	3	2, 3°(b)
1012	cis-2-Butylene (cis-2-Butene)	23	3	2, 3°(b)
1012	trans-2-Butylene (trans-2-Butene)	23	3	2, 3°(b)
1013	Carbon dioxide	20	2	2, 5°(a)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1014	Carbon dioxide containing not less than 1 % and not more than 10 % oxygen by mass	20	2	2, 6°(a)
1016	Carbon monoxide	236	6.1+3	2, 1°(bt)
1017	Chlorine	266	6.1+8	2, 3°(at)
1018	Chlorodifluoromethane (R 22)	20	2	2, 3°(a)
1020	Chloropentafluoroethane (R 115)	20	2	2, 3°(a)
1021	1-Chloro-1,2,2,2-tetrafluoroethane (R 124)	20	2	2, 3°(a)
1022	Chlorotrifluoromethane (R 13)	20	2	2, 5°(a)
1027	Cyclopropane	23	3	2, 3°(b)
1028	Dichlorodifluoromethane (R 12)	20	2	2, 3°(a)
1029	Dichlorofluoromethane (R 21)	20	2	2, 3°(a)
1030	1,1-Difluoroethane (R 152a)	23	3	2, 3°(b)
1032	Dimethylamine, anhydrous	236	3+6.1	2, 3°(bt)
1033	Dimethyl ether	23	3	2, 3°(b)
1035	Ethane	23	3	2, 5°(b)
1036	Ethylamine, anhydrous	236	3+6.1	2, 3°(bt)
1037	Ethyl chloride	236	3+6.1	2, 3°(bt)
1038	Ethylene, deeply-refrigerated	223	3	2, 7°(b)
1040	Ethylene oxide with nitrogen	236	3+6.1	2, 4°(ct)
1041	Ethylene oxide containing not more than 10 % carbon dioxide by mass	236	3+6.1	2, 4°(ct)
1041	Ethylene oxide containing more than 10 % but not more than 50 % carbon dioxide	236	3+6.1	2, 6°(ct)
1041	Carbon dioxide containing not more than 35 % ethylene oxide by mass	239	3	2, 6°(c)
1046	Helium, compressed	20	2	2, 1°(a)
1048	Hydrogen bromide	286	8+6.1	2, 3°(at)
1049	Hydrogen, compressed	23	3	2, 1°(b)
1050	Hydrogen chloride	286	8+6.1	2, 5°(at)
1052	Hydrogen fluoride, anhydrous	886	8+6.1	8, 6°
1053	Hydrogen sulphide	236	3+6.1	2, 3°(bt)
1055	Isobutylene	23	3	2, 3°(b)
1056	Krypton, compressed	20	2	2, 1°(a)
1060	Mixtures of methylacetylene and propadiene with hydrocarbons	239	3	2, 4°(c)
1061	Methylamine, anhydrous	236	3+6.1	2, 3°(bt)
1062	Methyl bromide	26	6.1	2, 3°(at)
1063	Methyl chloride	236	3+6.1	2, 3°(bt)
1064	Methyl mercaptan	236	3+6.1	2, 3°(bt)
1065	Neon, compressed	20	2	2, 1°(a)
1066	Nitrogen, compressed	20	2	2, 1°(a)
1067	Nitrogen dioxide (NO_2)	265	6.1+05	2, 3°(at)
1070	Nitrous oxide (N_2O)	25	2+05	2, 5°(a)
1072	Oxygen, compressed	20	2+05	2, 1°(a)
1073	Oxygen, deeply-refrigerated	225	2+05	2, 7°(a)
1076	Phosgene	266	6.1+8	2, 3°(at)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1077	Propylene	23	3	2, 3°(b)
1078	Mixtures F1, F2 and F3	20	2	2, 4°(a)
1079	Sulphur dioxide	26	6.1	2, 3°(at)
1080	Sulphur hexafluoride	20	2	2, 5°(a)
1082	Trifluorochloroethylene (R 1113)	236	3+6.1	2, 3°(ct)
1083	Trimethylamine, anhydrous	236	3+6.1	2, 3°(bt)
1085	Vinyl bromide	236	3+6.1	2, 3°(ct)
1086	Vinyl chloride	239	3	2, 3°(c)
1087	Methyl vinyl ether	236	3+6.1	2, 3°(ct)
1088	Acetal	33	3	3, 3°(b)
1089	Acetaldehyde	33	3	3, 1°(a)
1090	Acetone	33	3	3, 3°(b)
1091	Acetone oils	33	3	3, 3°(b)
1092	Acrolein, inhibited	663	6.1+3	6.1, 8°(a)
1093	Acrylonitrile, inhibited	336	3+6.1	3, 11°(a)
1098	Allyl alcohol	663	6.1+3	6.1, 8°(a)
1099	Allyl bromide	336	3+6.1	3, 16°(a)
1100	Allyl chloride	336	3+6.1	3, 16°(a)
1104	Amyl acetates	30	3	3, 31°(c)
1105	Amyl alcohols	30	3	3, 31°(c)
1105	Amyl alcohols	33	3	3, 3°(b)
1106	Amylamine (n-amylamine, tert-amylamine)	338	3+8	3, 22°(b)
1106	Amylamine (sec-amylamine)	38	3+8	3, 33°(c)
1107	Amyl chloride	33	3	3, 3°(b)
1108	1-Pentene (n-Amylene)	33	3	3, 1°(a)
1109	Amyl formates	30	3	3, 31°(c)
1110	n-Amyl methyl ketone	30	3	3, 31°(c)
1111	Amyl mercaptan	33	3	3, 3°(b)
1112	Amyl nitrate	30	3	3, 31°(c)
1113	Amyl nitrite	33	3	3, 3°(b)
1114	Benzene	33	3	3, 3°(b)
1120	Butanols	33	3	3, 3°(b)
1120	Butanols	30	3	3, 31°(c)
1123	Butyl aceetates	30	3	3, 31°(c)
1123	Butyl acetates	33	3	3, 3°(b)
1125	n-Butylamine	338	3+8	3, 22°(b)
1126	1-Bromobutane (n-Butyl bromide)	33	3	3, 3°(b)
1127	Chlorobutanes	33	3	3, 3°(b)
1128	n-Butyl formate	33	3	3, 3°(b)
1129	Butyraldehyde	33	3	3, 3°(b)
1130	Camphor oil	30	3	3, 31°(c)
1131	Carbon disulphide (Carbon sulphide)	336	3+6.1	3, 18°(a)
1133	Adhesives	33	3	3, 5°(a),(b),(c)
1133	Adhesives	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1134	Chlorobenzene	30	3	3, 31°(c)
1135	Ethylene chlorohydrin	663	6.1+3	6.1, 16°(a)
1136	Coal tar distillates	33	3	3, 3°(b)
1136	Coal tar distillates	30	3	3, 31°(c)
1139	Coating solution	33	3	3, 5°(a),(b),(c)
1139	Coating solution	30	3	3, 31°(c)
1143	Crotonaldehyde, stabilized	663	6.1+3	6.1, 8°(a)
1144	Crotonylene (2-Butyne)	339	3	3, 1°(a)
1145	Cyclohexane	33	3	3, 3°(b)
1146	Cyclopentane	33	3	3, 3°(b)
1147	Decahydronaphthalene	30	3	3, 31°(c)
1148	Diacetone alcohol, technical	33	3	3, 3°(b)
1148	Diacetone alcohol, chemically pure	30	3	3, 31°(c)
1149	Dibutyl ethers	30	3	3, 31°(c)
1150	1,2-Dichloroethylene	33	3	3, 3°(b)
1152	Dichloropentanes	30	3	3, 31°(c)
1153	Ethylene glycol diethyl ether	30	3	3, 31°(c)
1154	Diethylamine	338	3+8	3, 22°(b)
1155	Diethyl ether (ethyl ether)	33	3	3, 2°(a)
1156	Diethyl ketone	33	3	3, 3°(b)
1157	Diisobutyl ketone	30	3	3, 31°(c)
1158	Diisopropylamine	338	3+8	3, 22°(b)
1159	Diisopropyl ether	33	3	3, 3°(b)
1160	Dimethylamine aqueous solution	338	3+8	3, 22°(b)
1161	Dimethyl carbonate	33	3	3, 3°(b)
1162	Dimethyldichlorosilane	X338	3+8	3, 21°(b)
1163	Dimethylhydrazine, unsymmetrical	663	6.1+3+8	6.1, 7°(a)1.
1164	Dimethyl sulphide	33	3	3, 2°(b)
1165	Dioxane	33	3	3, 3°(b)
1166	Dioxolane	33	3	3, 3°(b)
1167	Divinyl ether inhibited	339	3	3, 2°(a)
1169	Extracts, aromatic, liquid	33	3	3, 5°(a),(b),(c)
1169	Extracts, aromatic, liquid	30	3	3, 31°(c)
1170	Ethanol or ethanol solution containing more than 70 vol.-% alcohol	33	3	3, 3°(b)
1170	Ethanol solution containing more than 24 vol.-% and not more 70 vol.-% alcohol	30	3	3, 31°(c)
1171	Ethylene glycol monomethyl ether	30	3	3, 31°(c)
1172	Ethylene glycol monomethyl ether acetate	30	3	3, 31°(c)
1173	Ethyl acetate	33	3	3, 3°(b)
1175	Ethylbenzene	33	3	3, 3°(b)
1176	Ethyl borate	33	3	3, 3°(b)
1177	Ethylbutyl acetate	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1178	2-Ethylbutyraldehyde	33	3	3, 3°(b)
1179	Ethyl butyl ether	33	3	3, 3°(b)
1180	Ethyl butyrate	30	3	3, 31°(c)
1181	Ethyl chloroacetate	63	6.1+3	6.1, 16°(b)
1182	Ethyl chloroformate	663	6.1+3+8	6.1, 10°(a)
1183	Ethyldichlorosilane	X338	4.3+3+8	4.3, 1°(a)
1184	1,2-Dichloroethane (Ethylene dichloride)	336	3+6.1	3, 16°(b)
1185	Ethyleneimine, inhibited	663	6.1+3	6.1, 4°
1188	Ethylene glycol monomethyl ether	30	3	3, 31°(c)
1189	Ethylene glycol monomethyl ether acetate	30	3	3, 31°(c)
1190	Ethyl formate	33	3	3, 3°(b)
1191	Octyl aldehydes (Ethyl hexaldehydes)	30	3	3, 31°(c)
1192	Ethyl lactate	30	3	3, 31°(c)
1193	Ethyl methyl ketone (methyl ethyl ketone)	33	3	3, 3°(b)
1194	Ethyl nitrite solution	336	3+6.1	3, 15°(a)
1195	Ethyl propionate	33	3	3, 3°(b)
1196	Ethyltrichlorosilane	X338	3+8	3, 21°(b)
1197	Extracts, flavouring, liquid	33	3	3, 5°(a),(b),(c)
1197	Extracts, flavouring, liquid	30	3	3, 31°(c)
1198	Formaldehyde solution, flammable	38	3+8	3, 33°(c)
1199	Furfural (furfuraldehyde)	30	3	3, 31°(c)
1201	Fusel oil	33	3	3, 3°(b)
1201	Fusel oil	30	3	3, 31°(c)
1202	Gasoil	30	3	3, 31°(c)
1202	Diesel fuel	30	3	3, 31°(c)
1202	Heating oil (light)	30	3	3, 31°(c)
1203	Motor spirit	33	3	3, 3°(b)
1206	Heptanes	33	3	3, 3°(b)
1207	Hexaldehyde	30	3	3, 31°(c)
1208	Hexanes	33	3	3, 3°(b)
1210	Printing ink	33	3	3, 5°(a),(b),(c)
1210	Printing ink	30	3	3, 31°(c)
1212	Isobutanol	30	3	3, 31°(c)
1213	Isobutyl acetate	33	3	3, 3°(b)
1214	Isobutylamine	338	3+8	3, 22°(b)
1216	Isoctenes	33	3	3, 3°(b)
1218	Isoprene, inhibited	339	3	3, 2°(a)
1219	Isopropanol (Isopropyl alcohol)	33	3	3, 3°(b)
1220	Isopropyl acetate	33	3	3, 3°(b)
1221	Isopropylamine	338	3+8	3, 22°(a)
1223	Kerosene	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1224	Ketones, n.o.s.	33	3	3, 2°(b), 3°(b)
1224	Ketones, n.o.s.	30	3	3, 31°(c)
1228	Mercaptans or mercaptan mixture, liquid, flammable, toxic n.o.s.	336	3+6.1	3, 18°(b)
1228	Mercaptans or mercaptans mixture, liquid, flammable, toxic, n.o.s.	36	3+6.1	3, 32°(c)
1229	Mesityl oxide	30	3	3, 31°(c)
1230	Methanol	336	3+6.1	3, 17°(b)
1231	Methyl acetate	33	3	3, 3°(b)
1233	Methylamyl acetate	30	3	3, 31°(c)
1234	Methylal	33	3	3, 2°(b)
1235	Methylamine, aqueous solution	338	3+8	3, 22°(b)
1237	Methyl butyrate	33	3	3, 3°(b)
1238	Methyl chloroformate	663	6.1+3+8	6.1, 10°(a)
1239	Methyl chloromethyl ether	663	6.1+3	6.1, 9°(a)
1242	Methyldichlorosilane	X338	4.3+3+8	4.3, 1°(a)
1243	Methyl formate	33	3	3, 1°(a)
1244	Methylhydrazine	663	6.1+3+8	6.1, 7°(a)1.
1245	Methyl isobutyl ketone	33	3	3, 3°(b)
1246	Methyl isopropenyl ketone, inhibited	339	3	3, 3°(b)
1247	Methyl methacrylate monomer, inhibited	339	3	3, 3°(b)
1248	Methyl propionate	33	3	3, 3°(b)
1249	Methyl propyl ketone	33	3	3, 3°(b)
1250	Methyltrichlorosilane	X338	3+8	3, 21°(a)
1251	Methyl vinyl ketone	339	3	3, 3°(b)
1259	Nickel carbonyl	663	6.1+3	6.1, 3°
1262	Octanes	33	3	3, 3°(b)
1263	Paint	33	3	3, 5°(a),(b),(c)
1263	Paint	30	3	3, 31°(c)
1263	Paint related material	33	3	3, 5°(a),(b),(c)
1263	Paint related material	30	3	3, 31°(c)
1264	Paraldehyde	30	3	3, 31°(c)
1265	Pentanes, liquid	33	3	3, 1°(a), 2°(b)
1266	Perfumery products	33	3	3, 5°(a),(b),(c)
1266	Perfumery products	30	3	3,31°(c)
1267	Petroleum crude oil	33	3	3, 1°(a), 2°(a),(b), 3(c)
1267	Petroleum crude oil	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1268	Petroleum distillates, n.o.s.	33	3	3, 1°(a), 2°(a),(b), 3°(c)
1268	Petroleum distillates, n.o.s.	30	3	3, 31°(c)
1268	Petroleum products, n.o.s.	33	3	3, 1°(a), 2°(a),(b), 3°(c)
1268	Petroleum products, n.o.s.	30	3	3, 31°(c)
1272	Pine oil	30	3	3, 31°(c)
1274	n-Propanol	33	3	3, 3°(b)
1274	n-Propanol	30	3	3, 31°(c)
1275	Propionaldehyde	33	3	3, 3°(b)
1276	n-Propyl acetate	33	3	3, 3°(b)
1277	Propylamine	338	3+8	3, 22°(b)
1278	1-Chloropropane (Propyl chloride)	33	3	3, 2°(b)
1279	1,2-Dichloropropane	33	3	3, 3°(b)
1280	Propylene oxide, inhibited	339	3	3, 2°(a)
1281	Propyl formates	33	3	3, 3°(b)
1282	Pyridine	33	3	3, 3°(b)
1286	Rosin oil	33	3	3, 5°(a),(b),(c)
1286	Rosin oil	30	3	3, 31°(c)
1287	Rubber solution	33	3	3, 5°(a),(b),(c)
1287	Rubber solution	30	3	3, 31°(c)
1288	Shale oil	33	3	3, 3°(b)
1288	Shale oil	30	3	3, 31°(c)
1289	Sodium methylate solution	338	3+8	3, 24°(b)
1289	Sodium methylate solution	38	3+8	3, 33°(c)
1292	Tetraethyl silicate	30	3	3, 31°(c)
1293	Tinctures, medicinal	33	3	3, 3°(b)
1293	Tinctures, medicinal	30	3	3, 31°(c)
1294	Toluene	33	3	3, 3°(b)
1295	Trichlorosilane	X338	4.3+3+8	4.3, 1°(a)
1296	Triethylamine	338	3+8	3, 22°(b)
1297	Trimethylamine, aqueous solution	338	3+8	3, 22°(a),(b)
1297	Trimethylamine, aqueous solution	38	3+8	3, 33°(c)
1298	Trimethylchlorosilane	X338	3+8	3, 21°(b)
1299	Turpentine	30	3	3, 31°(c)
1300	Turpentine substitute	33	3	3, 3°(b)
1300	Turpentine substitute	30	3	3, 31°(c)
1301	Vinyl acetate, inhibited	339	3	3, 3°(b)
1302	Vinyl ethyl ether inhibited	339	3	3, 2°(a)
1303	Vinylidene chloride, inhibited	339	3	3, 1°(a)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1304	Vinyl isobutyl ether, inhibited	339	3	3, 3°(b)
1305	Vinyltrichlorosilane, inhibited	X338	3+8	3, 21°(a)
1306	Wood preservatives, liquid	33	3	3, 5°(b),(c)
1306	Wood preservatives, liquid	30	3	3, 31°(c)
1307	Xylenes	33	3	3, 3°(b)
1307	Xylenes	30	3	3, 31°(c)
1308	Zirconium suspended in a flammable liquid	33	3	3, 1°(a), 2°(a),(b), 3°(b)
1308	Zirconium suspended in a flammable liquid	30	3	3, 31°(c)
1309	Aluminium powder, coated	40	4.1	4.1, 13°(b),(c)
1312	Borneol	40	4.1	4.1, 6°(c)
1313	Calcium resinate	40	4.1	4.1, 12°(c)
1314	Calcium resinate, fused	40	4.1	4.1, 12°(c)
1318	Cobalt resinate, precipitated	40	4.1	4.1, 12°(c)
1323	Ferrocerium	40	4.1	4.1, 13°(b)
1325	Flammable solid, organic, n.o.s.	40	4.1	4.1, 6°(b),(c)
1326	Hafnium powder, wetted	40	4.1	4.1, 13°(b)
1328	Hexamethylenetetramine	40	4.1	4.1, 6°(c)
1330	Manganese resinate	40	4.1	4.1, 12°(c)
1332	Metaldehyde	40	4.1	4.1, 6°(c)
1334	Naphthalene, crude or refined	40	4.1	4.1, 6°(c)
1338	Phosphorus, amorphous	40	4.1	4.1, 11°(c)
1339	Phosphorus heptasulphide	40	4.1	4.1, 11°(b)
1340	Phosphorus pentasulphide	423	4.3	4.3, 20°(b)
1341	Phosphorus sesquisulphide	40	4.1	4.1, 11°(b)
1343	Phosphorus trisulphide	40	4.1	4.1, 11°(b)
1345	Rubber scrap or shoddy	40	4.1	4.1, 1°(b)
1346	Silicon powder, amorphous	40	4.1	4.1, 13°(c)
1350	Sulphur	40	4.1	4.1, 11°(c)
1352	Titanium powder, wetted	40	4.1	4.1, 13°(b)
1358	Zirconium powder, wetted	40	4.1	4.1, 13°(b)
1361	Carbon	40	4.2	4.2, 1°(b),(c)
1361	Carbon black	40	4.2	4.2, 1°(b),(c)
1362	Carbon, activated	40	4.2	4.2, 1°(c)
1363	Copra	40	4.2	4.2, 2°(c)
1364	Cotton waste, oily	40	4.2	4.2, 3°(c)
1365	Cotton, wet	40	4.2	4.2, 3°(c)
1366	Diethylzinc	X333	4.2+4.3	4.2, 31°(a)
1369	p-Nitrosodimethylaniline	40	4.2	4.2, 5°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1370	Dimethylzinc	X333	4.2+4.3	4.2, 31°(a)
1373	Fibres, animal, vegetable or synthetic, n.o.s.	40	4.2	4.2, 3°(c)
1373	Fabrics, animal, vegetable or synthetic, n.o.s.	40	4.2	4.2, 3°(c)
1376	Iron oxide, spent	40	4.2	4.2, 16°(c)
1376	Iron sponge, spent	40	4.2	4.2, 16°(c)
1378	Metal catalyst, wetted	40	4.2	4.2, 12°(b)
1379	Paper, unsaturated oil treated	40	4.2	4.2, 3°(c)
1380	Pentaborane	333	4.2+6.1	4.2, 19°(a)
1381	Phosphorus, white or yellow, dry	46	4.2+6.1	4.2, 11°(a)
1382	Potassium sulphide, anhydrous	40	4.2	4.2, 13°(b)
1382	Potassium sulphide, with less than 30 % water of crystallisation	40	4.2	4.2, 13°(b)
1384	Sodium dithionite (Sodium hydrosulphite)	40	4.2	4.2, 13°(b)
1385	Sodium sulphide, anhydrous	40	4.2	4.2, 13°(b)
1385	Sodium sulphide, with less than 30 % water of crystallisation	40	4.2	4.2, 13°(b)
1386	Seed cake	40	4.2	4.2, 2°(c)
1389	Alkali metal amalgam	X423	4.3	4.3, 11°(a)
1390	Alkali metal amides	423	4.3	4.3, 19°(b)
1391	Alkali metal dispersion	X423	4.3	4.3, 11°(a)
1391	Alkaline-earth metal dispersion	X423	4.3	4.3, 11°(a)
1392	Alkaline-earth metal amalgam	X423	4.3	4.3, 11°(a)
1393	Alkaline-earth metal alloy, n.o.s.	423	4.3	4.3, 11°(b)
1394	Aluminium carbide	423	4.3	4.3,17°(b)
1395	Aluminium ferrosilicon powder	462	4.3+6.1	4.3, 15°(b)
1396	Aluminium powder, uncoated	423	4.3	4.3, 13°(b)
1398	Aluminium silicon powder, uncoated	423	4.3	4.3, 13°(c)
1400	Barium	423	4.3	4.3, 11°(b)
1401	Calcium	423	4.3	4.3, 11°(b)
1402	Calcium carbide	423	4.3	4.3, 17°(b)
1403	Calcium cyanamide	423	4.3	4.3, 19°(c)
1405	Calcium silicide	423	4.3	4.3, 12°(b),(c)
1407	Caesium	X423	4.3	4.3, 11°(a)
1408	Ferrosilicon	462	4.3+6.1	4.3, 15°(c)
1409	Metal hydrides, water-reactive, n.o.s.	423	4.3	4.3, 16°(b)
1415	Lithium	X423	4.3	4.3, 11°(a)
1417	Lithium silicon	423	4.3	4.3, 12°(b)
1418	Magnesium powder	423	4.3+4.2	4.3, 14°(b)
1418	Magnesium alloy powder	423	4.3+4.2	4.3, 14°(b)
1420	Potassium metal alloys	X423	4.3	4.3, 11°(a)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1421	Alkali metal alloy, liquid, n.o.s.	X423	4.3	4.3, 11°(a)
1422	Potassium sodium alloys	X423	4.3	4.3, 11°(a)
1423	Rubidium	X423	4.3	4.3, 11°(a)
1428	Sodium	X423	4.3	4.3, 11°(a)
1431	Sodium methylate	48	4.2+8	4.2, 15°(b)
1435	Zinc ashes	423	4.3	4.3, 13°(c)
1436	Zinc powder	423	4.3+4.2	4.3, 14°(b),(c)
1436	Zinc dust	423	4.3+4.2	4.3, 14°(b),(c)
1437	Zirconium hydride	40	4.1	4.1, 14°(b)
1438	Aluminium nitrate	50	5.1	5.1, 22°(c)
1439	Ammonium dichromate	50	5.1	5.1, 27°(b)
1444	Ammonium persulphate	50	5.1	5.1, 18°(c)
1445	Barium chlorate	56	5.1+6.1	5.1, 29°(b)
1446	Barium nitrate	56	5.1+6.1	5.1, 29°(b)
1447	Barium perchlorate	56	5.1+6.1	5.1, 29°(b)
1448	Barium permanganate	56	5.1+6.1	5.1, 29°(b)
1449	Barium peroxide	56	5.1+6.1	5.1, 29°(b)
1450	Bromates, inorganic, n.o.s.	50	5.1	5.1, 16°(b)
1451	Caesium nitrate	50	5.1	5.1, 22°(c)
1452	Calcium chlorate	50	5.1	5.1, 11°(b)
1453	Calcium chlorite	50	5.1	5.1, 14°(b)
1454	Calcium nitrate	50	5.1	5.1, 22°(c)
1455	Calcium perchlorate	50	5.1	5.1, 13°(b)
1456	Calcium permanganate	50	5.1	5.1, 17°(b)
1457	Calcium peroxide	50	5.1	5.1, 25°(b)
1458	Chlorate and borate mixture	50	5.1	5.1, 11°(b)
1459	Chlorate and magnesium chloride mixture	50	5.1	5.1, 11°(b)
1461	Chlorates, inorganic, n.o.s.	50	5.1	5.1, 11°(b)
1462	Chlorites, inorganic, n.o.s.	50	5.1	5.1, 14°(b)
1463	Chromium trioxide, anhydrous	58	5.1+8	5.1, 31°(b)
1465	Didymium nitrate	50	5.1	5.1, 22°(c)
1466	Ferric nitrate	50	5.1	5.1, 22°(c)
1467	Guanidine nitrate	50	5.1	5.1, 22°(c)
1469	Lead nitrate	56	5.1+6.1	5.1, 29°(b)
1470	Lead perchlorate	56	5.1+6.1	5.1, 29°(b)
1471	Lithium hypochlorite, mixture or dry	50	5.1	5.1, 15°(b)
1472	Lithium peroxide	50	5.1	5.1, 25°(b)
1473	Magnesium bromate	50	5.1	5.1, 16°(b)
1474	Magnesium nitrate	50	5.1	5.1, 22°(c)
1475	Magnesium perchlorate	50	5.1	5.1, 13°(b)
1476	Magnesium peroxide	50	5.1	5.1, 25°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1477	Nitrates, inorganic, n.o.s.	50	5.1	5.1, 22°(b),(c)
1479	Oxidizing solid, n.o.s.	50	5.1	5.1, 27°(b),(c)
1481	Perchlorates, inorganic, n.o.s.	50	5.1	5.1, 13°(b)
1482	Permanganates, inorganic, n.o.s.	50	5.1	5.1, 17°(b)
1483	Peroxides, inorganic, n.o.s.	50	5.1	5.1, 25°(b)
1484	Potassium bromate	50	5.1	5.1, 16°(b)
1485	Potassium chlorate	50	5.1	5.1, 11°(b)
1486	Potassium nitrate	50	5.1	5.1, 22°(c)
1487	Potassium nitrate and sodium nitrite mixture	50	5.1	5.1, 24°(b)
1488	Potassium nitrite	50	5.1	5.1, 23°(b)
1489	Potassium perchlorate	50	5.1	5.1, 13°(b)
1490	Potassium permanganate	50	5.1	5.1, 17°(b)
1492	Potassium persulphate	50	5.1	5.1, 18°(c)
1493	Silver nitrate	50	5.1	5.1, 22°(b)
1494	Sodium bromate	50	5.1	5.1, 16°(b)
1495	Sodium chlorate	50	5.1	5.1, 11°(b)
1496	Sodium chlorite	50	5.1	5.1, 14°(b)
1498	Sodium nitrate	50	5.1	5.1, 22°(c)
1499	Sodium nitrate and potassium nitrate mixture	50	5.1	5.1, 22°(c)
1500	Sodium nitrite	50	5.1	5.1, 23°(c)
1502	Sodium perchlorate	50	5.1	5.1, 13°(b)
1503	Sodium permanganate	50	5.1	5.1, 17°(b)
1505	Sodium persulphate	50	5.1	5.1, 18°(c)
1506	Strontium chlorate	50	5.1	5.1, 11°(b)
1507	Strontium nitrate	50	5.1	5.1, 22°(c)
1508	Strontium perchlorate	50	5.1	5.1, 13°(b)
1509	Strontium peroxide	50	5.1	5.1, 25°(b)
1510	Tetranitromethane	559	5.1+6.1	5.1, 2°(a)
1511	Urea hydrogen peroxide	58	5.1+8	5.1, 31°(c)
1512	Zinc ammonium nitrite	50	5.1	5.1, 23°(b)
1513	Zinc chlorate	50	5.1	5.1, 11°(b)
1514	Zinc nitrate	50	5.1	5.1, 22°(b)
1515	Zinc permanganate	50	5.1	5.1, 17°(b)
1516	Zinc peroxide	50	5.1	5.1, 25°(b)
1541	Acetone cyanohydrin, stablized	66	6.1	6.1, 12°(a)
1544	Alkaloids or alcaloid salts, solid, n.o.s.	66	6.1	6.1, 90°(a)
1544	Alkaloids or alcaloid salts, solid, n.o.s.	60	6.1	6.1, 90°(b),(c)
1545	Allyl isothiocyanate, inhibited	639	6.1+3	6.1, 20°(b)
1546	Ammonium arsenate	60	6.1	6.1, 51°(b)
1547	Aniline	60	6.1	6.1, 12°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1548	Aniline hydrochloride	60	6.1	6.1, 12°(c)
1549	Antimony compound, inorganic, solid, n.o.s.	60	6.1	6.1, 59°(c)
1550	Antimony lactate	60	6.1	6.1, 59°(c)
1551	Antimony potassium tartrate	60	6.1	6.1, 59°(c)
1553	Arsenic acid, liquid	66	6.1	6.1, 51°(a)
1554	Arsenic acid, solid	60	6.1	6.1, 51°(b)
1555	Arsenic bromide	60	6.1	6.1, 51°(b)
1556	Arsenic compound, liquid, n.o.s.	66	6.1	6.1, 51°(a)
1556	Arsenic compound, liquid, n.o.s.	60	6.1	6.1, 51°(b),(c)
1557	Arsenic compound, solid, n.o.s.	66	6.1	6.1, 51°(a)
1557	Arsenic compound, solid, n.o.s.	60	6.1	6.1, 51°(b),(c)
1558	Arsenic	60	6.1	6.1, 51°(b)
1559	Arsenic pentoxide	60	6.1	6.1, 51°(b)
1560	Arsenic trichloride	66	6.1	6.1, 51°(a)
1561	Arsenic trioxide	60	6.1	6.1, 51°(b)
1562	Arsenical dust	60	6.1	6.1, 51°(b)
1564	Barium compound, n.o.s.	60	6.1	6.1, 60°(b),(c)
1566	Beryllium compound, n.o.s.	60	6.1	6.1,54°(b)2., (c)
1567	Beryllium powder	64	6.1+4.1	6.1, 54°(b)1.
1569	Bromoacetone	63	6.1+3	6.1, 16°(b)
1570	Brucine	66	6.1	6.1, 90°(a)
1572	Cacodylic acid	60	6.1	6.1, 51°(b)
1573	Calcium arsenate	60	6.1	6.1, 51°(b)
1574	Calcium arsenate and calcium arsenite mixture, solid	60	6.1	6.1, 51°(b)
1577	Chlorodinitrobenzenes	60	6.1	6.1, 12°(b)
1578	Chloronitrobenzenes	60	6.1	6.1, 12°(b)
1579	4-Chloro-o-toluidine hydrochloride	60	6.1	6.1, 17°(c)
1580	Chloropicrin	66	6.1	6.1, 17°(a)
1581	Mixtures of methyl bromide and chloropicrin (liquefied gas)	26	6.1	2, 4°(at)
1582	Mixtures of methyl chloride and chloropicrin (liquefied gas)	236	3+6.1	2, 4°(bt)
1583	Chloropicrin mixture, n.o.s.	66	6.1	6.1, 17°(a)
1583	Chloropicrin mixture, n.o.s.	60	6.1	6.1, 17°(b),(c)
1585	Copper acetoarsenite	60	6.1	6.1, 51°(b)
1586	Copper arsenite	60	6.1	6.1, 51°(b)
1587	Copper cyanide	60	6.1	6.1, 41°(b)
1588	Cyanides, inorganic, solid, n.o.s.	66	6.1	6.1, 41°(a)
1588	Cyanides, inorganic, solid, n.o.s.	60	6.1	6.1, 41°(b),(c)
1590	Dichloroanilines	60	6.1	6.1, 12°(b)
1591	o-Dichlorobenzene	60	6.1	6.1, 15°(c)
1593	Dichloromethane	60	6.1	6.1, 15°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1594	Diethyl sulphate	60	6.1	6.1, 14°(b)
1595	Dimethyl sulphate	668	6.1+8	6.1, 27°(a)
1596	Dinitroanilines	60	6.1	6.1, 12°(b)
1597	Dinitrobenzenes	60	6.1	6.1, 12°(b)
1598	Dinitro-o-cresol	60	6.1	6.1, 12°(b)
1599	Dinitrophenol solution	60	6.1	6.1, 12°(b),(c)
1600	Dinitrotoluenes, molten	60	6.1	6.1, 24°(b)1.
1601	Disinfectant, solid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
1601	Disinfectant, solid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
1602	Dye, liquid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
1602	Dye, liquid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
1602	Dye intermediate, liquid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
1602	Dye intermediate, liquid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
1603	Ethyl bromoacetate	63	6.1+3	6.1, 16°(b)
1604	Ethylenediamine	83	8+3	8, 54°(b)
1605	Ethylene dibromide	66	6.1	6.1, 15°(a)
1606	Ferric arsenate	60	6.1	6.1, 51°(b)
1607	Ferric arsenite	60	6.1	6.1, 51°(b)
1608	Ferrous arsenate	60	6.1	6.1, 51°(b)
1610	Halogenated irritating liquid, n.o.s.	66	6.1	6.1, 17°(a)
1610	Halogenated irritating liquid, n.o.s.	60	6.1	6.1, 17°(b),(c)
1611	Hexaethyl tetraphosphate	60	6.1	6.1, 23°(b)
1613	Hydrogen cyanide, aqueous solution (Hydrocyanic acid)	663	6.1+3	6.1, 2°
1616	Lead acetate	60	6.1	6.1, 62°(c)
1617	Lead arsenates	60	6.1	6.1, 51°(b)
1618	Lead arsenites	60	6.1	6.1, 51°(b)
1620	Lead cyanide	60	6.1	6.1, 41°(b)
1621	London purple	60	6.1	6.1, 51°(b)
1622	Magnesium arsenate	60	6.1	6.1, 51°(b)
1623	Mercuric arsenate	60	6.1	6.1, 51°(b)
1624	Mercuric chloride	60	6.1	6.1, 52°(b)
1625	Mercuric nitrate	60	6.1	6.1, 52°(b)
1627	Mercurous nitrate	60	6.1	6.1, 52°(b)
1629	Mercury acetate	60	6.1	6.1, 52°(b)
1630	Mercury ammonium chloride	60	6.1	6.1, 52°(b)
1631	Mercury benzoate	60	6.1	6.1, 52°(b)
1634	Mercury bromides	60	6.1	6.1, 52°(b)
1636	Mercuy cyanide	60	6.1	6.1, 41°(b)
1637	Mercury gluconate	60	6.1	6.1, 52°(b)
1638	Mercury iodide	60	6.1	6.1, 52°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1639	Mercury nucleate	60	6.1	6.1, 52°(b)
1640	Mercury oleate	60	6.1	6.1, 52°(b)
1641	Mercury oxide	60	6.1	6.1, 52°(b)
1642	Mercury oxycyanide, desensitized	60	6.1	6.1, 41°(b)
1643	Mercury potassium iodide	60	6.1	6.1, 52°(b)
1644	Mercury salicylate	60	6.1	6.1, 52°(b)
1645	Mercury sulphate	60	6.1	6.1, 52°(b)
1646	Mercury thiocyanate	60	6.1	6.1, 52°(b)
1647	Mixtures of methyl bromide and ethylene bromide	236	3+6.1	2, 4°(bt)
1647	Methyl bromide and ethylene dibromide mixture, liquid	66	6.1	6.1, 15°(a)
1648	Acetonitrile (methyl cyanide)	33	3	3, 3°(b)
1649	Motor fuel anti-knock mixture	66	6.1	6.1, 31°(a)
1650	beta-Naphthylamine	60	6.1	6.1, 12°(b)
1651	Naphthylthiourea	60	6.1	6.1, 21°(b)
1652	Naphthylurea	60	6.1	6.1, 12°(b)
1653	Nickel cyanide	60	6.1	6.1, 41°(b)
1654	Nicotine	60	6.1	6.1, 90°(b)
1655	Nicotine compound or nicotine preparation, solid, n.o.s.	66	6.1	6.1, 90°(a)
1655	Nicotine compound or nicotine preparation, solid, n.o.s.	60	6.1	6.1, 90°(b),(c)
1656	Nicotine hydrochloride or nicotine hydrochloride solution	60	6.1	6.1, 90°(b)
1657	Nicotine salicylate	60	6.1	6.1, 90°(b)
1658	Nicotine sulphate, solid	60	6.1	6.1, 90°(b)
1658	Nicotine sulphate, solution	60	6.1	6.1, 90°(b)
1659	Nicotine tartrate	60	6.1	6.1, 90°(b)
1661	Nitroanilines (o-,m-,p-)	60	6.1	6.1, 12°(b)
1662	Nitrobenzene	60	6.1	6.1, 12°(b)
1663	Nitrophenols (o-,m-,p-)	60	6.1	6.1, 12°(c)
1664	Nitrotoluenes (o-,m-,p-)	60	6.1	6.1, 12°(b)
1665	Nitroxylenes (o-,m-,p-)	60	6.1	6.1, 12°(b)
1669	Pentachloroethane	60	6.1	6.1, 15°(b)
1670	Perchloromethyl mercaptan	66	6.1	6.1, 17°(a)
1671	Phenol, solid	60	6.1	6.1, 14°(b)
1672	Phenylcarbylamine chloride	66	6.1	6.1, 17°(a)
1673	Phenylenediamines (o-,m-,p-)	60	6.1	6.1, 12°(c)
1674	Phenylmercuric acetate	60	6.1	6.1, 33°(b)
1677	Potassium arsenate	60	6.1	6.1, 51°(b)
1678	Potassium arsenite	60	6.1	6.1, 51°(b)
1679	Potassium cuprocyanide	60	6.1	6.1, 41°(b)
1683	Silver arsenite	60	6.1	6.1, 51°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1684	Silver cyanide	60	6.1	6.1, 41°(b)
1685	Sodium arsenate	60	6.1	6.1, 51°(b)
1686	Sodium arsenite, aqueous solution	60	6.1	6.1, 51°(b),(c)
1688	Sodium cacodylate	60	6.1	6.1, 51°(b)
1690	Sodium fluoride	60	6.1	6.1, 63°(c)
1691	Strontium arsenite	60	6.1	6.1, 51°(b)
1692	Strychnine or strychnine salts	66	6.1	6.1, 90°(a)
1693	Tear gas substance, liquid or solid, n.o.s.	66	6.1	6.1, 25°(a)
1693	Tear gas substance, liquid or solid, n.o.s.	60	6.1	6.1, 25°(b)
1694	Bromobenzyl cyanides	66	6.1	6.1, 17°(a)
1695	Chloroacetone, stabilized	60	6.1	6.1, 17°(b)
1697	Chloroacetophenone	60	6.1	6.1, 17°(b)
1698	Diphenylamine chloroarsine	66	6.1	6.1, 34°(a)
1699	Diphenylchloroarsine	66	6.1	6.1, 34°(a)
1701	Xylyl bromide	60	6.1	6.1, 15°(b)
1702	1,1,2,2-Tetrachloroethane	60	6.1	6.1, 15°(b)
1704	Tetraethyl dithiopyrophosphate	60	6.1	6.1, 23°(b)
1707	Thallium compound, n.o.s.	60	6.1	6.1, 53°(b)
1708	Toluidines	60	6.1	6.1, 12°(b)
1709	2,4-Toluylenediamine	60	6.1	6.1, 12°(c)
1710	Trichloroethylene	60	6.1	6.1, 15°(c)
1711	Xylidines	60	6.1	6.1, 12°(b)
1712	Zinc arsenate	60	6.1	6.1, 51°(b)
1712	Zinc arsenate and zinc arsenite mixture	60	6.1	6.1, 51°(b)
1712	Zinc arsenite	60	6.1	6.1, 51°(b)
1713	Zinc cyanide	66	6.1	6.1, 41°(a)
1715	Acetic anhydride	83	8+3	8, 32°(b)2.
1716	Acetyl bromide	80	8	8, 35°(b)1.
1717	Acetyl chloride	X338	3+8	3, 25°(b)
1718	Butyl acid phosphate	80	8	8, 38°(c)
1719	Caustic alkali liquid, n.o.s.	80	8	8, 42°(b),(c)
1722	Allyl chloroformate	668	6.1+8+3	6.1, 28°(a)
1723	Allyl iodide	338	3+8	3, 25°(b)
1724	Allyltrichlorosilane, stabilized	X839	8+3	8, 37°(b)
1725	Aluminium bromide, anhydrous	80	8	8, 11°(b)
1726	Aluminium chloride, anhydrous	80	8	8, 11°(b)
1727	Ammonium hydrogendifluoride, solid	80	8	8, 9°(b)
1728	Amyltrichlorosilane	X80	8	8, 36°(b)
1729	Anisoyl chloride	80	8	8, 35°(b)1.
1730	Antimony pentachloride, liquid	80	8	8, 12°(b)
1731	Antimony pentachloride solution	80	8	8, 12°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1732	Antimony pentafluoride	86	8+6.1	8, 10°(b)
1733	Antimony trichloride	80	8	8, 11°(b)
1736	Benzoyl chloride	80	8	8, 35°(b)1.
1737	Benzyl bromide	68	6.1+8	6.1, 27°(b)
1738	Benzyl chloride	68	6.1+8	6.1, 27°(b)
1739	Benzyl chloroformate	88	8	8, 64°(a)
1740	Hydrogendifluorides, n.o.s.	80	8	8, 9°(b),(c)
1742	Boron trifluoride acetic acid complex	80	8	8, 33°(b)
1743	Boron trifluoride propionic acid complex	80	8	8, 33°(b)
1744	Bromine or bromine solution	886	8+6.1	8, 14°
1745	Bromine pentafluoride	568	5.1+6.1+8	5.1, 5°
1746	Bromine trifluoride	568	5.1+6.1+8	5.1, 5°
1747	Butyltrichlorosilane	X83	8+3	8, 37°(b)
1748	Calcium hypochlorite, dry	50	5.1	5.1, 15°(b)
1748	Calcium hypochlorite mixture, dry	50	5.1	5.1, 15°(b)
1750	Chloroacetic acid solution	68	6.1+8	6.1, 27°(b)
1751	Chloroacetic acid, solid	68	6.1+8	6.1, 27°(b)
1752	Chloroacetyl chloride	668	6.1+8	6.1, 27°(a)
1753	Chlorophenyltrichlorosilane	X80	8	8, 36°(b)
1754	Chlorosulphonic acid	88	8	8, 12°(a)
1755	Chromic acid solution	80	8	8, 17°(b),(c)
1756	Chromic fluoride, solid	80	8	8, 9°(b)
1757	Chromic fluoride solution	80	8	8, 8°(b),(c)
1758	Chromium oxychloride	88	8	8, 12°(a)
1759	Corrosive solid, n.o.s.	88	8	8, 65°(a)
1759	Corrosive solid, n.o.s.	80	8	8, 65°(b),(c)
1760	Corrosive liquid, n.o.s.	88	8	8, 66°(a)
1760	Corrosive liquid, n.o.s.	80	8	8, 66°(b),(c)
1761	Cupriethylenediamine solution	86	8+6.1	8, 53°(b),(c)
1762	Cyclohexenyltrichlorosilane	X80	8	8, 36°(b)
1763	Cyclohexyltrichlorosilane	X80	8	8, 36°(b)
1764	Dichloroacetic acid	80	8	8, 32°(b)1.
1765	Dichloroacetyl chloride	X80	8	8, 35°(b)1.
1766	Dichlorophenyltrichlorosilane	X80	8	8, 36°(b)
1767	Diethyldichlorosilane	X83	8+3	8, 37°(b)
1768	Difluorophosphoric acid, anhydrous	80	8	8, 8°(b)
1769	Diphenyldichlorosilane	X80	8	8, 36°(b)
1770	Diphenylmethyl bromide	80	8	8, 65°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1771	Dodecyltrichlorosilane	X80	8	8, 36°(b)
1773	Ferric chloride, anhydrous	80	8	8, 11°(c)
1775	Fluoroboric acid	80	8	8, 8°(b)
1776	Fluorophosphoric acid, anhydrous	80	8	8, 8°(b)
1777	Fluorosulphonic acid	88	8	8, 8°(a)
1778	Fluorosilicic acid	80	8	8, 8°(b)
1779	Formic acid	80	8	8, 32°(b)1.
1780	Fumaryl chloride	80	8	8, 35°(b)1.
1781	Hexadecyltrichlorosilane	X80	8	8, 36°(b)
1782	Hexafluorophosphoric acid	80	8	8, 8°(b)
1783	Hexamethylenediamine solution	80	8	8, 53°(b),(c)
1784	Hexyltrichlorosilane	X80	8	8, 36°(b)
1786	Hydrofluoric acid and sulphuric acid mixture	886	8+6.1	8, 7°(a)
1787	Hydriodic acid	80	8	8, 5°(b),(c)
1788	Hydrobromic acid	80	8	8, 5°(b),(c)
1789	Hydrochloric acid	80	8	8, 5°(b),(c)
1790	Hydrofluoric acid with more than 85 % hydrogen fluoride	886	8+6.1	8, 6°
1790	Hydrofluoric acid with more than 60 % but not more than 85 % hydrogen fluoride	886	8+6.1	8, 7°(a)
1790	Hydrofluoric acid with not more than 60 % hydrogen fluoride	86	8+6.1	8, 7°(b)
1791	Hypochlorite solution with between 5 and 16 % active chlorine	80	8	8, 61°(b)
1791	Hypochlorite solution with more than 5 % but less than 16 % available chlorine	80	8	8, 61°(c)
1792	Iodine monochloride	80	8	8, 12°(b)
1793	Isopropyl acid phosphate	80	8	8, 38°(c)
1794	Lead sulphate	80	8	8, 1°(b)
1796	Nitrating acid mixture with more than 50 % nitric acid	885	8+05	8, 3°(a)
1796	Nitrating acid mixture with not more than 50 % nitric acid	80	8	8, 3°(b)
1799	Nonyltrichlorosilane	X80	8	8, 36°(b)
1800	Octadecyltrichlorosilane	X80	8	8, 36°(b)
1801	Octyltrichlorosilane	X80	8	8, 36°(b)
1802	Perchloric acid	85	8+05	8, 4°(b)
1803	Phenolsulphonic acid, liquid	80	8	8, 34°(b)
1804	Phenyltrichlorosilane	X80	8	8, 36°(b)
1805	Phosphoric acid	80	8	8, 17°(c)
1806	Phosphorus pentachloride	80	8	8, 11°(b)
1807	Phosphorus pentoxide	80	8	8, 16°(b)
1808	Phosphorus tribromide	80	8	8, 12°(b)
1809	Phosphorus trichloride	886	8+6.1	8, 12°(a)
1810	Phosphorus oxychloride	80	8	8, 12°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1811	Potassium hydrogendifluoride	86	8+6.1	8, 9°(b)
1812	Potassium fluoride	60	6.1	6.1, 63°(c)
1813	Potassium hydroxide, solid	80	8	8, 41°(b)
1814	Potassium hydroxide solution	80	8	8, 42°(b),(c)
1815	Propionyl chloride	338	3+8	3, 25°(b)
1816	Propyltrichlorosilane	X83	8+3	8, 37°(b)
1817	Pyrosulphuryl chloride	80	8	8, 12°(b)
1818	Silicon tetrachloride	80	8	8, 12°(b)
1819	Sodium aluminate solution	80	8	8, 42°(b),(c)
1823	Sodium hydroxide, solid	80	8	8, 41°(b)
1824	Sodium hydroxide solution	80	8	8, 42°(b),(c)
1825	Sodium monoxide	80	8	8, 41°(b)
1826	Nitrating acid mixture, spent with not more than 50 % nitric acid	80	8	8, 3°(b)
1826	Nitrating acid mixture, spent with more than 50 % nitric acid	885	8+05	8, 3°(a)
1827	Stannic chloride, anhydrous	80	8	8, 12°(b)
1828	Sulphur chlorides	X88	8	8, 12°(a)
1829	Sulphur trioxide, inhibited	X88	8	8, 1°(a)
1830	Sulphuric acid, with more than 51 % acid	80	8	8, 1°(b)
1831	Sulphuric acid, fuming	X886	8+6.1	8, 1°(a)
1832	Sulphuric acid, spent	80	8	8, 1°(b)
1833	Sulphurous acid	80	8	8, 1°(b)
1834	Sulphuryl chloride	X88	8	8, 12°(a)
1835	Tetramethylammonium hydroxide	80	8	8, 51°(b)
1836	Thionyl chloride	X88	8	8, 12°(a)
1837	Thiophosphoryl chloride	80	8	8, 12°(b)
1838	Titanium tetrachloride	80	8	8, 12°(b)
1839	Trichloroacetic acid	80	8	8, 31°(b)
1840	Zinc chloride solution	80	8	8, 5°(c)
1843	Ammonium dinitro-o-cresolate	60	6.1	6.1, 12°(b)
1846	Carbon tetrachloride	60	6.1	6.1, 15°(b)
1847	Potassium sulphide, hydrated	80	8	8, 45°(b)1.
1848	Propionic acid	80	8	8, 32°(c)
1849	Sodium sulphide, hydrated	80	8	8, 45°(b)1.
1851	Medicine, liquid, toxic, n.o.s.	60	6.1	6.1, 90°(b),(c)
1858	Hexafluoropropylene (R 1216)	26	6.1	2, 3°(at)
1860	Vinyl fluoride	239	3	2, 5°(c)
1862	Ethyl crotonate	33	3	3, 3°(b)
1863	Fuel, aviation, turbine engine	33	3	3, 1°(a), 2°(a),(b), 3°(b)
1863	Fuel, aviation, turbine engine	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1866	Resin solution	33	3	3, 5°(a),(b),(c)
1866	Resin solution	30	3	3, 31°(c)
1868	Decaborane	46	4.1+6.1	4.1, 16°(b)
1869	Magnesium	40	4.1	4.1, 13°(c)
1869	Magnesium alloys	40	4.1	4.1, 13°(c)
1871	Titanium hydride	40	4.1	4.1, 14°(b)
1872	Lead dioxide	56	5.1+6.1	5.1, 29°(c)
1873	Perchloric acid, with more than 50 % but not more than 72 % acid, by mass	558	5.1+8	5.1, 3°(a)
1884	Barium oxide	60	6.1	6.1, 60°(c)
1885	Benzidine	60	6.1	6.1, 12°(b)
1886	Benzylidene chloride	60	6.1	6.1, 15°(b)
1887	Bromochloromethane	60	6.1	6.1, 15°(c)
1888	Chloroform	60	6.1	6.1, 15°(c)
1889	Cyanogen bromide	668	6.1+8	6.1, 27°(a)
1891	Ethyl bromide	60	6.1	6.1, 15°(b)
1892	Ethyldichloroarsine	66	6.1	6.1, 34°(a)
1894	Phenylmercuric hydroxide	60	6.1	6.1, 33°(b)
1895	Phenylmercuric nitrate	60	6.1	6.1, 33°(b)
1897	Tetrachloroethylene	60	6.1	6.1, 15°(c)
1898	Acetyl iodide	80	8	8, 35°(b)1.
1902	Diisooctyl acid phosphate	80	8	8, 38°(c)
1903	Disinfectant, liquid, corrosive, n.o.s.	88	8	8, 66°(a)
1903	Disinfectant, liquid, corrosive, n.o.s.	80	8	8, 66°(b),(c)
1906	Sludge acid	80	8	8, 1°(b)
1907	Soda lime	80	8	8, 41°(c)
1908	Chlorite solution with not less than 16 % available chlorine	80	8	8, 61°(b),(c)
1912	Mixtures of methyl chloride and methylene chloride (liquefied gas)	236	3+6.1	2, 4°(bt)
1913	Neon, deeply-refrigerated	22	2	2, 7°(a)
1914	Butyl propionate	30	3	3, 31°(c)
1915	Cyclohexanone	30	3	3, 31°(c)
1916	2,2'-Dichlorodiethyl ether	63	6.1+3	6.1, 16°(b)
1917	Ethyl acrylate, inhibited	339	3	3, 3°(b)
1918	Isopropylbenzene (Cumene)	30	3	3, 31°(c)
1919	Methyl acrylate, inhibited	339	3	3, 3°(b)
1920	Nonanes	30	3	3, 31°(c)
1921	Propyleneimine, inhibited	336	3+6.1	3, 12°
1922	Pyrrolidine	338	3+8	3, 23°(b)
1923	Calcium dithionite	40	4.2	4.2, 13°(b)
1928	Methyl magnesium bromide in ethyl ether	X323	4.3+3	4.3, 3°(a)
1929	Potassium dithionite	40	4.2	4.2, 13°(b)
1932	Zirconium scrap	40	4.2	4.2, 12°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1935	Cyanide solution, n.o.s.	66	6.1	6.1, 41°(a)
1935	Cyanide solution, n.o.s.	60	6.1	6.1, 41°(b),(c)
1938	Bromoacetic acid	80	8	8, 31°(b)
1939	Phosphorus oxybromide	80	8	8, 11°(b)
1940	Thioglycolic acid	80	8	8, 32°(b)1.
1942	Ammonium nitrate	50	5.1	5.1, 21°(c)
1951	Argon, deeply-refrigerated	22	2	2, 7°(a)
1952	Carbon dioxide containing not more than 35 % ethylene oxide by mass	239	3	2, 6°(c)
1957	Deuterium	23	3	2, 1°(b)
1958	1,2-Dichloro-1,1,2,2-tetrafluoroethane (R114)	20	2	2, 3°(a)
1959	1,1-Difluoroethylene (Vinylidene fluoride)	239	3	2, 5°(c)
1961	Ethane, deeply-refrigerated	223	3	2, 7°(b)
1962	Ethylene	23	3	2, 5°(b)
1963	Helium, deeply-refrigerated	22	2	2,7°(a)
1965	Mixtures of hydrocarbons (liquefied gases) (Mixtures A, AO, A1, B and C)	23	3	2, 4°(b)
1966	Hydrogen, deeply-refrigerated	223	3	2, 7°(b)
1969	Isobutane	23	3	2, 3°(b)
1970	Krypton, deeply-refrigerated	22	2	2, 7°(a)
1971	Methane, compressed	23	3	2, 1°(b)
1971	Natural gas, compressed	23	3	2, 2°(b)
1972	Natural gas, deeply-refrigerated	223	3	2, 8°(b)
1972	Methane, deeply-refrigerated	223	3	2, 7°(b)
1973	Gas mixture R 502	20	2	2, 4°(a)
1974	Bromochlorodifluoromethane (R 12B1)	20	2	2, 3°(a)
1976	Octafluorocyclobutane (RC 318)	20	2	2, 3°(a)
1977	Nitrogen, deeply-refrigerated	22	2	2, 7°(a)
1978	Propane, technically-pure	23	3	2, 3°(b)
1982	Tetrafluoromethane (R 14)	20	2	2, 1°(a)
1983	1-Chloro-2,2,2-trifluoroethane (R 133a)	20	2	2, 3°(a)
1984	Trifluoromethane (R 23)	20	2	2, 5°(a)
1986	Alcohols, flammable, toxic, n.o.s.	336	3+6.1	3, 17°(a),(b)
1986	Alcohols, flammable, toxic, n.o.s.	36	3+6.1	3, 32°(c)
1987	Alcohols, flammable, n.o.s	33	3	3, 2°(b), 3°(b)
1987	Alcohols, flammable, n.o.s	30	3	3, 31°(c)
1988	Aldehydes, flammable, toxic, n.o.s.	336	3+6.1	3, 17°(a),(b)
1988	Aldehydes, flammable, toxic, n.o.s.	36	3+6.1	3, 32°(c)
1989	Aldehydes, flammable, n.o.s.	33	3	3, 2°(b), 3°(b)
1989	Aldehydes, flammable, n.o.s.	30	3	3, 31°(c)
1991	Chloroprene, inhibited	336	3+6.1	3, 16°(a)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
1992	Flammable liquid, toxic, n.o.s.	336	3+6.1	3, 19°(a),(b)
1992	Flammable liquid, toxic, n.o.s.	36	3+6.1	3, 32°(c)
1993	Flammable liquid, n.o.s.	33	3	3, 1°(a), 2°(a),(b), 3°(b), 5°(c)
1993	Flammable liquid, n.o.s.	30	3	3, 31°(c)
1994	Iron pentacarbonyl	663	6.1+3	6.1, 3°
1999	Tars, liquid	33	3	3, 5°(b),(c)
1999	Tars, liquid	30	3	3, 31°(c)
2001	Cobalt naphthenates, powder	40	4.1	4.1, 12°(c)
2003	Metal alkyls, n.o.s. or metal aryls, n.o.s.	X333	4.2+4.3	4.2, 31°(a)
2004	Magnesium diamide	40	4.2	4.2, 16°(b)
2005	Magnesium diphenyl	X333	4.2+4.3	4.2, 31°(a)
2008	Zirconium powder, dry	40	4.2	4.2, 12°(b),(c)
2014	Hydrogen peroxide, aqueous solution	58	5.1+8	5.1, 1°(b)
2015	Hydrogen peroxide, stabilized	559	5.1+8	5.1, 1°(a)
2015	Hydrogen peroxide, aqueous solution, stabilized	559	5.1+8	5.1, 1°(a)
2018	Chloroanilines, solid	60	6.1	6.1, 12°(b)
2019	Chloroanilines, liquid	60	6.1	6.1, 12°(b)
2020	Chlorophenols, solid	60	6.1	6.1, 17°(c)
2021	Chlorophenols, liquid	60	6.1	6.1, 17°(c)
2022	Cresylic acid	68	6.1+8	6.1, 27°(b)
2023	Epichlorohydrin	63	6.1+3	6.1, 16°(b)
2024	Mercury compound, liquid, n.o.s.	66	6.1	6.1, 52°(a)
2024	Mercury compound, liquid, n.o.s.	60	6.1	6.1, 52°(b),(c)
2025	Mercury compound, solid, n.o.s.	66	6.1	6.1, 52°(a)
2025	Mercury compound, solid, n.o.s.	60	6.1	6.1, 52°(b),(c)
2026	Phenylmercuric compound, n.o.s.	66	6.1	6.1, 33°(a)
2026	Phenylmercuric compound, n.o.s.	60	6.1	6.1, 33°(b),(c)
2027	Sodium arsenite, solid	60	6.1	6.1, 51°(b)
2030	Hydrazine hydrate	86	8+6.1	8, 44°(b)
2030	Hydrazine, aqueous solution	86	8+6.1	8, 44°(b)
2031	Nitric acid containing not more than 70 % pure acid	80	8	8, 2°(b)
2031	Nitric acid containing more than 70 % pure acid	88	8	8, 2°(a)1.
2032	Nitric acid, red fuming	856	8+05+6.1	8, 2°(a)2.
2033	Potassium monoxide	80	8	8, 41°(b)
2035	1,1,1-Trifluoroethane	23	3	2, 3°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2036	Xenon	20	2	2, 5°(a)
2038	Dinitrotoluenes	60	6.1	6.1, 12°(b)
2045	Isobutyraldehyde	33	3	3, 3°(b)
2046	Cymenes (o-, m-, p-) (Methyl isopropyl benzenes)	30	3	3, 31°(c)
2047	Dichloropropenes	33	3	3, 3°(b)
2047	Dichloropropenes	30	3	3, 31°(c)
2048	Dicyclopentadiene	30	3	3, 31°(c)
2049	Diethylbenzenes (o-, m-, p-)	30	3	3, 31°(c)
2050	Diisobutylene, isomeric compounds	33	3	3, 3°(b)
2051	2-Dimethylaminoethanol	83	8+3	8, 54°(b)
2052	Dipentene	30	3	3, 31°(c)
2053	Methyl isobutyl carbinol	30	3	3, 31°(c)
2054	Morpholine	30	3	3, 31°(c)
2055	Styrene monomer, inhibited (Vinylbenzene)	39	3	3, 31°(c)
2056	Tetrahydrofuran	33	3	3, 3°(b)
2057	Tripropylene	33	3	3, 3°(b)
2057	Tripropylene	30	3	3, 31°(c)
2058	Valeraldehyde	33	3	3, 3°(b)
2059	Nitrocellulose solution, flammable	33	3	3, 4°(a),(b)
2059	Nitrocellulose solution, flammable	30	3	3, 34°(c)
2067	Ammonium nitrate fertilizers, type A1	50	5.1	5.1, 21°(c)
2068	Ammonium nitrate fertilizers, type A2	50	5.1	5.1, 21°(c)
2069	Ammonium nitrate fertilizers, type A3	50	5.1	5.1, 21°(c)
2070	Ammonium nitrate fertilizers, type A4	50	5.1	5.1, 21°(c)
2073	Ammonia dissolved in water with more than 35 % but not more than 40 % ammonia	268	6.1	2, 9°(at)
2073	Ammonia dissolved in water with more than 40 % but not more than 50 % ammonia	268	6.1	2, 9°(at)
2074	Acrylamide	60	6.1	6.1, 12°(c)
2075	Chloral, anhydrous, inhibited	60	6.1	6.1, 17°(b)
2076	Cresols (o-, m-, p-)	68	6.1+8	6.1, 27°(b)
2077	alpha-Naphthylamine	60	6.1	6.1, 12°(c)
2078	Toluene diisocyanate	60	6.1	6.1, 19°(b)
2079	Diethylenetriamine	80	8	8, 53°(b)
2187	Carbon dioxide, deeply-refrigerated	22	2	2, 7°(a)
2193	Hexafluoroethane (R 116)	20	2	2, 5°(a)
2201	Nitrous oxide, deeply-refrigerated	225	2+05	2, 7°(a)
2205	Adiponitrile	60	6.1	6.1, 12°(c)
2206	Isocyanates, toxic, n.o.s.	60	6.1	6.1, 19°(b),(c)
2206	Isocyanate solution, toxic, n.o.s.	60	6.1	6.1, 19°(b),(c)
2208	Calcium hypochlorite mixture, dry	50	5.1	5.1, 15°(c)
2209	Formaldehyde solution	80	8	8, 63°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2210	Maneb	40	4.2+4.3	4.2, 16°(c)
2210	Maneb preparation	40	4.2+4.3	4.2, 16°(c)
2211	Polymeric beads, expandable	90	9	9, 4°(c)
2212	Blue asbestos (Crocidolite)	90	9	9, 1°(b)
2212	Brown asbestos (Amosite or Mysorite)	90	9	9, 1°(b)
2213	Paraformaldehyde	40	4.1	4.1, 6°(c)
2214	Phthalic anhydride	80	8	8, 31°(c)
2215	Maleic anhydride	80	8	8, 31°(c)
2217	Seed cake	40	4.2	4.2, 2°(c)
2218	Acrylic acid, inhibited	839	8+3	8, 32°(b)2.
2219	Allyl glycidyl ether	30	3	3, 31°(c)
2222	Anisole (phenyl methyl ether)	30	3	3, 31°(c)
2224	Benzonitrile	60	6.1	6.1, 12°(b)
2225	Benzenesulphonyl chloride	80	8	8, 35°(c)
2226	Benzotrichloride	80	8	8, 66°(b)
2227	n-Butyl methacrylate, inhibited	39	3	3, 31°(c)
2232	Chloroacetaldehyde	66	6.1	6.1, 17°(a)
2233	Chloroanisidines	60	6.1	6.1, 17°(c)
2234	Chlorobenzotrifluorides (o-, m-, p-)	30	3	3, 31°(c)
2235	Chlorobenzyl chlorides	60	6.1	6.1, 17°(c)
2236	3-Chloro-4-methylphenyl isocyanate	60	6.1	6.1, 19°(b)
2237	Chloronitroanilines	60	6.1	6.1, 17°(c)
2238	Chlorotoluenes (o-, m-, p-)	30	3	3, 31°(c)
2239	Chlorotoluidines	60	6.1	6.1, 17°(c)
2240	Chromosulphuric acid	88	8	8, 1°(a)
2241	Cycloheptane	33	3	3, 3°(b)
2242	Cycloheptene	33	3	3, 3°(b)
2243	Cyclohexyl acetate	30	3	3, 31°(c)
2244	Cyclopentanol	30	3	3, 31°(c)
2245	Cyclopentanone	30	3	3, 31°(c)
2246	Cyclopentene	33	3	3, 2°(b)
2247	n-Decane	30	3	3, 31°(c)
2248	Di-n-butylamine	83	8+3	8, 54°(b)
2250	Dichlorophenyl isocyanates	60	6.1	6.1, 19°(b)
2251	2,5-Norbornadiene, inhibited (Dicycloheptadiene)	339	3	3, 3°(b)
2252	1,2-Dimethoxyethane	33	3	3, 3°(b)
2253	N,N-Dimethylaniline	60	6.1	6.1, 12°(b)
2256	Cyclohexene	33	3	3, 3°(b)
2257	Potassium	X423	4.3	4.3, 11°(a)
2258	1,2-Propylenediamine	83	8+3	8, 54°(b)
2259	Triethylenetetramine	80	8	8, 53°(b)
2260	Tripropylamine	38	3+8	3, 33°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2261	Xylenols	60	6.1	6.1, 14°(b)
2262	Dimethylcarbamoyl chloride	80	8	8, 35°(b)1.
2263	Dimethylcyclohexanes	33	3	3, 3°(b)
2264	Dimethylcyclohexylamine	83	8+3	8, 54°(b)
2265	N,N-Dimethylformamide	30	3	3, 31°(c)
2266	Dimethyl-N-propylamine	338	3+8	3, 22°(b)
2267	Dimethyl thiophosphoryl chloride	68	6.1+8	6.1, 27°(b)
2269	3,3'-Iminodipropylamine	80	8	8, 53°(c)
2270	Ethylamine, aqueous solution	338	3+8	3, 22°(b)
2271	Ethyl amyl ketones	30	3	3, 31°(c)
2272	N-Ethylaniline	60	6.1	6.1, 12°(c)
2273	2-Ethylaniline	60	6.1	6.1, 12°(c)
2274	N-Ethyl-N-benzylaniline	60	6.1	6.1, 12°(c)
2275	2-Ethylbutanol	30	3	3, 31°(c)
2276	2-Ethylhexylamine	38	3+8	3, 33°(c)
2277	Ethyl methacrylate	339	3	3, 3°(b)
2278	n-Heptene	33	3	3, 3°(b)
2279	Hexachlorobutadiene	60	6.1	6.1, 15°(c)
2280	Hexamethylenediamine, solid	80	8	8, 52°(c)
2281	Hexamethylene diisocyanate	60	6.1	6.1, 19°(b)
2282	Hexanols	30	3	3, 31°(c)
2283	Isobutyl methacrylate, inhibited	39	3	3, 31°(c)
2284	Isobutyronitrile	336	3+6.1	3, 11°(b)
2285	Isocyanatobenzotrifluorides	63	6.1+3	6.1, 18°(b)
2286	Pentamethylheptane (Isododecane)	30	3	3, 31°(c)
2287	Isoheptene	33	3	3, 3°(b)
2288	Isohexene	33	3	3, 3°(b)
2289	Isophoronediamine	80	8	8, 53°(c)
2290	Isophorone diisocyanate	60	6.1	6.1, 19°(c)
2291	Lead compound, soluble, n.o.s.	60	6.1	6.1, 62°(c)
2293	4-Methoxy-4-methylpentan-2-one	30	3	3, 31°(c)
2294	N-Methylaniline	60	6.1	6.1, 12°(c)
2295	Methyl chloroacetate	63	6.1+3	6.1, 16°(b)
2296	Methylcyclohexane	33	3	3, 3°(b)
2297	Methylcyclohexanones	30	3	3, 31°(c)
2298	Methylcyclopentane	33	3	3, 3°(b)
2299	Methyl dichloroacetate	60	6.1	6.1, 17°(c)
2300	2-Methyl-5-ethylpyridine	60	6.1	6.1, 12°(c)
2301	2-Methylfuran	33	3	3, 3°(b)
2302	5-Methylhexan-2-one	30	3	3, 31°(c)
2303	Isopropenylbenzene	30	3	3, 31°(c)
2304	Naphthalene, molten	44	4.1	4.1, 5°
2305	Nitrobenzenesulphonic acid	80	8	8, 34°(b)
2306	Nitrobenzotrifluorides	60	6.1	6.1, 12°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2307	3-Nitro-4-chlorobenzotrifluoride	60	6.1	6.1, 12°(b)
2308	Nitrosylsulphuric acid	80	8	8, 1°(b)
2309	Octadiene	33	3	3, 3°(b)
2310	Pentan-2,4-dione	30	3	3, 31°(c)
2311	Phenetidines	60	6.1	6.1, 12°(c)
2312	Phenol, molten	60	6.1	6.1, 24°(b)
2313	Picolines	30	3	3, 31°(c)
2315	Polychlorinated biphenyls	90	9	9, 2°(b)
2317	Sodium cuprocyanide solution	66	6.1	6.1, 41°(a)
2318	Sodium hydrosulphide	40	4.2	4.2, 13°(b)
2319	Terpene hydrocarbons, n.o.s.	30	3	3, 31°(c)
2320	Tetraethylenepentamine	80	8	8, 53°(c)
2321	Trichlorobenzenes, liquid	60	6.1	6.1, 15°(c)
2322	Trichlorobutene	60	6.1	6.1, 15°(b)
2323	Triethyl phosphite	30	3	3, 31°(c)
2324	Triisobutylene (Isobutylene trimer)	30	3	3, 31°(c)
2325	1,3,5-Trimethylbenzene	30	3	3, 31°(c)
2326	Trimethylcyclohexylamine	80	8	8, 53°(c)
2327	Trimethylhexamethylenediamines	80	8	8, 53°(c)
2328	Trimethylhexamethylene diisocyanate	60	6.1	6.1, 19°(c)
2329	Trimethyl phosphite	30	3	3, 31°(c)
2330	Undecane	30	3	3, 31°(c)
2331	Zinc chloride, anhydrous	80	8	8, 11°(c)
2332	Acetaldehyde oxime	30	3	3, 31°(c)
2333	Allyl acetate	336	3+6.1	3, 17°(b)
2334	Allylamine	663	6.1+3	6.1, 7°(a)2.
2335	Allyl ethyl ether	336	3+6.1	3, 17°(b)
2336	Allylformate	336	3+6.1	3, 17°(a)
2337	Phenyl mercaptan	663	6.1+3	6.1, 20°(a)
2338	Benzotrifluoride	33	3	3, 3°(b)
2339	2-Bromobutane	33	3	3, 3°(b)
2340	2-Bromoethyl ethyl ether	33	3	3, 3°(b)
2341	1-Bromo-3-methylbutane	30	3	3, 31°(c)
2342	Bromomethylpropanes	33	3	3, 3°(b)
2343	2-Bromopentane	33	3	3, 3°(b)
2344	Bromopropanes	33	3	3, 3°(b)
2345	3-Bromopropyne	33	3	3, 3°(b)
2346	Butanedione (diacetyl)	33	3	3, 3°(b)
2347	Butyl mercaptan	33	3	3, 3°(b)
2348	Butyl acrylate, inhibited	39	3	3, 31°(c)
2350	Butyl methyl ether	33	3	3, 3°(b)
2351	Butyl nitrites	33	3	3, 3°(b)
2351	Butyl nitrites	30	3	3, 31°(c)
2352	Butyl vinyl ether, inhibited	339	3	3, 3°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2353	Butyryl chloride	338	3+8	3, 25°(b)
2354	Chloromethyl ethyl ether	336	3+6.1	3, 16°(b)
2356	2-chloropropane	33	3	3, 2°(a)
2357	Cyclohexylamine	83	8+3	8, 54°(b)
2358	Cyclooctatetraene	33	3	3, 3°(b)
2359	Diallylamine	338	3+8+6.1	3, 27°(b)
2360	Diallyl ether	336	3+6.1	3, 17°(b)
2361	Diisobutylamine	38	3+8	3, 33°(c)
2362	1,1-Dichloroethane (Ethylidene chloride)	33	3	3, 3°(b)
2363	Ethyl mercaptan	33	3	3, 2°(a)
2364	n-Propylbenzene	30	3	3, 31°(c)
2366	Diethyl carbonate (Ethyl carbonate)	30	3	3, 31°(c)
2367	alpha-Methylvaleraldehyde	33	3	3, 3°(b)
2368	alpha-Pinene	30	3	3, 31°(c)
2369	Ethylene glycol monobutyl ether	60	6.1	6.1, 14°(c)
2370	1-Hexene	33	3	3, 3(b)
2371	Isopentenes	33	3	3, 1°(a)
2372	1,2-Di-(dimethylamino) ethane	33	3	3, 3°(b)
2373	Diethoxymethane	33	3	3, 3°(b)
2374	3,3-Diethoxypropene	33	3	3, 3°(b)
2375	Diethyl sulphide	33	3	3, 3°(b)
2376	2,3-Dihydropyran	33	3	3, 3°(b)
2377	1,1-Dimethoxyethane	33	3	3, 3°(b)
2378	2-Dimethylaminoacetonitrile	336	3+6.1	3, 11°(b)
2379	1,3-Dimethylbutylamine	338	3+8	3, 22°(b)
2380	Dimethyldiethoxysilane	33	3	3, 3°(b)
2381	Dimethyl disulphide	33	3	3, 3°(b)
2382	Dimethylhydrazine, symmetrical	663	6.1+3	6.1, 7°(a)2.
2383	Dipropylamine	338	3+8	3, 22°(b)
2384	di-n-propyl ether	33	3	3, 3°(b)
2385	Ethyl isobutyrate	33	3	3, 3°(b)
2386	1-Ethylpiperidine	338	3+8	3, 23°(b)
2387	Fluorobenzene	33	3	3, 3°(b)
2388	Fluorotoluenes	33	3	3, 3°(b)
2389	Furan	33	3	3, 1°(a)
2390	2-Iodobutane	33	3	3, 3°(b)
2391	Iodomethylpropanes	33	3	3, 3°(b)
2392	Iodopropanes	30	3	3, 31°(c)
2393	Isobutyl formate	33	3	3, 3°(b)
2394	Isobutyl propionate	33	3	3, 3°(b)
2395	Isobutyryl chloride	338	3+8	3, 25°(b)
2396	Methacrylaldehyde, inhibited	336	3+6.1	3, 17°(b)
2397	3-Methylbutan-2-one	33	3	3, 3°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2398	Methyl tert-butyl ether	33	3	3, 3°(b)
2399	1-Methylpiperidine	338	3+8	3, 23°(b)
2400	Methyl isovalerate	33	3	3, 3°(b)
2401	Piperidine	338	3+8	3, 23°(b)
2402	Propanethiols (propyl mercaptans)	33	3	3, 3°(b)
2403	Isopropenyl acetate	33	3	3, 3°(b)
2404	Propionitrile	336	3+6.1	3, 11°(b)
2405	Isopropyl butyrate	30	3	3, 31°(c)
2406	Isopropyl isobutyrate	33	3	3, 3°(b)
2409	Isopropyl propionate	33	3	3, 3°(b)
2410	1,2,3,6-Tetrahydropyridine	33	3	3, 3°(b)
2411	Butyronitrile	336	3+6.1	3, 11°(b)
2412	Tetrahydrothiophene (thiolanne)	33	3	3, 3°(b)
2413	Tetrapropyl orthotitanate	30	3	3, 31°(c)
2414	Thiophene	33	3	3, 3°(b)
2416	Trimethyl borate	33	3	3, 3°(b)
2426	Ammonium nitrate, liquid, (hot concentrated solution)	59	5.1	5.1, 20°
2427	Potassium chlorate aqueous solution	50	5.1	5.1, 11°(b)
2428	Sodium chlorate, aqueous solution	50	5.1	5.1, 11°(b)
2429	Calcium chlorate, aqueous solution	50	5.1	5.1, 11°(b)
2430	Alkylphenols, solid, n.o.s	88	8	8, 39°(a)
2430	Alkylphenols, solid, n.o.s	80	8	8, 39°(b),(c)
2431	Anisidines	60	6.1	6.1, 12°(c)
2432	N,N-Diethylaniline	60	6.1	6.1, 12°(c)
2433	Chloronitrotoluenes	60	6.1	6.1, 17°(c)
2434	Dibenzyldichlorosilane	X80	8	8, 36°(b)
2435	Ethylphenyldichlorosilane	X80	8	8, 36°(b)
2436	Thioacetic acid	33	3	3, 3°(b)
2437	Methylphenyldichlorosilane	X80	8	8, 36°(b)
2438	Trimethylacetyl chloride	663	6.1+3+8	6.1, 10°(a)
2439	Sodium hydrogendifluoride	80	8	8, 9°(b)
2440	Stannic chloride pentahydrate	80	8	8, 11°(c)
2442	Trichloroacetyl chloride	X80	8	8, 35°(b)1.
2443	Vanadium oxytrichloride	80	8	8, 12°(b)
2444	Vanadium tetrachloride	88	8	8, 12°(a)
2445	Lithium alkyls	X333	4.2+4.3	4.2, 31°(a)
2446	Nitrocresols	60	6.1	6.1, 12°(c)
2447	Phosphorus, white, molten	446	4.2+6.1	4.2, 22°
2448	Sulphur, molten	44	4.1	4.1, 15°
2456	2-Chloropropene	33	3	3, 1°(a)
2457	2,3-Dimethylbutane	33	3	3, 3°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2458	Hexadiene	33	3	3, 3°(b)
2459	2-Methyl-1-butene	33	3	3, 1°(a)
2460	2-Methyl-2-butene	33	3	3, 2°(b)
2461	Methylpentadiene	33	3	3, 3°(b)
2464	Beryllium nitrate	56	5.1+6.1	5.1, 29°(b)
2465	Dichloroisocyanuric acid, dry	50	5.1	5.1, 26°(b)
2465	Dichloroisocyanuric acid salts	50	5.1	5.1, 26°(b)
2467	Sodium percarbonates	50	5.1	5.1, 19°(c)
2468	Trichloroisocyanuric acid, dry	50	5.1	5.1, 26°(b)
2469	Zinc bromate	50	5.1	5.1, 16°(c)
2470	Phenylacetonitrile, liquid	60	6.1	6.1, 12°(c)
2473	Sodium arsanilate	60	6.1	6.1, 34°(c)
2474	Thiophosgene	60	6.1	6.1, 21°(b)
2475	Vanadium trichloride	80	8	8, 11°(c)
2477	Methyl isothiocyanate	63	6.1+3	6.1, 20°(b)
2478	Isocyanates or isocyanate solution, flammable, toxic, n.o.s.	336	3+6.1	3, 14°(b)
2478	Isocyanates or isocyanate solution, flammable, toxic, n.o.s.	36	3+6.1	3, 32°(c)
2482	n-Propyl isocyanate	663	6.1+3	6.1, 6°(a)
2483	Isopropyl isocyanate	336	3+6.1	3, 14°(a)
2484	tert-Butyl isocyanate	663	6.1+3	6.1, 6°(a)
2485	n-Butyl isocyanate	663	6.1+3	6.1, 6°(a)
2486	Isobutyl isocyanate	336	3+6.1	3, 14°(b)
2487	Phenyl isocyanate	63	6.1+3	6.1, 18°(b)
2488	Cyclohexyl isocyanate	63	6.1+3	6.1, 18°(b)
2489	Diphenylmethane-4.4'-diisocyanate	60	6.1	6.1, 19°(c)
2490	Dichloroisopropyl ether	60	6.1	6.1, 17°(b)
2491	Ethanolamine or ethanolamine solution	80	8	8, 53°(c)
2493	Hexamethyleneimine	338	3+8	3, 23°(b)
2495	Iodine pentafluoride	568	5.1+6.1+8	5.1, 5°
2496	Propionic anhydride	80	8	8, 32°(c)
2498	1,2,3,6-Tetrahydrobenzaldehyde	30	3	3, 31°(c)
2501	Tris-(1-aziridinyl) phosphine oxide solution	60	6.1	6.1, 23°(b),(c)
2502	Valeryl chloride	83	8+3	8, 35°(b)2.
2503	Zirconium tetrachloride	80	8	8, 11°(c)
2504	Tetrabromoethane	60	6.1	6.1, 15°(c)
2505	Ammonium fluoride	60	6.1	6.1, 63°(c)
2506	Ammonium hydrogen sulphate	80	8	8, 13°(b)
2507	Chloroplatinic acid, solid	80	8	8, 16°(c)
2508	Molybdenum pentachloride	80	8	8, 11°(c)
2509	Potassium hydrogen sulphate	80	8	8, 13°(b)
2511	2-Chloropropionic acid	80	8	8, 32°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2512	Aminophenols (o-, m-, p-)	60	6.1	6.1, 12°(c)
2513	Bromoacetyl bromide	X80	8	8, 35°(b)1.
2514	Bromobenzene	30	3	3, 31°(c)
2515	Bromoform	60	6.1	6.1, 15°(c)
2516	Carbon tetrabromide	60	6.1	6.1, 15°(c)
2517	1-Chloro-1,1-difluoroethane (R 142b)	23	3	2, 3°(b)
2518	1,5,9-Cyclododecatriene	60	6.1	6.1, 25°(c)
2520	Cyclooctadienes	30	3	3, 31°(c)
2521	Diketene, inhibited	663	6.1+3	6.1, 13°(a)
2522	Dimethylaminoethyl methacrylate	69	6.1	6.1, 12°(b)
2524	Ethyl orthoformate	30	3	3, 31°(c)
2525	Ethyl oxalate	60	6.1	6.1, 14°(c)
2526	Furfurylamine	38	3+8	3, 33°(c)
2527	Isobutyl acrylate, inhibited	39	3	3, 31°(c)
2528	Isobutyl isobutyrate	30	3	3, 31°(c)
2529	Isobutyric acid	38	3+8	3, 33°(c)
2530	Isobutyric anhydride	38	3+8	3, 33°(c)
2531	Methacrylic acid, inhibited	89	8	8, 32°(c)
2533	Methyl trichloroacetate	60	6.1	6.1, 17°(c)
2535	Methylmorpholine	338	3+8	3, 23°(b)
2536	Methyltetrahydrofuran	33	3	3, 3°(b)
2538	Nitronaphthalene	40	4.1	4.1, 6°(c)
2541	Terpinolene	30	3	3, 31°(c)
2542	Tributylamine	80	8	8, 53°(c)
2545	Hafnium powder, dry	40	4.2	4.2, 12°(b),(c)
2546	Titanium powder, dry	40	4.2	4.2, 12°(b),(c)
2552	Hexafluoroacetone hydrate	60	6.1	6.1, 17°(b)
2554	Methylallyl chloride	33	3	3, 3°(b)
2558	Epibromohydrin	663	6.1+3	6.1, 16°(a)
2560	2-Methylpentan-2-o1	30	3	3, 31°(c)
2561	3-Methyl-1-butene (Isopropylethylene)	33	3	3, 1°(a)
2564	Trichloroacetic acid solution	80	8	8, 32°(b)1.,(c)
2565	Dicyclohexylamine	80	8	8, 53°(c)
2567	Sodium pentachlorophenate	60	6.1	6.1, 17°(b)
2570	Cadmium compound	66	6.1	6.1, 61°(a)
2570	Cadmium compound	60	6.1	6.1, 61°(b),(c)
2571	Alkylsulphuric acids	80	8	8, 34°(b)
2572	Phenylhydrazine	60	6.1	6.1, 12°(b)
2573	Thallium chlorate	56	5.1+6.1	5.1, 29°(b)
2574	Tricresyl phosphate	60	6.1	6.1, 23°(b)
2576	Phosphorus oxybromide, molten	80	8	8, 15°

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2577	Phenylacetyl chloride	80	8	8, 35°(b)1.
2578	Phosphorus trioxide	80	8	8, 16°(c)
2579	Piperazine	80	8	8, 52°(c)
2580	Aluminium bromide solution	80	8	8, 5°(c)
2581	Aluminium chloride solution	80	8	8, 5°(c)
2582	Ferric chloride solution	80	8	8, 5°(c)
2583	Alkylsulphonic acids, solid	80	8	8, 1°(b)
2583	Arylsulphonic acids, solid	80	8	8, 1°(b)
2584	Alkylsulphonic acids, liquid	80	8	8, 1°(b)
2584	Arylsulphonic acids, liquid	80	8	8, 1°(b)
2585	Alkylsulphonic acids, solid	80	8	8, 34°(c)
2585	Arylsulphonic acids, solid	80	8	8, 34°(c)
2586	Alkylsulphonic acids, liquid	80	8	8, 34°(c)
2586	Arylsulphonic acids, liquid	80	8	8, 34°(c)
2587	Benzoquinone	60	6.1	6.1, 14°(b)
2588	Pesticide, solid, toxic, n.o.s.	66	6.1	6.1, 87°(a)
2588	Pesticide, solid, toxic, n.o.s.	60	6.1	6.1, 87°(b),(c)
2589	Vinyl chloroacetate	63	6.1+3	6.1, 16°(b)
2590	White asbestos (Actinolite, Anthophyllite, Chrysotile or Tremolite)	90	9	9, 1°(c)
2591	Xenon, deeply-refrigerated	22	2	2, 7°(a)
2599	Gas mixture R 503	20	2	2, 6°(a)
2600	Town gas	236	3+6.1	2, 2°(bt)
2600	Water gas	236	3+6.1	2, 2°(bt)
2600	Synthesis gas	236	3+6.1	2, 2°(bt)
2602	Gas mixture R 500	20	2	2, 4°(a)
2603	Cycloheptatriene	336	3+6.1	3, 19°(b)
2604	Boron trifluoride diethyl etherate	883	8+3	8, 33°(a)
2605	Methoxymethyl isocyanate	336	3+6.1	3, 14°(a)
2606	Methyl orthosilicate (Tetramethoxysilane)	663	6.1+3	6.1, 8°(a)
2607	Acrolein dimer, stabilized	39	3	3, 31°(c)
2608	Nitropropanes	30	3	3, 31°(c)
2609	Triallyl borate	60	6.1	6.1, 14°(c)
2610	Triallylamine	38	3+8	3, 33°(c)
2611	Propylene chlorohydrin	63	6.1+3	6.1, 16°(b)
2612	Methyl propyl ether	33	3	3, 2°(b)
2614	Methallyl alcohol	30	3	3, 31°(c)
2615	Ethyl propyl ether	33	3	3, 3°(b)
2616	Triisopropyl borate	33	3	3, 3°(b)
2616	Triisopropyl borate	30	3	3, 31°(c)
2617	Methylcyclohexanols	30	3	3, 31°(c)
2618	Vinyltoluene, inhibited (o-, m-, p-)	39	3	3, 31°(c)
2619	Benzyldimethylamine	83	8+3	8, 54°(b)
2620	Amyl butyrates	30	3	3, 31°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2621	Acetyl methyl carbinol	30	3	3, 31°(c)
2622	Glycidaldehyde	336	3+6.1	3, 17°(b)
2624	Magnesium silicide	423	4.3	4.3, 12°(b)
2626	Chloric acid, aqueous solution	50	5.1	5.1, 4°(b)
2627	Nitrites, inorganic, n.o.s.	50	5.1	5.1, 23°(b)
2628	Potassium fluoroacetate	66	6.1	6.1, 17°(a)
2629	Sodium fluoroacetate	66	6.1	6.1, 17°(a)
2642	Fluoroacetic acid	66	6.1	6.1, 17°(a)
2643	Methyl bromoacetate	60	6.1	6.1, 17°(b)
2644	Methyl iodide	60	6.1	6.1, 15°(b)
2645	Phenacyl bromide	60	6.1	6.1, 17°(b)
2646	Hexachlorocyclopentadiene	66	6.1	6.1, 15°(a)
2647	Malononitrile	60	6.1	6.1, 12°(b)
2648	1,2-Dibromobutan-3-one	60	6.1	6.1, 17°(b)
2649	1,3-Dichloroacetone	60	6.1	6.1, 17°(b)
2650	1,1-Dichloro-1-nitroethane	60	6.1	6.1, 17°(b)
2651	4,4'-Diaminodiphenylmethane	60	6.1	6.1, 12°(c)
2653	Benzyl iodide	60	6.1	6.1, 15°(b)
2655	Potassium fluorosilicate	60	6.1	6.1, 64°(c)
2656	Quinoline	60	6.1	6.1, 12°(c)
2657	Selenium disulphide	60	6.1	6.1, 55°(b)
2658	Selenium powder	60	6.1	6.1, 55°(c)
2659	Sodium chloroacetate	60	6.1	6.1, 17°(c)
2660	Nitrotoluidines (mono)	60	6.1	6.1, 12°(c)
2661	Hexachloroacetone	60	6.1	6.1, 17°(c)
2662	Hydroquinone	60	6.1	6.1, 14°(c)
2664	Dibromomethane	60	6.1	6.1, 15°(c)
2666	Ethyl cyanoacetate	60	6.1	6.1, 12°(c)
2667	Butyltoluenes	60	6.1	6.1, 25°(c)
2668	Chloroacetonitrile	63	6.1+3	6.1, 11°(b)
2669	Chlorocresols	60	6.1	6.1, 14°(b)
2670	Cyanuric chloride	80	8	8, 39°(b)
2671	Aminopyridines (o-, m-, p-)	60	6.1	6.1, 12°(b)
2672	Ammonia solution containing between 10 and 35 % ammonia	80	8	8, 43°(c)
2673	2-Amino-4-chlorophenol	60	6.1	6.1, 12°(b)
2674	Sodium fluorosilicate	60	6.1	6.1, 64°(c)
2677	Rubidium hydroxide solution	80	8	8, 42°(b),(c)
2678	Rubidium hydroxide	80	8	8, 41°(b)
2679	Lithium hydroxide solution	80	8	8, 42°(b),(c)
2680	Lithium hydroxide monohydrate	80	8	8, 41°(b)
2681	Caesium hydroxide solution	80	8	8, 42°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2682	Caesium hydroxide	80	8	8, 41°(b)
2683	Ammonium sulphide solution	86	8+6.1+3	8, 45°(b)2.
2684	Diethylaminopropylamine	38	3+8	3, 33°(c)
2685	N,N-Diethylethylenediamine	83	8+3	8, 54°(b)
2686	Diethylaminoethanol	30	3	3, 31°(c)
2687	Dicyclohexylammonium nitrite	40	4.1	4.1, 11°(c)
2688	1-Bromo-3-chloropropane	60	6.1	6.1, 15°(c)
2689	Glycerol alpha-monochlorohydrin	60	6.1	6.1, 17°(c)
2690	N,n-Butylimidazole	60	6.1	6.1, 12°(b)
2691	Phosphorus pentabromide	80	8	8, 11°(b)
2692	Boron tribromide (boron bromide)	X88	8	8, 12°(a)
2693	Bisulphites, aqueous solution, n.o.s.	80	8	8, 17°(c)
2698	Tetrahydrophthalic anhydrides	80	8	8, 31°(c)
2699	Trifluoroacetic acid	88	8	8, 32°(a)
2705	1-Pentol	80	8	8, 66°(b)
2707	Dimethyldioxanes	33	3	3, 3°(b)
2707	Dimethyldioxanes	30	3	3, 31°(c)
2708	Butoxyl	30	3	3, 31°(c)
2709	Butylbenzenes	30	3	3, 31°(c)
2710	Dipropyl ketone	30	3	3, 31°(c)
2711	Dibromobenzene	30	3	3, 31°(c)
2713	Acridine	60	6.1	6.1, 12°(c)
2714	Zinc resinate	40	4.1	4.1, 12°(c)
2715	Aluminium resinate	40	4.1	4.1, 12°(c)
2716	1,4-Butynediol	60	6.1	6.1, 14°(c)
2717	Camphor, synthetic	40	4.1	4.1, 6°(c)
2719	Barium bromate	56	5.1+6.1	5.1, 29°(b)
2720	Chromium nitrate	50	5.1	5.1, 22°(c)
2721	Copper chlorate	50	5.1	5.1, 11°(b)
2722	Lithium nitrate	50	5.1	5.1, 22°(c)
2723	Magnesium chlorate	50	5.1	5.1, 11°(b)
2724	Manganese nitrate	50	5.1	5.1, 22°(c)
2725	Nickel nitrate	50	5.1	5.1, 22°(c)
2726	Nickel nitrite	50	5.1	5.1, 23°(c)
2727	Thallium nitrate	65	6.1+05	6.1, 68°(b)
2728	Zirconium nitrate	50	5.1	5.1, 22°(c)
2729	Hexachlorobenzene	60	6.1	6.1, 15°(c)
2730	Nitroanisole	60	6.1	6.1, 12°(c)
2732	Nitrobromobenzene	60	6.1	6.1, 12°(c)
2733	Amines or polyamines, flammable, corrosive, n.o.s.	338	3+8	3, 22°(a),(b)
2733	Amines or polyamines, flammable, corrosive, n.o.s.	38	3+8	3, 33°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2734	Amines or polyamines, liquid, corrosive, flammable, n.o.s.	883	8+3	8, 54°(a)
2734	Amines or polyamines, liquid, corrosive, flammable, n.o.s.	83	8+3	8, 54°(b)
2735	Amines or polyamines, liquid, corrosive, n.o.s.	88	8	8, 53°(a)
2735	Amines or polyamines, liquid, corrosive, n.o.s.	80	8	8, 53°(b),(c)
2738	N-Butylaniline	60	6.1	6.1, 12°(b)
2739	Butyric anhydride	80	8	8, 32°(c)
2740	n-Propyl chloroformate	668	6.1+8+3	6.1, 28°(a)
2741	Barium hypochlorite	56	5.1+6.1	5.1, 29°(b)
2742	Chloroformates, toxic, corrosive, flammable, n.o.s.	638	6.1+3+8	6.1, 28°(b)
2743	n-Butyl chloroformate	638	6.1+3+8	6.1, 28°(b)
2744	Cyclobutyl chloroformate	638	6.1+3+8	6.1, 28°(b)
2745	Chloromethyl chloroformate	68	6.1+8	6.1, 27°(b)
2746	Phenyl chloroformate	68	6.1+8	6.1, 27°(b)
2747	tert-Butylcyclohexyl chloroformate	60	6.1	6.1, 17°(c)
2748	2-Ethylhexyl chloroformate	68	6.1+8	6.1, 27°(b)
2749	Tetramethylsilane	33	3	3, 1°(a)
2750	1,3-Dichloropropanol-2	60	6.1	6.1, 17°(b)
2751	Diethylthiophosphoryl chloride	80	8	8, 35°(b)1.
2752	1,2-Epoxy-3-ethoxypropane	30	3	3, 31°(c)
2753	N-Ethylbenzyltoluidines	60	6.1	6.1, 12°(c)
2754	N-Ethyltoluidines	60	6.1	6.1, 12°(b)
2757	Carbamate pesticide, solid, toxic	66	6.1	6.1, 74°(a)
2757	Carbamate pesticide, solid, toxic	60	6.1	6.1, 74°(b),(c)
2758	Carbamate pesticide, liquid, flammable, toxic	336	3+6.1	3, 44°(a),(b)
2759	Arsenical pesticide, solid, toxic	66	6.1	6.1, 79°(a)
2759	Arsenical pesticide, solid, toxic	60	6.1	6.1, 79°(b),(c)
2760	Arsenical pesticide, liquid, flammable, toxic	336	3+6.1	3, 49°(a),(b)
2761	Organochlorine pesticide, solid, toxic	66	6.1	6.1, 72°(a)
2761	Organochlorine pesticide, solid, toxic	60	6.1	6.1, 72°(b),(c)
2762	Organochlorine pesticide, liquid, flammable, toxic	336	3+6.1	3, 42°(a),(b)
2763	Triazine pesticide, solid, toxic	66	6.1	6.1, 82°(a)
2763	Triazine pesticide, solid, toxic	60	6.1	6.1, 82°(b),(c)
2764	Triazine pesticide, liquid, flammable, toxic	336	3+6.1	3, 52°(a),(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2765	Phenoxy pesticide, solid, toxic	66	6.1	6.1, 73°(a)
2765	Phenoxy pesticide, solid, toxic	60	6.1	6.1, 73°(b),(c)
2766	Phenoxy pesticide, liquid, flammable, toxic	336	3+6.1	3, 43°(a),(b)
2767	Phenyl urea pesticide, solid, toxic	66	6.1	6.1, 85°(a)
2767	Phenyl urea pesticide, solid, toxic	60	6.1	6.1, 85°(b),(c)
2768	Phenyl urea pesticide, liquid, flammable, toxic	336	3+6.1	3, 55°(a),(b)
2769	Benzoic derivative pesticide, solid, toxic	66	6.1	6.1, 83°(a)
2769	Benzoic derivative pesticide, solid, toxic	60	6.1	6.1, 83°(b),(c)
2770	Benzoic derivative pesticide, liquid, flammable, toxic	336	3+6.1	3, 53°(a),(b)
2771	Dithiocarbamate pesticide, solid, toxic	66	6.1	6.1, 86°(a)
2771	Dithiocarbamate pesticide, solid, toxic	60	6.1	6.1, 86°(b),(c)
2772	Dithiocarbamate pesticide, liquid, flammable, toxic	336	3+6.1	3, 56°(a),(b)
2773	Phthalimide derivative pesticide, solid, toxic	66	6.1	6.1, 84°(a)
2773	Phthalimide derivative pesticide, solid, toxic	60	6.1	6.1, 84°(b),(c)
2774	Phthalimide derivative pesticide, liquid, flammable, toxic	336	3+6.1	3, 54°(a),(b)
2775	Copper based pesticide, solid, toxic	66	6.1	6.1, 80°(a)
2775	Copper based pesticide, solid, toxic	60	6.1	6.1, 80°(b),(c)
2776	Copper based pesticide, liquid, flammable, toxic	336	3+6.1	3, 50°(a),(b)
2777	Mercury based pesticide, solid, toxic	66	6.1	6.1, 75°(a)
2777	Mercury based pesticide, solid, toxic	60	6.1	6.1, 75°(b),(c)
2778	Mercury based pesticide, liquid, flammable, toxic	336	3+6.1	3, 45°(a),(b)
2779	Substituted nitrophenol pesticide, solid, toxic	66	6.1	6.1, 81°(a)
2779	Substituted nitrophenol pesticide, solid, toxic	60	6.1	6.1, 81°(b),(c)
2780	Substituted nitrophenol pesticide, liquid, flammable, toxic	336	3+6.1	3, 51°(a),(b)
2781	Bipyridilium pesticide, solid, toxic	66	6.1	6.1, 78°(a)
2781	Bipyridilium pesticide, solid, toxic	60	6.1	6.1, 78°(b),(c)
2782	Bipyridilium pesticide, liquid, flammable, toxic	336	3+6.1	3, 48°(a),(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2783	Organophosphorus pesticide, solid, toxic	66	6.1	6.1, 71°(a)
2783	Organophosphorus pesticide, solid, toxic	60	6.1	6.1, 71°(b),(c)
2784	Organophosphorous pesticide, liquid, flammable, toxic	336	3+6.1	3, 41°(a),(b)
2785	4-Thiapentanal	60	6.1	6.1, 21°(c)
2786	Organotin pesticide, solid, toxic	66	6.1	6.1, 76°(a)
2786	Organotin pesticide, solid, toxic	60	6.1	6.1, 76°(b),(c)
2787	Organotin pesticide, liquid, flammable, toxic	336	3+6.1	3, 46°(a),(b)
2788	Organotin compound, liquid, n.o.s.	66	6.1	6.1, 32°(a)
2788	Organotin compound, liquid, n.o.s.	60	6.1	6.1, 32°(b),(c)
2789	Acetic acid, glacial	83	8+3	8, 32°(b)2.
2789	Acetic acid, solution	83	8+3	8, 32°(b)2.
2790	Acetic acid, solution	80	8	8, 32°(c)
2793	Ferrous metal borings, shavings, turnings or cuttings	40	4.2	4.2, 12°(c)
2796	Sulphuric acid, with more than 51 % acid	80	8	8, 1°(b)
2796	Battery fluid, acid	80	8	8, 1°(b)
2797	Battery fluid, alkali	80	8	8, 42°(b)
2798	Phenylphosphorus dichloride	80	8	8, 35°(b)1.
2799	Phenylphosphorus thiodichloride	80	8	8. 35°(b)1.
2801	Dye or dye intermediate, liquid, corrosive, n.o.s.	80	8	8, 66°(b),(c)
2802	Copper chloride	80	8	8, 11°(c)
2803	Gallium	80	8	8, 65°(c)
2805	Lithium hydride, fused solid	423	4.3	4.3, 16°(b)
2809	Mercury	80	8	8, 66°(c)
2810	Toxic liquid, organic, n.o.s.	66	6.1	6.1, 25°(a)
2810	Toxic liquid, organic, n.o.s.	60	6.1	6.1, 25°(b),(c)
2811	Toxic solid, organic, n.o.s.	66	6.1	6.1, 25°(a)
2811	Toxic solid, organic, n.o.s.	60	6.1	6.1, 25°(b),(c)
2813	Water-reactive solid, n.o.s.	423	4.3	4.3, 20°(b),(c)
2814	Infectious substance, affecting humans	606	6.2	6.2, 3°(b)
2815	N-Aminoethylpiperazine	80	8	8, 53°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2817	Ammonium hydrogendifluoride solution	86	8+6.1	8, 7°(b),(c)
2818	Ammonium polysulphide solution	86	8+6.1	8, 45°(c)
2818	Ammonium polysulphide solution	86	8+6.1	8, 45°(b)1.
2819	Amyl acid phosphate	80	8	8, 38°(c)
2820	Butyric acid	80	8	8, 32°(c)
2821	Phenol solution	60	6.1	6.1, 14°(b),(c)
2822	2-Chloropyridine	60	6.1	6.1, 12°(b)
2823	Crotonic acid	80	8	8, 31°(c)
2826	Ethyl chlorothioformate	83	8+3	8, 64°(b)
2829	Caproic acid	80	8	8, 32°(c)
2830	Lithium ferrosilicon	423	4.3	4.3, 12°(b)
2831	1,1,1-Trichloroethane	60	6.1	6.1, 15°(c)
2834	Phosphorous acid	80	8	8, 16°(c)
2835	Sodium aluminium hydride	423	4.3	4.3, 16°(b)
2837	Bisulphates, aqueous solution	80	8	8, 1°(b),(c)
2838	Vinyl butyrate, inhibited	339	3	3, 3°(b)
2839	Aldol	60	6.1	6.1, 14°(b)
2840	Butyraldoxime	30	3	3, 31°(c)
2841	Di-n-amylamine	36	3+6.1	3, 32°(c)
2842	Nitroethane	30	3	3, 31°(c)
2844	Calcium manganese silicon	423	4.3	4.3, 12°(c)
2845	Pyrophoric liquid, organic, n.o.s.	333	4.2	4.2, 6°(a)
2849	3-Chloropropanol-1	60	6.1	6.1, 17°(c)
2850	Propylene tetramer	30	3	3, 31°(c)
2851	Boron trifluoride dihydrate	80	8	8, 10°(b)
2853	Magnesium fluorosilicate	60	6.1	6.1, 64°(c)
2854	Ammonium fluorosilicate	60	6.1	6.1, 64°(c)
2855	Zinc fluorosilicate	60	6.1	6.1, 64°(c)
2856	Fluorosilicates, n.o.s.	60	6.1	6.1, 64°(c)
2858	Zirconium, dry	40	4.1	4.1, 13°(c)
2859	Ammonium metavanadate	60	6.1	6.1, 58°(b)
2861	Ammonium polyvanadate	60	6.1	6.1, 58°(b)
2862	Vanadium pentoxide	60	6.1	6.1, 58°(b)
2863	Sodium ammonium vanadate	60	6.1	6.1, 58°(b)
2864	Potassium metavanadate	60	6.1	6.1, 58°(b)
2865	Hydroxylamine sulphate	80	8	8, 16°(c)
2869	Titanium trichloride mixture	80	8	8, 11°(b),(c)
2870	Aluminium borohydride	X333	4.2+4.3	4.2, 17°(a)
2870	Aluminium borohydride in devices	X333	4.2+4.3	4.2, 17°(a)
2871	Antimony powder	60	6.1	6.1, 59°(c)
2872	Dibromochloropropanes	60	6.1	6.1, 15°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2873	Dibutylaminoethanol	60	6.1	6.1, 12°(c)
2874	Furfuryl alcohol	60	6.1	6.1, 14°(c)
2875	Hexachlorophene	60	6.1	6.1, 17°(c)
2876	Resorcinol	60	6.1	6.1, 14°(c)
2878	Titanium sponge, powder or granules	40	4.1	4.1, 13°(c)
2879	Selenium oxychloride	886	8+6.1	8, 12°(a)
2880	Calcium hypochlorite, hydrated mixture	50	5.1	5.1, 15°(b)
2880	Calcium hypochlorite, hydrated	50	5.1	5.1, 15°(b)
2881	Metal catalyst, dry	40	4.2	4.2, 12°(b),(c)
2900	Infectious substance, affecting animals only	606	6.2	6.2, 3°(b)
2902	Pesticide, liquid, toxic, n.o.s.	66	6.1	6.1, 87°(a)
2902	Pesticide, liquid, toxic, n.o.s.	60	6.1	6.1, 87°(b),(c)
2903	Pesticide, liquid, toxic, flammable, n.o.s.	663	6.1+3	6.1, 87°(a)
2903	Pesticide, liquid, toxic, flammable, n.o.s.	63	6.1+3	6.1, 87°(b),(c)
2904	Chlorophenolates, liquid	80	8	8, 62°(c)
2904	Phenolates, liquid	80	8	8, 62°(c)
2905	Chlorophenolates, solid	80	8	8, 62°(c)
2905	Phenolates, solid	80	8	8, 62°(c)
2906	Triisocyanatoisocyanurate of isophoronediisocyanate, solution	30	3	3, 31°(c)
2912	Radioactive material, low specific activity (LSA), not otherwise specified in this appendix	70	7A, 7B or 7C	7, Sch 5, 6 or 13
	gas	72	7A, 7B or 7C	
	gas, flammable	723	7A, 7B or 7C + 3	
	liquid, flammable, with a flash-point not above 61 °C	73	7A, 7B or 7C + 3	
	solid, flammable	74	7A, 7B or 7C + 4.1	
	oxidizing	75	7A, 7B or 7C + 05	
	toxic	76	7A, 7B or 7C + 6.1	
	corrosive	78	7A, 7B or 7C + 8	
2920	Corrosive liquid, flammable, n.o.s.	883	8+3	8, 68°(a)
2920	Corrosive liquid, flammable, n.o.s.	83	8+3	8, 68°(b)
2921	Corrosive solid, flammable, n.o.s.	884	8+4.1	8, 67°(a)
2921	Corrosive solid, flammable, n.o.s.	84	8+4.1	8, 67°(b)
2922	Corrosive liquid, toxic, n.o.s.	886	8+6.1	8, 76°(a)
2922	Corrosive liquid, toxic, n.o.s.	86	8+6.1	8, 76°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2923	Corrosive solid, toxic, n.o.s.	886	8+6.1	8, 75°(a)
2923	Corrosive solid, toxic, n.o.s.	86	8+6.1	8, 75°(b),(c)
2924	Flammable liquid, corrosive, n.o.s.	338	3+8	3, 26°(a),(b)
2924	Flammable liquid, corrosive, n.o.s.	38	3+8	3, 33°(c)
2925	Flammable solid, corrosive, organic, n.o.s.	48	4.1+8	4.1, 8°(b),(c)
2926	Flammable solid, toxic, organic, n.o.s.	46	4.1+6.1	4.1, 7°(b),(c)
2927	Toxic liquid, corrosive, organic, n.o.s.	668	6.1+8	6.1, 27°(a)
2927	Toxic liquid, corrosive, organic, n.o.s.	68	6.1+8	6.1, 27°(b)
2928	Toxic solid, corrosive, organic, n.o.s.	668	6.1+8	6.1, 27°(a)
2928	Toxic solid, corrosive, organic, n.o.s.	68	6.1+8	6.1, 27°(b)
2929	Toxic liquid, flammable, organic, n.o.s	663	6.1+3	6.1, 26°(a)1.
2929	Toxic liquid, flammable, organic, n.o.s	63	6.1+3	6.1, 26°(b)1.
2930	Toxic solid, flammable, organic, n.o.s.	664	6.1+4.1	6.1, 26°(a)2.
2930	Toxic solid, flammable, organic, n.o.s.	64	6.1+4.1	6.1, 26°(b)2.
2931	Vanadyl sulphate	60	6.1	6.1, 58°(b)
2933	Methyl 2-chloropropionate	30	3	3, 31°(c)
2934	Isopropyl 2-chloropropionate	30	3	3, 31°(c)
2935	Ethyl 2-chloropropionate	30	3	3, 31°(c)
2936	Thiolactic acid	60	6.1	6.1, 21°(b)
2937	alpha-Methylbenzyl alcohol	60	6.1	6.1, 14°(c)
2938	Methyl benzoate	60	6.1	6.1, 14°(c)
2940	9-Phosphabicyclononanes (cyclooctadiene phosphines)	40	4.2	4.2, 5°(b)
2941	Fluoroanilines	60	6.1	6.1, 12°(c)
2942	2-Trifluoromethylaniline	60	6.1	6.1, 12°(c)
2943	Tetrahydrofurfurylamine	30	3	3, 31°(c)
2945	N-Methylbutylamine	338	3+8	3, 22°(b)
2946	2-Amino-5-diethylaminopentane	60	6.1	6.1, 12°(c)
2947	Isopropyl chloroacetate	30	3	3, 31°(c)
2948	3-Trifluoromethylaniline	60	6.1	6.1, 17°(b)
2949	Sodium hydrosulphide hydrated	80	8	8, 45°(b)1.
2950	Magnesium granules, coated	423	4.3	4.3, 11°(c)
2965	Boron trifluoride dimethyl etherate	382	4.3+3+8	4.3, 2°(a)
2966	Thioglycol	60	6.1	6.1, 21°(b)
2967	Sulphamic acid	80	8	8, 16°(c)
2968	Maneb, stabilized	423	4.3	4.3, 20°(c)
2968	Maneb preparation, stabilized	423	4.3	4.3, 20°(c)
2980	Uranyl nitrate hexahydrate solution	78	7A, 7B or 7C +8	7, Sch 5, 6 or 13
2982	Radioactive material, not otherwise specified in this appendix	70	7A, 7B or 7C	7, Sch 9, 10, 11 or 13
	gas	72	7A, 7B or 7C	

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
	gas, flammable	723	7A, 7B or 7C + 3	
	liquid, flammable, with a flash-point not above 61 °C	73	7A, 7B or 7C + 3	
	solid, flammable	74	7A, 7B or 7C + 4.1	
	oxidizing	75	7A, 7B or 7C + 05	
	toxic	76	7A, 7B or 7C + 6.1	
	corrosive	78	7A, 7B or 7C + 8	
2983	Ethylene oxide and propylene oxide mixture	336	3+6.1	3, 17°(a)
2984	Hydrogen peroxide, aqueous solution	50	5.1	5.1, 1°(c)
2985	Chlorosilanes, flammable, corrosive, n.o.s.	338	3 + 8	3, 21°(b)
2986	Chlorosilanes, corrosive, flammable, n.o.s.	X83	8+3	8, 37°(b)
2987	Chlorosilanes, corrosive, n.o.s.	80	8	8, 36°(b)
2988	Chlorosilanes, water-reactive, flammable, corrosive, n.o.s.	X338	4.3+3+8	4.3, 1°(a)
2989	Lead phosphite, dibasic	40	4.1	4.1, 11°(b),(c)
2991	Carbamate pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 74°(a)
2991	Carbamate pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 74°(b),(c)
2992	Carbamate pesticide, liquid, toxic	66	6.1	6.1, 74°(a)
2992	Carbamate pesticide, liquid, toxic	60	6.1	6.1, 74°(b),(c)
2993	Arsenical pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 79°(a)
2993	Arsenical pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 79°(b),(c)
2994	Arsenical pesticide, liquid, toxic	66	6.1	6.1, 79°(a)
2994	Arsenical pesticide, liquid, toxic	60	6.1	6.1, 79°(b),(c)
2995	Organochlorine pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 72°(a)
2995	Organochlorine pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 72°(b),(c)
2996	Organochlorine pesticide, liquid, toxic	66	6.1	6.1, 72°(a)
2996	Organochlorine pesticide, liquid, toxic	60	6.1	6.1, 72°(b),(c)
2997	Triazine pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 82°(a)
2997	Triazine pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 82°(b),(c)
2998	Triazine pesticide, liquid, toxic	66	6.1	6.1, 82°(a)
2998	Triazine pesticide, liquid, toxic	60	6.1	6.1, 82°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
2999	Phenoxy pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 73°(a)
2999	Phenoxy pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 73°(b),(c)
3000	Phenoxy pesticide, liquid, toxic	66	6.1	6.1, 73°(a)
3000	Phenoxy pesticide, liquid, toxic	60	6.1	6.1, 73°(b),(c)
3001	Phenyl urea pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 85°(a)
3001	Phenyl urea pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 85°(b),(c)
3002	Phenyl urea pesticide, liquid, toxic	66	6.1	6.1, 85°(a)
3002	Phenyl urea pesticide, liquid, toxic	60	6.1	6.1, 85°(b),(c)
3003	Benzoic derivative pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 83°(a)
3003	Benzoic derivative pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 83°(b),(c)
3004	Benzoic derivative pesticide, liquid, toxic	66	6.1	6.1, 83°(a)
3004	Benzoic derivative pesticide, liquid, toxic	60	6.1	6.1, 83°(b),(c)
3005	Dithiocarbamate pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 86°(a)
3005	Dithiocarbamate pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 86°(b),(c)
3006	Dithiocarbamate pesticide, liquid, toxic	66	6.1	6.1, 86°(a)
3006	Dithiocarbamate pesticide, liquid, toxic	60	6.1	6.1, 86°(b),(c)
3007	Phthalimide derivative pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 84°(a)
3007	Phthalimide derivative pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 84°(b),(c)
3008	Phthalimide derivative pesticide, liquid, toxic	66	6.1	6.1, 84°(a)
3008	Phthalimide derivative pesticide, liquid, toxic	60	6.1	6.1, 84°(b),(c)
3009	Copper based pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 80°(a)
3009	Copper based pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 80°(b),(c)
3010	Copper based pesticide, liquid, toxic	66	6.1	6.1, 80°(a)
3010	Copper based pesticide, liquid, toxic	60	6.1	6.1, 80°(b),(c)
3011	Mercury based pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 75°(a)
3011	Mercury based pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 75°(b),(c)
3012	Mercury based pesticide, liquid, toxic	66	6.1	6.1, 75°(a)
3012	Mercury based pesticide, liquid, toxic	60	6.1	6.1, 75°(b),(c)
3013	Substituted nitrophenol pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 81°(a)
3013	Substituted nitrophenol pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 81°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3014	Substituted nitrophenol pesticide, liquid, toxic	66	6.1	6.1, 81°(a)
3014	Substituted nitrophenol pesticide, liquid, toxic	60	6.1	6.1, 81°(b),(c)
3015	Bipyridilium pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 78°(a)
3015	Bipyridilium pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 78°(b),(c)
3016	Bipyridilium pesticide, liquid, toxic	66	6.1	6.1, 78°(a)
3016	Bipyridilium pesticide, liquid, toxic	60	6.1	6.1, 78°(b),(c)
3017	Organophosphorus pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 71°(a)
3017	Organophosphorus pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 71°(b),(c)
3018	Organophosphorus pesticide, liquid, toxic	66	6.1	6.1, 71°(a)
3018	Organophosphorus pesticide, liquid, toxic	60	6.1	6.1, 71°(b),(c)
3019	Organotin pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 76°(a)
3019	Organotin pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 76°(b),(c)
3020	Organotin pesticide, liquid, toxic	66	6.1	6.1, 76°(a)
3020	Organotin pesticide, liquid, toxic	60	6.1	6.1, 76°(b),(c)
3021	Pesticide, liquid, flammable, toxic, n.o.s.	336	3+6.1	3, 57°(a),(b)
3022	1,2-Butylene oxide, stabilized	339	3	3, 3°(b)
3023	tert-Octyl mercaptan	63	6.1+3	6.1, 20°(b)
3024	Coumarin derivative pesticide, liquid, flammable, toxic	336	3+6.1	3, 47°(a),(b)
3025	Coumarin derivative pesticide, liquid, toxic, flammable	663	6.1+3	6.1, 77°(a)
3025	Coumarin derivative pesticide, liquid, toxic, flammable	63	6.1+3	6.1, 77°(b),(c)
3026	Coumarin derivative pesticide, liquid, toxic	66	6.1	6.1, 77°(a)
3026	Coumarin derivative pesticide, liquid, toxic	60	6.1	6.1, 77°(b),(c)
3027	Coumarin derivative pesticide, solid, toxic	66	6.1	6.1, 77°(a)
3027	Coumarin derivative pesticide, solid, toxic	60	6.1	6.1, 77°(b),(c)
3049	Metal alkyl halides, n.o.s. or metal aryl halides, n.o.s.	X333	4.2+4.3	4.2, 32°(a)
3050	Metal alkyl hydrides, n.o.s. or metal aryl hydrides, n.o.s.	X333	4.2+4.3	4.2, 32°(a)
3051	Aluminium alkyls	X333	4.2+4.3	4.2, 31°(a)
3052	Aluminium alkyl halides	X333	4.2+4.3	4.2, 32°(a)
3053	Magnesium alkyls	X333	4.2+4.3	4.2, 31°(a)
3054	Cyclohexyl mercaptan	30	3	3, 31°(c)
3055	2-(2-Aminoethoxy) ethanol	80	8	8, 53°(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3056	n-Heptaldehyde	30	3	3, 31°(c)
3065	Alcoholic beverages	30	3	3, 31°(c)
3065	Alcoholic beverages	33	3	3, 3°(b)
3066	Paint or paint related material	80	8	8, 66°(b),(c)
3070	Dichlorodifluoromethane and ethylene oxide mixtures with not more than 12 % ethylene oxide by mass	26	6.1	2, 4°(at)
3071	Mercaptan mixture, liquid, toxic, flammable, n.o.s.	63	6.1+3	6.1, 20°(b)
3071	Mercaptans, liquid, toxic, flammable, n.o.s.	63	6.1+3	6.1, 20°(b)
3073	Vinylpyridines, inhibited	639	6.1+3	6.1, 11°(b)
3076	Aluminium alkyl hydrides	X333	4.2+4.3	4.2, 32°(a)
3077	Environmentally hazardous substance, solid, n.o.s.	90	9	9, 12°(c)
3078	Cerium	423	4.3	4.3, 13°(b)
3079	Methacrylonitrile, inhibited	336	3+6.1	3,11°(a)
3080	Isocyanates, toxic, flammable, n.o.s.	63	6.1+3	6.1, 18°(b)
3080	Isocyanate solution, toxic, flammable, n.o.s.	63	6.1+3	6.1, 18°(b)
3082	Environmentally hazardous substance, liquid, n.o.s.	90	9	9, 11°(c)
3084	Corrosive solid, oxidizing, n.o.s.	885	8+05	8, 73°(a)
3084	Corrosive solid, oxidizing, n.o.s.	85	8+05	8, 73°(b)
3085	Oxidizing solid, corrosive, n.o.s.	58	5.1+8	5.1, 31°(b),(c)
3086	Toxic solid, oxidizing, n.o.s.	665	6.1+05	6.1, 68°(a)
3086	Toxic solid, oxidizing, n.o.s.	65	6.1+05	6.1, 68°(b)
3087	Oxidizing solid, toxic, n.o.s.	56	5.1+6.1	5.1, 29°(b),(c)
3088	Self-heating solid, organic, n.o.s.	40	4.2	4.2, 5°(b),(c)
3089	Metal powder, flammable, n.o.s.	40	4.1	4.1, 13°(b),(c)
3092	1-Methoxy-2-propanol	30	3	3, 31°(c)
3093	Corrosive liquid, oxidizing, n.o.s.	885	8+05	8, 74°(a)
3093	Corrosive liquid, oxidizing, n.o.s.	85	8+05	8, 74°(b)
3094	Corrosive liquid, water-reactive n.o.s.	823	8+4.3	8, 72°(a),(b)
3095	Corrosive solid, self-heating, n.o.s	84	8+4.2	8, 69°(b)
3096	Corrosive solid, water-reactive, n.o.s.	842	8+4.3	8, 71°(b)
3109	Organic peroxide, type F, liquid	539	5.2+(8)	5.2, 9°(b)
3110	Organic peroxide, type F, solid	539	5.2	5.2, 10°(b)
3119	Organic peroxide, type F, liquid, temperature controlled	539	5.2	5.2, 19°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3120	Organic peroxide, type F, solid, temperature controlled	539	5.2	5.2, 20°(b)
3122	Toxic liquid, oxidizing, n.o.s.	665	6.1+05	6.1, 68°(a)
3122	Toxic liquid, oxidizing, n.o.s.	65	6.1+05	6.1, 68°(b)
3123	Toxic liquid, water-reactive, n.o.s.	623	6.1+4.3	6.1, 44°(a),(b)
3124	Toxic solid, self-heating, n.o.s.	664	6.1+4.2	6.1, 66°(a)
3124	Toxic solid, self-heating, n.o.s.	64	6.1+4.2	6.1, 66°(b)
3125	Toxic solid, water-reactive, n.o.s.	642	6.1+4.3	6.1, 44°(b),(c)
3126	Self-heating solid, corrosive, organic, n.o.s.	48	4.2+8	4.2, 9°(b),(c)
3128	Self-heating solid, toxic, organic, n.o.s.	46	4.2+6.1	4.2, 7°(b),(c)
3129	Water-reactive liquid, corrosive, n.o.s.	X382	4.3+8	4.3, 25°(a)
3129	Water-reactive liquid, corrosive, n.o.s.	382	4.3+8	4.3, 25°(b),(c)
3130	Water-reactive liquid, toxic, n.o.s.	X362	4.3+6.1	4.3, 23°(a)
3130	Water-reactive liquid, toxic, n.o.s.	362	4.3+6.1	4.3, 23°(b),(c)
3131	Water-reactive solid, corrosive, n.o.s.	482	4.3+8	4.3, 24°(b),(c)
3134	Water-reactive solid, toxic, n.o.s.	462	4.3+6.1	4.3, 22°(b),(c)
3138	Ethylene, acetylene and propylene in mixture, refrigerated liquid	223	3	2, 8°(b)
3140	Alkaloids or alcaloid salts, liquid, n.o.s.	66	6.1	6.1, 90°(a)
3140	Alkaloids or alcaloid salts, liquid, n.o.s.	60	6.1	6.1, 90°(b),(c)
3141	Antimony compound, inorganic, liquid, n.o.s.	60	6.1	6.1, 59°(c)
3142	Disinfectant, liquid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
3142	Disinfectant, liquid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
3143	Dye, solid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
3143	Dye, solid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
3143	Dye intermediate, solid, toxic, n.o.s.	66	6.1	6.1, 25°(a)
3143	Dye intermediate, solid, toxic, n.o.s.	60	6.1	6.1, 25°(b),(c)
3144	Nicotine compound or nicotine preparation, liquid, n.o.s.	66	6.1	6.1, 90°(a)
3144	Nicotine compound or nicotine preparation, liquid, n.o.s.	60	6.1	6.1, 90°(b),(c)
3145	Alkylphenols, liquid, n.o.s.	88	8	8, 40°(a)
3145	Alkylphenols, liquid, n.o.s.	80	8	8, 40°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3146	Organotin compound, solid, n.o.s.	66	6.1	6.1, 32°(a)
3146	Organotin compound, solid, n.o.s.	60	6.1	6.1, 32°(b),(c)
3147	Dye or dye intermediate, solid, corrosive, n.o.s.	80	8	8, 65°(b),(c)
3148	Water-reactive liquid, n.o.s.	X323	4.3	4.3, 21°(a)
3148	Water-reactive liquid, n.o.s.	323	4.3	4.3, 21°(b),(c)
3149	Hydrogen peroxide and peroxyacetic acid mixture, stabilized	58	5.1+8	5.1, 1°(b)
3151	Polyhalogenated biphenyls, liquid	90	9	9, 2°(b)
3151	Polyhalogenated terphenyls, liquid	90	9	9, 2°(b)
3152	Polyhalogenated biphenyls, solid	90	9	9, 2°(b)
3152	Polyhalogenated terphenyls, solid	90	9	9, 2°(b)
3155	Pentachlorophenol	60	6.1	6.1, 17°(b)
3159	1,1,1,2-Tetrafluorethane (R 134a)	20	2	2, 3°(a)
3170	Aluminium dross	423	4.3	4.3, 13°(b),(c)
3172	Toxins, extracted from living sources, n.o.s.	66	6.1	6.1, 90°(a)
3172	Toxins, extracted from living sources, n.o.s.	60	6.1	6.1, 90°(b),(c)
3174	Titanium disulphide	40	4.2	4.2, 13°(c)
3175	Solids containing flammable liquid, n.o.s.	40	4.1	4.1, 4°(c)
3176	Flammable solid, organic, molten, n.o.s.	44	4.1	4.1, 5°
3178	Flammable solid, inorganic, n.o.s.	40	4.1	4.1, 11°(b),(c)
3179	Flammable solid, toxic, inorganic, n.o.s.	46	4.1+6.1	4.1, 16°(b),(c)
3180	Flammable solid, corrosive, inorganic, n.o.s.	48	4.1+8	4.1, 17°(b),(c)
3181	Metal salts of organic compounds, flammable, n.o.s.	40	4.1	4.1, 12°(b),(c)
3182	Metal hydrides, flammable, n.o.s.	40	4.1	4.1, 14°(b),(c)
3183	Self-heating liquid, organic, n.o.s.	30	4.2	4.2, 6°(b),(c)
3184	Self-heating liquid, toxic, organic, n.o.s.	36	4.2+6.1	4.2, 8°(b),(c)
3185	Self-heating liquid, corrosive, organic, n.o.s.	38	4.2+8	4.2, 10°(b),(c)
3186	Self-heating liquid, inorganic, n.o.s.	30	4.2	4.2, 17°(b),(c)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3187	Self-heating liquid, toxic, inorganic, n.o.s.	36	4.2+6.1	4.2, 19°(b),(c)
3188	Self-heating liquid, corrosive, inorganic, n.o.s.	38	4.2+8	4.2, 21°(b),(c)
3189	Metal powder, self-heating, n.o.s.	40	4.2	4.2, 12°(b),(c)
3190	Self-heating solid, inorganic, n.o.s.	40	4.2	4.2, 16°(b),(c)
3191	Self-heating solid, toxic, inorganic, n.o.s.	46	4.2+6.1	4.2, 18°(b),(c)
3192	Self-heating solid, corrosive, inorganic, n.o.s.	48	4.2+8	4.2, 20°(b),(c)
3194	Pyrophoric liquid, inorganic, n.o.s.	333	4.2	4.2, 17°(a)
3203	Pyrophoric organometallic compound, n.o.s.	X333	4.2+4.3	4.2, 33°(a)
3205	Alkaline-earth metal alcoholates, n.o.s.	40	4.2	4.2, 14°(b),(c)
3206	Alkali metal alcoholates, n.o.s.	48	4.2+8	4.2, 15°(b),(c)
3207	Organometallic compound, or solution, or dispersion, water-reactive, flammable, n.o.s	X323	4.3+3	4.3, 3°(a)
3207	Organometallic compound, or solution, or dispersion, water-reactive, flammable, n.o.s	323	4.3+3	4.3, 3°(b),(c)
3208	Metallic substance, water-reactive, n.o.s.	423	4.3	4.3, 13°(b),(c)
3209	Metallic substance, water-reactive, self-heating, n.o.s.	423	4.3+4.2	4.3, 14°(b),(c)
3210	Chlorates, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 11°(b)
3211	Perchlorates, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 13°(b)
3212	Hypochlorites, inorganic, n.o.s.	50	5.1	5.1, 15°(b)
3213	Bromates, inorganic, aqueous solution n.o.s.	50	5.1	5.1, 16°(b),(c)
3214	Permanganates, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 17°(b)
3215	Persulphates, inorganic, n.o.s.	50	5.1	5.1, 18°(c)
3216	Persulfates, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 18°(c)
3217	Percarbonates, inorganic, n.o.s.	50	5.1	5.1, 19°(c)
3218	Nitrates, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 22°(b),(c)
3219	Nitrites, inorganic, aqueous solution, n.o.s.	50	5.1	5.1, 23°(b),(c)
3220	Pentafluoroethane (R 125)	20	2	2, 5°(a)
3241	2-Bromo-2-nitropropane-1,3-diol	60	6.1	6.1, 17°(c)

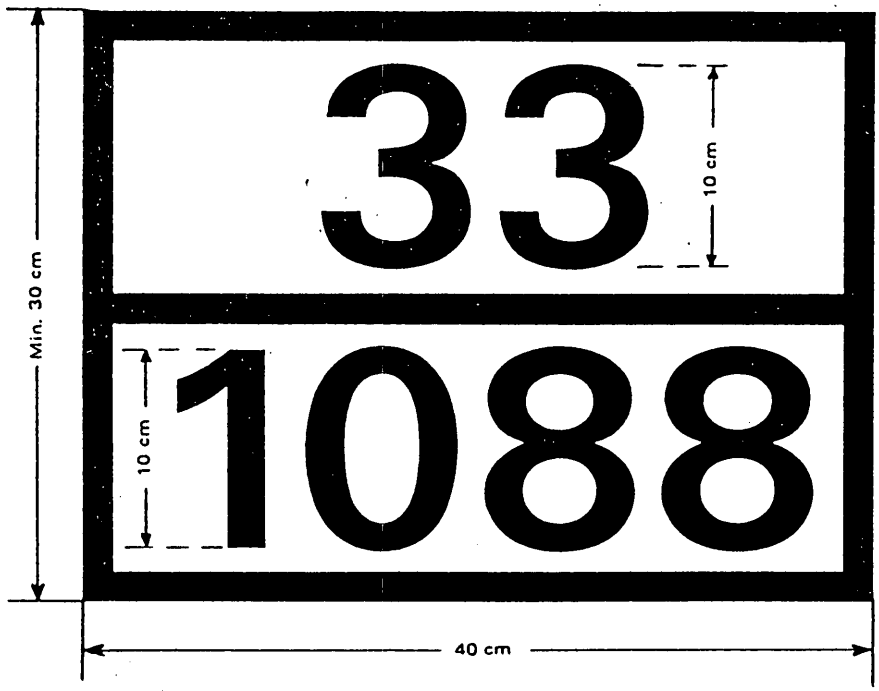
250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3243	Solids containing toxic liquid, n.o.s.	60	6.1	6.1, 65°(b)
3244	Solids containing corrosive liquid, n.o.s.	80	8	8, 65°(b)
3246	Methanesulphonyl chloride	668	6.1+8	6.1, 27°(a)
3247	Sodium peroxoborate, anhydrous	50	5.1	5.1, 27°(b)
3248	Medicine, liquid, flammable, toxic, n.o.s.	336	3+6.1	3, 19°(b)
3248	Medicine, liquid, flammable, toxic, n.o.s.	36	3+6.1	3, 32°(c)
3249	Medicine, solid, toxic, n.o.s.	60	6.1	6.1, 90°(b),(c)
3250	Chloroacetic acid, molten	68	6.1+8	6.1, 24°(b)2.
3253	Disodium trioxosilicate pentahydrate	80	8	8, 41°(c)
3256	Elevated temperature liquid, flammable, n.o.s.	30	3	3, 61°(c)
3259	Amines or polyamines, solid, corrosive, n.o.s.	88	8	8, 52°(a)
3259	Amines or polyamines, solid, corrosive, n.o.s.	80	8	8, 52°(b),(c)
3260	Corrosive solid, acidic, inorganic, n.o.s.	88	8	8,16°(a)
3260	Corrosive solid, acidic, inorganic, n.o.s.	80	8	8, 16°(b),(c)
3261	Corrosive solid, acidic, organic, n.o.s.	88	8	8, 39°(a)
3261	Corrosive solid, acidic, organic, n.o.s.	80	8	8, 39°(b),(c)
3262	Corrosive solid, basic, inorganic, n.o.s.	88	8	8, 46°(a)
3262	Corrosive solid, basic, inorganic, n.o.s.	80	8	8, 46°(b),(c)
3263	Corrosive solid, basic, organic, n.o.s.	88	8	8, 55°(a)
3263	Corrosive solid, basic, organic, n.o.s.	80	8	8, 55°(b),(c)
3264	Corrosive liquid, acidic, inorganic, n.o.s.	88	8	8, 17°(a)
3264	Corrosive liquid, acidic, inorganic, n.o.s.	80	8	8, 17°(b),(c)
3265	Corrosive liquid, acidic, organic, n.o.s.	88	8	8, 40°(a)
3265	Corrosive liquid, acidic, organic, n.o.s.	80	8	8, 40°(b),(c)
3266	Corrosive liquid, basic, inorganic, n.o.s.	88	8	8. 47°(a)
3266	Corrosive liquid, basic, inorganic, n.o.s.	80	8	8, 47°(b),(c)
3267	Corrosive liquid, basic, organic, n.o.s.	88	8	8, 56°(a)
3267	Corrosive liquid, basic, organic, n.o.s.	80	8	8, 56°(b),(c)
3271	Ethers, n.o.s.	33	3	3, 3°(b)
3271	Ethers, n.o.s.	30	3	3, 31°(c)
3272	Esters, n.o.s.	33	3	3, 3°(b)
3272	Esters, n.o.s.	30	3	3, 31°(c)
3273	Nitriles, flammable, toxic, n.o.s.	336	3+6.1	3, 11°(a),(b)
3274	Alcoholates solution, n.o.s.	338	3+8	3, 24°(b)
3275	Nitriles, toxic, flammable, n.o.s.	663	6.1+3	6.1, 11°(a)
3275	Nitriles, toxic, flammable, n.o.s.	63	6.1+3	6.1, 11°(b)

250 000 *(cont'd)*

Substance Identification No (Lower part)	Name of substance	Hazard Identification No (Upper part)	Label	Class and item number
(a)	(b)	(c)	(d)	(e)
3276	Nitriles, toxic, n.o.s.	66	6.1	6.1, 12°(a)
3276	Nitriles, toxic, n.o.s.	60	6.1	6.1, 12°(b),(c)
3277	Chloroformates, toxic, corrosive, n.o.s.	68	6.1+8	6.1, 27°(b)
3278	Organophosphorus compound, toxic, n.o.s.	66	6.1	6.1, 23°(a)
3278	Organophosphorus compound, toxic, n.o.s.	60	6.1	6.1, 23°(b),(c)
3279	Organophosphorus compound, toxic, flammable, n.o.s.	663	6.1+3	6.1, 22°(a)
3279	Organophosphorus compound, toxic, flammable, n.o.s.	63	6.1+3	6.1, 22°(b)
3280	Organoarsenic compound, n.o.s	66	6.1	6.1, 34°(a)
3280	Organoarsenic compound, n.o.s.	60	6.1	6.1, 34°(b),(c)
3281	Metal carbonyls, n.o.s.	66	6.1	6.1, 36°(a)
3281	Metal carbonyls, n.o.s.	60	6.1	6.1, 36°(b),(c)
3282	Organometallic compound, toxic, n.o.s.	66	6.1	6.1, 35°(a)
3282	Organometallic compound, toxic, n.o.s.	60	6.1	6.1, 35°(b),(c)
3283	Selenium compound, n.o.s.	66	6.1	6.1, 55°(a)
3283	Selenium compound, n.o.s.	60	6.1	6.1, 55°(b),(c)
3284	Tellurium compound, n.o.s.	60	6.1	6.1, 57°(b),(c)
3285	Vanadium compound, n.o.s.	60	6.1	6.1, 58°(b),(c)
3286	Flammable liquid, toxic, corrosive, n.o.s.	368	3+6.1+8	3, 27°(a),(b)
3287	Toxic liquid, inorganic, n.o.s.	66	6.1	6.1, 65°(a)
3287	Toxic liquid, inorganic, n.o.s.	60	6.1	6.1, 65°(b),(c)
3288	Toxic solid, inorganic, n.o.s.	66	6.1	6.1, 65°(a)
3288	Toxic solid, inorganic, n.o.s.	60	6.1	6.1, 65°(b),(c)
3289	Toxic liquid, corrosive, inorganic, n.o.s.	668	6.1+8	6.1, 67°(a)
3289	Toxic liquid, corrosive, inorganic, n.o.s.	68	6.1+8	6.1, 67°(b)
3290	Toxic solid, corrosive, inorganic, n.o.s.	668	6.1+8	6.1, 67°(a)
3290	Toxic solid, corrosive, inorganic, n.o.s.	68	6.1+8	6.1, 67°(b)
3291	Clinical waste, unspecified, n.o.s.	606	6.2	6.2, 4°(b)
3293	Hydrazine, aqueous solution	60	6.1	6.1, 65°(c)
3294	Hydrogen cyanide, solution in alcohol	663	6.1+3	6.1, 2°
3295	Hydrocarbons, liquid, n.o.s.	33	3	3, 1°(a), 2°(a),(b), 3°(b)
3295	Hydrocarbons, liquid, n.o.s.	30	3	3, 31°(c)
3301	Corrosive liquid, self-heating, n.o.s.	884	8+4.2	8, 70°(a)
3301	Corrosive liquid, self-heating, n.o.s.	84	8+4.2	8, 70°(b)

250 001 Identification numbers shall be shown on the plate as indicated below:



Identification number of danger (2 or 3 figures)

Identification number of substance (4 figures)

Background orange.
Border, horizontal line and figure black, 15 mm thickness.

250 002-
259 999

APPENDIX B.6

TRAINING CERTIFICATE FOR DRIVERS OF VEHICLES REQUIRED IN MARGINAL 10 315

(See marginal 10 381)

260 000 The certificate of competence for drivers of vehicles carrying dangerous goods issued in conformity with the prescription in marginal 10 315 shall have the layout as reproduced in the model below. It is recommended that the format shall be the same as the European national driving permit, namely A7 (7A × 105 mm) or a double sheet which can be folded to that format.

Page 1

ADR-Training certificate for drivers of vehicles carrying dangerous goods

In tanks (1) **Other than in tanks** (1)

Certificat No .....

Distinguishing sign of issuing State .....

Valid for class(es) (1) (2)

in tanks	other than in tanks
1	1
1	2
3	3
4.1, 4.2, 4.3	4.1, 4.2, 4.3
5.1, 5.2	5.1, 5.2
6.1, 6.2	6.1, 6.2
7	7
8	8
9	9

until (date) (3) .....

(1) Strike out what does not apply.
(2) For extension to other classes, see page 3.
(3) For renewal, see page 2.

Page 2

Surname .....

First name(s) .....

Date of birth .....

Nationality .....

Signature of holder .....

Issued by .....

Date .....

Signature (4) .....

Renewed until .....

By .....

Date .....

Signature (4) .....

(4) And/or seal (or stamp) of issuing authority.

Page 3

Extended to class(es) (5)

In tanks

1	
2	
3	
4.1, 4.2, 4.3	Date .....
5.1, 5.2	
6.1, 6.2	Signature
7	and/or seal or stamp .....
8	
9	

Other than in tanks

1	
2	
3	
4.1, 4.2, 4.3	Date .....
5.1, 5.2	
6.1, 6.2	Signature
7	and/or seal or stamp .....
8	
9	

(5) Strike out what does not apply.

Page 4

For national regulations only