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Legislation

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Price: EUR 7

⁽¹⁾ Text with EEA relevance

EN

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.

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II

(Non-legislative acts)

REGULATIONS

COMMISSION REGULATION (EU) No 1229/2012

of 10 December 2012

amending Annexes IV and XII to Directive 2007/46/EC of the European Parliament and of the Council establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive)**(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive)⁽¹⁾, and in particular Article 39(2) and (3) thereof,

Whereas:

- (1) Directive 2007/46/EC establishes a harmonised framework containing the administrative provisions and general technical requirements for all new vehicles. In particular it includes the regulatory acts laying down the technical requirements with which vehicles have to comply in order to be granted EC vehicle type-approval.
- (2) Part 1 of Annex IV to Directive 2007/46/EC contains a list of regulatory acts for EC type-approval of vehicles produced in unlimited series. Directive 2007/46/EC has been amended several times and that list has accordingly been updated.
- (3) Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefor⁽²⁾, provides for the repeal of several Directives. The repealed Directives have been replaced by corresponding United Nations Economic Commission for Europe (UNECE) Regulations and by Commission Regulations. Those changes should be reflected in Annex IV to Directive 2007/46/EC.

- (4) It is essential to adapt the requirements for EC type-approval of small series in order to ensure that manufacturers who produce small series of vehicles may continue to have access to the internal market. For such purposes, it is necessary to adopt simplified measures to reduce the cost required by the type-approval process whereas at the same time ensuring a high level of road safety and protection of the environment.
- (5) Since N₁ vehicles exhibit construction features similar to those of M₁ vehicles, it is also appropriate to lay down harmonised technical requirements for vehicles of category N₁ in order to allow such vehicles produced in small series to access the internal market.
- (6) It is essential that the requirements laid down in Appendix 1 to Annex IV to Directive 2007/46/EC apply to all new vehicles. However, sufficient time should be given to manufacturers to allow them to adapt their vehicles to the new requirements.
- (7) Sections 1 and 2 of Part A of Annex XII to Directive 2007/46/EC include quantitative limits for the purposes of EC type-approval of small series. It is appropriate, when extending EC type-approval of small series to vehicles of category N₁, to introduce a quantitative limit for vehicles of that category. Likewise, given the purpose of EC type-approval, namely to foster access to the internal market, the number of vehicles of category N₁ that may benefit from national type-approval pursuant to Article 23 of Directive 2007/46/EC should be restricted to the necessary minimum. Therefore, the quantity of those vehicles should also be laid down.
- (8) Annexes IV and XII to Directive 2007/46/EC should therefore be amended accordingly.

⁽¹⁾ OJ L 263, 9.10.2007, p. 1.⁽²⁾ OJ L 200, 31.7.2009, p. 1.

- (9) The measures provided for in this Regulation are in accordance with the opinion of the Technical Committee — Motor Vehicles,

HAS ADOPTED THIS REGULATION:

Article 1

Annexes IV and XII to Directive 2007/46/EC are amended in accordance with the Annex to this Regulation.

Article 2

EC type-approval of small series granted before 1 November 2012 shall cease to be valid on 31 October 2016. National

authorities shall consider certificates of conformity for vehicles to be no longer valid for the purposes of Article 26(1) of Directive 2007/46/EC, unless the type-approvals concerned have been updated to the requirements of Appendix 1 to Annex IV to Directive 2007/46/EC.

Article 3

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

However, point (1)(b) of the Annex shall apply in accordance with the dates set out therein.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 10 December 2012.

For the Commission

The President

José Manuel BARROSO

ANNEX

Directive 2007/46/EC is amended as follows:

(1) Annex IV is amended as follows:

(a) Part I is replaced by the following:

PART I

Regulatory acts for EC type-approval of vehicles produced in unlimited series

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
1	Permissible sound level	Directive 70/157/EEC	X	X	X	X	X	X				
2	Emissions (Euro 5 and 6) light duty vehicles/access to information	Regulation (EC) No 715/2007	X ⁽¹⁾	X ⁽¹⁾		X ⁽¹⁾	X ⁽¹⁾					
3	Fuel tanks/rear protective devices	Directive 70/221/EEC	X ⁽²⁾	X ⁽²⁾	X ⁽²⁾	X ⁽²⁾	X ⁽²⁾	X ⁽²⁾	X	X	X	X
3A	Prevention of fire risks (liquid fuel tanks)	Regulation (EC) No 661/2009 UNECE Regulation No 34	X	X	X	X	X	X	X	X	X	X
3B	Rear underrun protective devices (RUPDs) and their installation; rear underrun protection (RUP)	Regulation (EC) No 661/2009 UNECE Regulation No 58	X	X	X	X	X	X	X	X	X	X
4	Rear registration plate space	Directive 70/222/EEC	X	X	X	X	X	X	X	X	X	X
4A	Space for mounting and fixing rear registration plates	Regulation (EC) No 661/2009 Regulation (EU) No 1003/2010	X	X	X	X	X	X	X	X	X	X
5	Steering effort	Directive 70/311/EEC	X	X	X	X	X	X	X	X	X	X
5A	Steering equipment	Regulation (EC) No 661/2009 UNECE Regulation No 79	X	X	X	X	X	X	X	X	X	X
6	Door latches and hinges	Directive 70/387/EEC	X			X	X	X				
6A	Vehicle access and manoeuvrability	Regulation (EC) No 661/2009 Regulation (EU) No 130/2012	X	X	X	X	X	X				
6B	Door latches and door retention components	Regulation (EC) No 661/2009 UNECE Regulation No 11	X			X						
7	Audible warning	Directive 70/388/EEC	X	X	X	X	X	X				
7A	Audible warning devices and signals	Regulation (EC) No 661/2009 UNECE Regulation No 28	X	X	X	X	X	X				
8	Indirect vision devices	Directive 2003/97/EC	X	X	X	X	X	X				

[illegible]

[illegible]

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
23	Direction indicators	Directive 76/759/EEC	X	X	X	X	X	X	X	X	X	X
23A	Direction indicators for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 6	X	X	X	X	X	X	X	X	X	X
24	Rear registration plate lamps	Directive 76/760/EEC	X	X	X	X	X	X	X	X	X	X
24A	Illumination of rear-registration plates of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 4	X	X	X	X	X	X	X	X	X	X
25	Headlamps (including bulbs)	Directive 76/761/EEC	X	X	X	X	X	X				
25A	Power-driven vehicle's sealed-beam headlamps (SB) emitting an European asymmetrical passing beam or a driving beam or both	Regulation (EC) No 661/2009 UNECE Regulation No 31	X	X	X	X	X	X				
25B	Filament lamps for use in approved lamp units of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 37	X	X	X	X	X	X	X	X	X	X
25C	Motor vehicle headlamps equipped with gas-discharge light sources	Regulation (EC) No 661/2009 UNECE Regulation No 98	X	X	X	X	X	X				
25D	Gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 99	X	X	X	X	X	X				
25E	Motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with filament lamps and/or LED modules	Regulation (EC) No 661/2009 UNECE Regulation No 112	X	X	X	X	X	X				
25F	Adaptive front-lighting systems (AFS) for motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 123	X	X	X	X	X	X				
26	Front fog lamps	Directive 76/762/EEC	X	X	X	X	X	X				
26A	Power-driven vehicle front fog lamps	Regulation (EC) No 661/2009 UNECE Regulation No 19	X	X	X	X	X	X				
27	Towing hooks	Directive 77/389/EEC	X	X	X	X	X	X				
27A	Towing device	Regulation (EC) No 661/2009 Regulation (EU) No 1005/2010	X	X	X	X	X	X				

[illegible]

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
37	Wheel guards	Directive 78/549/EEC	X									
37A	Wheel guards	Regulation (EC) No 661/2009 Regulation (EU) No 1009/2010	X									
38	Head restraints	Directive 78/932/EEC	X									
38A	Head restraints (headrests), whether or not incorporated in vehicle seats	Regulation (EC) No 661/2009 UNECE Regulation No 25	X	X	X	X	X	X				
40	Engine power	Directive 80/1269/EEC	X ⁽⁷⁾	X ⁽⁷⁾	X ⁽⁷⁾	X ⁽⁷⁾	X ⁽⁷⁾	X ⁽⁷⁾				
41	Emissions (Euro IV and V) heavy duty vehicles.	Directive 2005/55/EC	X ⁽⁸⁾	X ⁽⁸⁾	X	X ⁽⁸⁾	X ⁽⁸⁾	X				
41A	Emissions (Euro VI) heavy duty vehicles/access to information	Regulation (EC) No 595/2009	X ⁽⁹⁾	X ⁽⁹⁾	X	X ⁽⁹⁾	X ⁽⁹⁾	X				
42	Lateral protection	Directive 89/297/EEC					X	X			X	X
42A	Lateral protection of goods vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 73					X	X			X	X
43	Spray-suppression systems	Directive 91/226/EEC				X	X	X	X	X	X	X
43A	Spray suppression systems	Regulation (EC) No 661/2009 Regulation (EU) No 109/2011				X	X	X	X	X	X	X
44	Masses and dimensions (cars)	Directive 92/21/EEC	X									
44A	Masses and dimensions	Regulation (EC) No 661/2009 Regulation (EU) No 1230/2012	X									
45	Safety glazing	Directive 92/22/EEC	X	X	X	X	X	X	X	X	X	X
45A	Safety glazing materials and their installation on vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 43	X	X	X	X	X	X	X	X	X	X
46	Tyres	Directive 92/23/EEC	X	X	X	X	X	X	X	X	X	X
46A	Installation of tyres	Regulation (EC) No 661/2009 Regulation (EU) No 458/2011	X	X	X	X	X	X	X	X	X	X
46B	Pneumatic tyres for motor vehicles and their trailers (Class C1)	Regulation (EC) No 661/2009 UNECE Regulation No 30	X			X			X	X		

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
46C	Pneumatic tyres for commercial vehicles and their trailers (Classes C2 and C3)	Regulation (EC) No 661/2009 UNECE Regulation No 54		X	X	X	X	X			X	X
46D	Tyre rolling sound emissions, adhesion on wet surfaces and rolling resistance (Classes C1, C2 and C3)	Regulation (EC) No 661/2009 UNECE Regulation No 117	X	X	X	X	X	X	X	X	X	X
46E	Temporary-use spare unit, run-flat tyres/system and tyre pressure monitoring system	Regulation (EC) No 661/2009 UNECE Regulation No 64	X ^(9A)			X ^(9A)						
47	Speed limitation devices	Directive 92/24/EEC		X	X		X	X				
47A	Speed limitation of vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 89		X	X		X	X				
48	Masses and dimensions (other than vehicles referred to in item 44)	Directive 97/27/EC		X	X	X	X	X	X	X	X	X
48A	Masses and dimensions	Regulation (EC) No 661/2009 Regulation (EU) No 1230/2012		X	X	X	X	X	X	X	X	X
49	External projections of cabs	Directive 92/114/EEC				X	X	X				
49A	Commercial vehicles with regard to their external projections forward of the cab's rear panel	Regulation (EC) No 661/2009 UNECE Regulation No 61				X	X	X				
50	Couplings	Directive 94/20/EC	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X	X	X	X
50A	Mechanical coupling components of combinations of vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 55	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X ⁽¹⁰⁾	X	X	X	X
50B	Close-coupling device (CCD); fitting of an approved type of CCD	Regulation (EC) No 661/2009 UNECE Regulation No 102					X ⁽¹⁰⁾	X ⁽¹⁰⁾			X ⁽¹⁰⁾	X ⁽¹⁰⁾
51	Flammability	Directive 95/28/EC			X							
51A	Burning behaviour of materials used in the interior construction of certain categories of motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 118			X							
52	Buses and coaches	Directive 2001/85/EC		X	X							
52A	M ₂ and M ₃ vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 107		X	X							

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
52B	Strength of the superstructure of large passenger vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 66		X	X							
53	Frontal impact	Directive 96/79/EC	X ⁽¹¹⁾									
53A	Protection of occupants in the event of a frontal collision	Regulation (EC) No 661/2009 UNECE Regulation No 94	X ⁽¹¹⁾									
54	Side impact	Directive 96/27/EC	X ⁽¹²⁾			X ⁽¹²⁾						
54A	Protection of occupants in the event of lateral collision	Regulation (EC) No 661/2009 UNECE Regulation No 95	X ⁽¹²⁾			X ⁽¹²⁾						
55	(empty)											
56	Vehicles intended for the transport of dangerous goods	Directive 98/91/EC				X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾
56A	Vehicles for the carriage of dangerous goods	Regulation (EC) No 661/2009 UNECE Regulation No 105				X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾	X ⁽¹³⁾
57	Front underrun protection	Directive 2000/40/EC					X	X				
57A	Front underrun protective devices (FUPDs) and their installation; front underrun protection (FUP)	Regulation (EC) No 661/2009 UNECE Regulation No 93					X	X				
58	Pedestrian protection	Regulation (EC) No 78/2009	X			X						
59	Recyclability	Directive 2005/64/EC	X			X		-				
60	(empty)											
61	Air-conditioning systems	Directive 2006/40/EC	X			X ⁽¹⁴⁾						
62	Hydrogen system	Regulation (EC) No 79/2009	X	X	X	X	X	X				
63	General Safety	Regulation (EC) No 661/2009	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾	X ⁽¹⁵⁾
64	Gear shift indicators	Regulation (EC) No 661/2009 Regulation (EU) No 65/2012	X									
65	Advanced emergency braking system	Regulation (EC) No 661/2009 Regulation (EU) No 347/2012		X	X		X	X				
66	Lane departure warning system	Regulation (EC) No 661/2009 Regulation (EU) No 351/2012		X	X		X	X				

Item	Subject	Regulatory act	Applicability									
			M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
67	Specific components for liquefied petroleum gases (LPG) and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 67	X	X	X	X	X	X				
68	Vehicle alarm systems (VAS)	Regulation (EC) No 661/2009 UNECE Regulation No 97	X			X						
69	Electric safety	Regulation (EC) No 661/2009 UNECE Regulation No 100	X	X	X	X	X	X				
70	Specific components for CNG and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 110	X	X	X	X	X	X				

Explanatory notes:

X Regulatory act applicable.

Note: The series of amendments of the UNECE Regulations which apply on a compulsory basis are listed in Annex IV to Regulation (EC) No 661/2009. Series of amendments adopted subsequently are accepted as an alternative.

- (¹) For vehicles with a reference mass not exceeding 2 610 kg. At the manufacturer's request, may apply to vehicles with a reference mass not exceeding 2 840 kg.
- (²) In case of vehicles equipped with a LPG or CNG installation, a vehicle type-approval in accordance with UNECE Regulation No 67 or UNECE Regulation No 110 is required.
- (³) The fitting of an electronic stability control ("ESC") system is required in accordance with Article 12 of Regulation (EC) No 661/2009. Therefore, the requirements set out in Annex 21 to UNECE Regulation 13 shall be complied with for the purposes of EC type-approval of new types of vehicles as well as for the registration, sale and entry into service of new vehicles. The implementation dates set out in Article 13 of Regulation (EC) No 661/2009 shall apply instead of the dates set out in UNECE Regulation No 13.
- (⁴) The fitting of an ESC system is required in accordance with Article 12 of Regulation (EC) No 661/2009. Therefore, the requirements set out in Part A of Annex 9 to UNECE Regulation No 13-H shall be complied with for the purposes of EC type-approval of new types of vehicles as well as for the registration, sale and entry into service of new vehicles. The implementation dates set out in Article 13 Regulation (EC) No 661/2009 shall apply instead of the dates set out in UNECE Regulation No 13-H.
- (^{4A}) If fitted, the protective device shall fulfil the requirements of UNECE Regulation No 18.
- (^{4B}) This Regulation applies to seats not falling within the scope of UNECE Regulation No 80.
- (⁵) Vehicles of this category shall be fitted with a suitable windscreen defrosting and demisting device.
- (⁶) Vehicles of this category shall be fitted with a suitable windscreen washing and wiping devices.
- (⁷) In case of vehicles equipped with an electric power train, a vehicle type-approval in accordance with UNECE Regulation No 85 is required.
- (⁸) For vehicles with a reference mass exceeding 2 610 kg and which did not benefit from the possibility offered in note (¹).
- (⁹) For vehicles with a reference mass exceeding 2 610 kg which are not type-approved (at the manufacturer's request and provided their reference mass does not exceed 2 840 kg) under Regulation (EC) No 715/2007.
- For other options, see Article 2 of Regulation (EC) No 595/2009.
- (^{9A}) Applies only where such vehicles are fitted with equipment covered by UNECE Regulation No 64. Tyre pressure monitoring system for M1 vehicles applies on a compulsory basis in accordance with Article 9(2) of Regulation (EC) No 661/2009.
- (¹⁰) Applies only to vehicles equipped with coupling(s).
- (¹¹) Applies to vehicles with a technically permissible maximum laden mass not exceeding 2,5 tonnes.
- (¹²) Only applicable to vehicles where the "Seating Reference Point ('R' point)" of the lowest seat is not more than 700 mm above the ground level.
- (¹³) Applies only when the manufacturer applies for type-approval of vehicles intended for the transport of dangerous goods.
- (¹⁴) Applies only for vehicles of category N₁, class I as described in the first table in point 5.3.1.4 of Annex I to Directive 70/220/EEC.
- (¹⁵) At the request of the manufacturer, a type-approval may be granted under this item, as an alternative to obtaining type-approvals under items 3A, 3B, 4A, 5A, 6A, 6B, 7A, 8A, 9A, 9B, 10A, 12A, 13A, 13B, 14A, 15A, 15B, 16A, 17A, 17B, 18A, 19A, 20A, 21A, 22A, 22B, 22C, 23A, 24A, 25A, 25B, 25C, 25D, 25E, 25F, 26A, 27A, 28A, 29A, 30A, 31A, 32A, 33A, 34A, 35A, 36A, 37A, 38A, 42A, 43A, 44A, 45A, 46A, 46B, 46C, 46D, 46E, 47A, 48A, 49A, 50A, 50B, 51A, 52A, 52B, 53A, 54A, 56A, 57A and 64 to 70.;

(b) Appendix 1 to Part I is replaced by the following:

'Appendix 1

Regulatory acts for EC type-approval of vehicles produced in small series pursuant to Article 22

1. This Appendix applies to new EC type-approvals of small series granted from 1 November 2012, except for item 54A which applies from 1 November 2014.
2. EC type-approvals of small series granted before 1 November 2012 shall cease to be valid on 31 October 2016. National authorities shall consider certificates of conformity for vehicles to be no longer valid for the purposes of Article 26(1) of this Directive, unless the type-approvals concerned have been updated to the requirements of this Appendix.

Table 1
M₁ vehicles ⁽¹⁾

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
1	Permissible sound level	Directive 70/157/EEC		A
2	Emissions (Euro 5 and 6) light duty vehicles/access to information	Regulation (EC) No 715/2007	(a) On-board diagnostic (OBD)	The vehicle shall be fitted with an OBD system that fulfils the requirements of Article 4(1) and (2) of Regulation (EC) No 692/2008 (The OBD system shall be designed to record at least the malfunction of the engine management system). The OBD-interface shall be able to communicate with commonly available diagnostic tools.
			(b) In service conformity	N/A
			(c) Access to information	It is sufficient that the manufacturer provide access to repair and maintenance information in a readily accessible and prompt manner.
3A	Prevention of fire risks (liquid fuel tanks)	Regulation (EC) No 661/2009	(a) Liquid fuel tanks	B
		UNECE Regulation No 34	(b) Installation in vehicle	B
4A	Space for mounting and fixing rear registration plates	Regulation (EC) No 661/2009 Regulation (EU) No 1003/2010		B
5A	Steering equipment	Regulation (EC) No 661/2009		C
		UNECE Regulation No 79	(a) Mechanical systems	The provisions of paragraph 5 of UNECE Regulation No 79 shall apply. All tests prescribed in paragraph 6.2 of UNECE Regulation No 79 shall be performed and the requirements of paragraph 6.1 of UNECE Regulation No 79 shall apply.
			(b) Complex electronic vehicle control system	All the requirements of Annex 6 of UNECE Regulation No 79 shall apply. Compliance with these requirements may only be checked by an appointed technical service.

⁽¹⁾ The explanatory notes relating to Part I of Annex IV apply also to Table 1.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
6A	Door latches and door retention components	Regulation (EC) No 661/2009		C
		UNECE Regulation No 11	(a) General requirements (Paragraph 5 of UNECE Regulation No 11)	All the requirements shall apply.
			(b) Performance requirements (Paragraph 6 of UNECE Regulation No 11)	Only the requirements of paragraph 6.1.5.4 and paragraph 6.3 on door locks shall apply.
7A	Audible warning devices and signals	Regulation (EC) No 661/2009	(a) Components	X
		UNECE Regulation No 28	(b) Installation on vehicle	B
8A	Devices for indirect vision and their installation	Regulation (EC) No 661/2009	(a) Components	X
		UNECE Regulation No 46	(b) Installation on vehicle	B
9B	Braking	Regulation (EC) No 661/2009	(a) Design and tests requirements	A
		UNECE Regulation No 13-H	(b) Electronic stability control (ESC) and brake assist systems(BAS)	The fitting of BAS and ESC shall not be required. If fitted, they shall comply with the requirements of UNECE Regulation No 13-H.
10A	Electromagnetic compatibility	Regulation (EC) No 661/2009 UNECE Regulation No 10		B
12A	Interior fittings	Regulation (EC) No 661/2009		C
		UNECE Regulation No 21	(a) Interior arrangement	
			(i) Radii and protrusion requirements for switches, pull-knobs and the like, controls and general interior fittings	The requirements of paragraphs 5.1 to 5.6 of UNECE Regulation No 21 may be waived at the request of the manufacturer. The requirements of paragraph 5.2 of UNECE Regulation No 21 with the exception of paragraphs 5.2.3.1, 5.2.3.2 and 5.2.4 shall apply.
			(ii) Energy absorption tests on the upper dashboard	Energy absorption tests on the upper dashboard shall only be performed when the vehicle is not fitted with at least two front airbags or two static four-point harnesses.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
			(iii) Energy absorption test on the rear part of the seats	N/A
			(b) Power-operation of windows, roof-panel systems and partition systems	All requirements of paragraph 5.8 UNECE Regulation No 21 shall apply.
13A	Protection of motor vehicles against unauthorised use	Regulation (EC) No 661/2009 UNECE Regulation No 116		A
14A	Protection of the driver against the steering mechanism in the event of impact	Regulation (EC) No 661/2009 UNECE Regulation No 12		C
				Tests are required when the vehicle has not been tested under UNECE Regulation No 94 (see item 53A)
15A	Seats, their anchorages and any head restraints	Regulation (EC) No 661/2009 UNECE Regulation No 17		C
			(a) General requirements (i) Specifications	Requirements of paragraph 5.2 of UNECE Regulation No 17 shall apply with the exception of paragraph 5.2.3.
			(ii) Strength tests for seat backrest and head restraints	The requirements of paragraph 6.2 UNECE Regulation No 17 shall apply.
			(iii) Unlocking and adjustment tests	The test shall be performed in accordance with the requirements of Annex 7 to UNECE Regulation No 17.
			(b) Head restraints (i) Specifications	Requirements of paragraphs 5.4, 5.5, 5.6, 5.10, 5.11 and 5.12 of UNECE Regulation No 17 shall apply with the exception of paragraph 5.5.2.
			(ii) Strength tests on head restraints	The test prescribed in paragraph 6.4 shall be performed.
			(c) Special requirements regarding the protection of occupants from displaced luggage	The requirements of Annex 9 to UNECE Regulation No 26 may be waived at the request of the manufacturer.
16A	External projections	Regulation (EC) No 661/2009 UNECE Regulation No 26		C
			(a) General specifications	The requirements of paragraph 5 of UNECE Regulation No 26 shall apply.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
			(b) Particular specifications	The requirements of paragraph 6 of UNECE Regulation No 26 shall apply.
17A	Vehicle access and manoeuvrability	Regulation (EC) No 661/2009 Regulation (EU) No 130/2012		D
17B	Speedometer equipment including its installation	Regulation (EC) No 661/2009 UNECE Regulation No 39		B
18A	Manufacturer's statutory plate and vehicle identification number	Regulation (EC) No 661/2009 Regulation (EU) No 19/2011		B
19A	Safety-belt anchorages, Isofix anchorages systems and Isofix top tether anchorages	Regulation (EC) No 661/2009 UNECE Regulation No 14		B
20A	Installation of lighting and light-signalling devices on vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 48		B Daytime Running Lights (DRL) shall be fitted to a new vehicle type in accordance with Article 2 of Directive 2008/89/EC.
21A	Retro-reflecting devices for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 3		X
22A	Front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 7		X
22B	Daytime running lamps for power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 87		X
22C	Side-marker lamps for motor vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 91		X

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
23A	Direction indicators for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 6		X
24A	Illumination of rear-registration plates of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 4		X
25A	Power-driven vehicle's sealed-beam headlamps (SB) emitting an European asymmetrical passing beam or a driving beam or both	Regulation (EC) No 661/2009 UNECE Regulation No 31		X
25B	Filament lamps for use in approved lamp units of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 37		X
25C	Motor vehicle headlamps equipped with gas-discharge light sources	Regulation (EC) No 661/2009 UNECE Regulation No 98		X
25D	Gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 99		X
25E	Motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with filament lamps and/or LED modules	Regulation (EC) No 661/2009 UNECE Regulation No 112		X
25F	Adaptive front-lighting systems (AFS) for motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 123		X

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
26A	Power-driven vehicle front fog lamps	Regulation (EC) No 661/2009 UNECE Regulation No 19		X
27A	Towing device	Regulation (EC) No 661/2009 Regulation (EU) No 1005/2010		B
28A	Rear fog lamps for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 38		X
29A	Reversing lights for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 23		X
30A	Parking lamps for power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 77		X
31A	Safety-belts, restraint systems, child restraint systems and Isofix child restraint systems	Regulation (EC) No 661/2009 UNECE Regulation No 16	(a) Components	X
			(b) Installation requirements	B
32A	Forward field of vision	Regulation (EC) No 661/2009 UNECE Regulation No 125		A
33A	Location and identification of hand controls, tell-tales and indicators	Regulation (EC) No 661/2009 UNECE Regulation No 121		A
34A	Windscreen defrosting and demisting systems	Regulation (EC) No 661/2009		C
		Regulation (EU) No 672/2010	(a) Windscreen defrosting	Only paragraph 1.1.1 of Annex II to Regulation (EU) No 672/2010 shall apply provided that warm air flow is ducted to the whole surface of the windscreen or the latter is electrically heated on its whole surface.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
			(b) Windscreen demisting	Only point 1.2.1 of Annex II to Regulation (EU) No 672/2010 shall apply provided that warm air flow is ducted to the whole surface of the windscreen or the latter is electrically heated on its whole surface.
35A	Windscreen wiper and washer systems	Regulation (EC) No 661/2009 Regulation (EU) No 1008/2010		C
			(a) Windscreen wiper system	Paragraphs 1.1 to 1.1.10 of Annex III to Regulation (EU) No 1008/2010 shall apply. Only the test described in paragraph 2.1.10 of Annex III to Regulation (EU) No 1008/2010 shall be performed.
			(b) Windscreen washer system	Section 1.2 of Annex III to Regulation (EU) No 1008/2010 shall apply with the exception of points 1.2.2, 1.2.3 and 1.2.5.
36A	Heating system	Regulation (EC) No 661/2009 UNECE Regulation No 122		C The fitting of a heating system shall not be required.
			(a) All heating systems	The requirements of paragraph 5.3 and of paragraph 6 of UNECE Regulation No 122 shall apply.
			(b) LPG heating systems	The requirements of Annex 8 to UNECE Regulation No 122 shall apply.
37A	Wheel guards	Regulation (EC) No 661/2009 Regulation (EU) No 1009/2010		B
40	Engine power	Directive 80/1269/EEC		A (When the vehicle manufacturer produces his own engine).
				(When the vehicle manufacturer uses an engine from another manufacturer) Bench test data from the engine manufacturer are accepted provided that the engine management system is identical (i.e. having at least the same ECU). Power output test may be performed on a chassis dynamometer. It shall be taken into account of the power loss in the transmission.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
41	Emissions (Euro IV and V) heavy duty vehicles	Directive 2005/55/EC		A
			OBD	May be waived at the request of the vehicle manufacturer.
41A	Emissions (Euro VI) heavy duty vehicles/access to information	Regulation (EC) No 595/2009		A With the exception of the set of requirements relating to OBDs and access to information.
44A	Masses and dimensions	Regulation (EC) No 661/2009 Regulation (EU) No 1230/2012		B The hill start test at maximum combination mass described in paragraph 5.1 of Part A of Annex 1 to Regulation (EU) No 1230/2012 may be waived at the request of the manufacturer.
45A	Safety glazing materials and their installation on vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 43	(a) Components	X
			(b) Installation	B
46	Tyres	Directive 92/23/EEC	Components	X
46A	Installation of tyres	Regulation (EC) No 661/2009 Regulation (EU) No 458/2011		B Dates for progressive application shall be those set out in Article 13 of Regulation (EC) No 661/2009.
46B	Pneumatic tyres for motor vehicles and their trailers (Class C1)	Regulation (EC) No 661/2009 UNECE Regulation No 30	Components	X
46D	Tyre rolling sound emissions, adhesion on wet surfaces and rolling resistance (classes C1, C2 and C3)	Regulation (EC) No 661/2009 UNECE Regulation No 117	Components	X
46E	Temporary-use spare unit, run-flat tyres/system and tyre pressure monitoring system	Regulation (EC) No 661/2009 UNECE Regulation No 64	Components	X
			Fitting of a tyre-pressure monitoring system (TPMS)	B The fitting of a TPMS shall not be required.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
50A	Mechanical coupling components of combinations of vehicles	Regulation (EC) No 661/2009	(a) Components	X
		UNECE Regulation No 55	(b) Installation	B
53A	Protection of occupants in the event of a frontal collision	Regulation (EC) No 661/2009 UNECE Regulation No 94		C The requirements of UNECE Regulation No 94 shall apply to vehicles fitted with front airbags. Vehicles not fitted with airbags shall fulfil the requirement of item 14A of this table.
54A	Protection of occupants in the event of lateral collision	Regulation (EC) No 661/2009 UNECE Regulation No 95		C (shall apply from 1 November 2014)
			Head form test	The manufacturer shall supply the technical service with suitable information concerning a possible impact of the head of the dummy against the structure of the vehicle or the side glazing if made up of laminated glazing. When such impact is proven likely to happen, then the partial test using the head form test described in paragraph 3.1 of Annex 8 to UNECE Regulation No 95 shall be conducted and the criterion specified in paragraph 5.2.1.1 of UNECE Regulation 95 shall be met. In agreement with the technical service, the test procedure described in Annex 4 to UNECE Regulation No 21 may be used as an alternative to the test mentioned above.
58	Pedestrian protection	Regulation (EC) No 78/2009	(a) Technical requirements applicable to vehicle	N/A
			(b) Frontal protection systems	X
59	Recyclability	Directive 2005/64/EC		N/A Only Article 7 on reuse of component parts shall apply.
61	Air-conditioning systems	Directive 2006/40/EC		A Fluorinated greenhouse gases with a global warming potential higher than 150 are permitted until 31 December 2016.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
62	Hydrogen system	Regulation (EC) No 79/2009		X
63	General Safety	Regulation (EC) No 661/2009		Under this item, a type-approval may be granted, at the request of the manufacturer. See footnote ⁽¹⁵⁾ of the table for vehicles produced in unlimited series
64	Gear shift indicators	Regulation (EC) No 661/2009 Regulation (EU) No 65/2012		N/A
67	Specific components for liquefied petroleum gases (LPG) and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 67	(a) Components	X
			(b) Installation	A
68	Vehicle alarm systems (VAS)	Regulation (EC) No 661/2009 UNECE Regulation No 97	(a) Components	X
			(b) Installation	B
69	Electric safety	Regulation (EC) No 661/2009 UNECE Regulation No 100		B
70	Specific components for CNG and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 110	(a) Components	X
			(b) Installation	A

Meaning of letters

X	Full application of the regulatory act. (a) a type-approval certificate shall be issued; (b) tests and checks shall be conducted by the technical service or the manufacturer under the conditions laid down in Articles 41, 42 and 43; (c) a test report shall be drafted in accordance with the provisions of Annex V; (d) Conformity of Production (COP) shall be ensured.
A	Application of the regulatory act as follows: (a) all requirements of the regulatory act shall be fulfilled unless otherwise stated; (b) no type-approval certificate shall be required; (c) tests and checks shall be conducted by the technical service or the manufacturer under the conditions laid down in Articles 41, 42 and 43; (d) a test report shall be drafted in accordance with the provisions of Annex V; (e) COP shall be ensured.

B	Application of the regulatory act as follows: As for letter "A" with the exception that the tests and checks may be performed by the manufacturer himself subject to the agreement of the type-approval authority (i.e. the conditions laid down in Articles 41, 42 and 43 do not have to be fulfilled).
C	Application of the regulatory act as follows: (a) only the technical requirements from the regulatory shall be fulfilled, irrespective of any transitional provision; (b) no type-approval certificate shall be required; (c) tests and checks shall be conducted by the technical service or by the manufacturer (see decisions for letter "B"); (d) a test report shall be drafted in accordance with the provisions of Annex V; (e) COP shall be ensured.
D	Same as for decisions in letters "B" and "C" with the exception that a statement of compliance submitted by the manufacturer is sufficient. No test report shall be required. The type-approval authority or technical service may require additional information of further evidence, if need be.
N/A	The regulatory act shall not apply. Compliance with one or more specific aspects included in the regulatory act may however be imposed.

Note: The series of amendments of the UNECE Regulations to be used are listed in Annex IV to Regulation (EC) No 661/2009. Series of amendments adopted subsequently are accepted as an alternative.

Table 2
N₁ vehicles ⁽¹⁾

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
1	Permissible sound level	Directive 70/157/EEC		A
2	Emissions (Euro 5 and 6) light duty vehicles/access to information	Regulation (EC) No 715/2007	(a) OBD	The vehicle shall be fitted with an OBD system that fulfils the requirements of Article 4(1) and (2) of Regulation (EC) No 692/2008(the OBD system shall be designed to record at least the malfunction of the engine management system). The OBD-interface shall be able to communicate with commonly available diagnostic tools.
			(b) In service conformity	N/A
			(c) Access to information	It is sufficient that the manufacturer provides access to repair and maintenance information in a readily accessible and prompt manner.
3A	Prevention of fire risks (liquid fuel tanks)	Regulation (EC) No 661/2009	(a) Liquid fuel tanks	B
		UNECE Regulation No 34	(b) Installation in vehicle	B

⁽¹⁾ The explanatory notes relating to Part I of Annex IV apply also to Table 2. The letters in Table 2 have the same meaning as in Table 1.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
4A	Space for mounting and fixing rear registration plates	Regulation (EC) No 661/2009 Regulation (EU) No 1003/2010		B
5A	Steering equipment	Regulation (EC) No 661/2009 UNECE Regulation No 79		C
			(a) Mechanical systems	The provisions of paragraph 5 of UNECE Regulation No 79.01 shall apply. All tests prescribed in paragraph 6.2 of UNECE Regulation No 79 shall be performed and the requirements of paragraph 6.1 of UNECE Regulation No 79 shall apply.
			(b) Complex electronic vehicle control system	All the requirements of Annex 6 of UNECE Regulation No 79 shall apply. Compliance with these requirements may only be checked by an appointed technical service.
6A	Door latches and door retention components	Regulation (EC) No 661/2009 UNECE Regulation No 11		C
			(a) General requirements (Paragraph 5 of UNECE Regulation No 11)	All requirements shall apply.
			(b) Performance requirements (Paragraph 6 of UNECE Regulation No 11)	Only the requirements of paragraph 6.1.5.4 and paragraph 6.3 on door locks shall apply.
7A	Audible warning devices and signals	Regulation (EC) No 661/2009 UNECE Regulation No 28	(a) Components	X
			(b) Installation on vehicle	B
8A	Devices for indirect vision and their installation	Regulation (EC) No 661/2009 UNECE Regulation No 46	(a) Components	X
			(b) Installation on vehicle	B
9A	Braking of vehicles and trailers	Regulation (EC) No 661/2009 UNECE Regulation No 13.	(a) design and test requirements	A
			(b) ESC	The fitting of ESC shall not be required. If fitted, it shall comply with the requirements of UNECE Regulation No 13.
9B	Braking of passenger cars	Regulation (EC) No 661/2009 UNECE Regulation No 13-H	(a) Design and test requirements	A
			(b) Electronic stability control (ESC) and brake assist systems(BAS)	The fitting of BAS and ESC shall not be required. If fitted, they shall comply with the requirements of UNECE Regulation No 13-H.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
10A	Electromagnetic compatibility	Regulation (EC) No 661/2009 UNECE Regulation No 10		B
13A	Protection of motor vehicles against unauthorised use	Regulation (EC) No 661/2009 UNECE Regulation No 116		A
14A	Protection of the driver against the steering mechanism in the event of impact	Regulation (EC) No 661/2009 UNECE Regulation No 12		C
			(a) Barrier impact test	A test shall be required.
			(b) Body block impact test against steering wheel	Not required if the steering wheel is fitted with an airbag.
			(c) Head form test	Not required if the steering wheel is fitted with an airbag.
15A	Seats, their anchorages and any head restraints	Regulation (EC) No 661/2009 UNECE Regulation N 17		B
17A	Vehicle access and manoeuvrability	Regulation (EC) No 661/2009 Regulation (EU) No 130/2012		D
17B	Speedometer equipment including its installation	Regulation (EC) No 661/2009 UNECE Regulation No 39		B
18A	Manufacturer's statutory plate and vehicle identification number	Regulation (EC) No 661/2009 Regulation (EU) No 19/2011		B
19A	Safety-belt anchorages, Isofix anchorages systems and Isofix top tether anchorages	Regulation (EC) No 661/2009 UNECE Regulation No 14		B
20A	Installation of lighting and light-signalling devices on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 48		B DRLs shall be fitted to a new vehicle type in accordance with Article 2 of Directive 2008/89/EC.
21A	Retro-reflecting devices for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 3		X

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
22A	Front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 7		X
22B	Daytime running lamps for power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 87		X
22C	Side-marker lamps for motor vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 91		X
23A	Direction indicators for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 6		X
24A	Illumination of rear-registration plates of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 4		X
25A	Power-driven vehicle's sealed-beam headlamps (SB) emitting an European asymmetrical passing beam or a driving beam or both	Regulation (EC) No 661/2009 UNECE Regulation No 31		X
25B	Filament lamps for use in approved lamp units of power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 37		X
25C	Motor vehicle headlamps equipped with gas-discharge light sources	Regulation (EC) No 661/2009 UNECE Regulation No 98		X
25D	Gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 99		X

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
25E	Motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with filament lamps and/or LED modules	Regulation (EC) No 661/2009 UNECE Regulation No 112		X
25F	Adaptive front-lighting systems (AFS) for motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 123		X
26A	Power-driven vehicle front fog lamps	Regulation (EC) No 661/2009 UNECE Regulation No 19		X
27A	Towing device	Regulation (EC) No 661/2009 Regulation (EU) No 1005/2010		B
28A	Rear fog lamps for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 38		X
29A	Reversing lights for power-driven vehicles and their trailers	Regulation (EC) No 661/2009 UNECE Regulation No 23		X
30A	Parking lamps for power-driven vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 77		X
31A	Safety-belts, restraint systems, child restraint systems and Isofix child restraint systems	Regulation (EC) No 661/2009 UNECE Regulation No 16	(a) Components	X
			(b) Installation requirements	B
33A	Location and identification of hand controls, tell-tales and indicators	Regulation (EC) No 661/2009 UNECE Regulation No 121		A
34A	Windscreen defrosting and demisting systems	Regulation (EC) No 661/2009 Regulation (EU) No 672/2010		N/A The vehicle shall be fitted with a suitable windscreen defrosting and demisting system.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
35A	Windscreen wiper and washer systems	Regulation (EC) No 661/2009 Regulation (EU) No 1008/2010		N/A The vehicle shall be fitted with a suitable windscreen wiper and washer system.
36A	Heating system	Regulation (EC) No 661/2009 UNECE Regulation No 122		C The fitting of a heating system shall not be required.
			(a) All heating systems	The requirements of paragraph 5.3 and of paragraph 6 of UNECE Regulation No 122 shall apply.
			(b) LPG heating systems	The requirements of Annex 8 to UNECE Regulation No 122 shall apply.
38	Head restraints whether or not incorporated in vehicle seats	Regulation (EC) No 661/2009 UNECE Regulation No 25		X
40	Engine power	Directive 80/1269/EEC		A <i>(When the vehicle manufacturer produces his own engine)</i>
				<i>(When the vehicle manufacturer uses an engine from another manufacturer)</i> Bench test data from the engine manufacturer are accepted provided that the engine management system is identical (i.e. having at least the same ECU). Power output test may be performed on a chassis dynamometer. It shall be taken into account of the power loss in the transmission.
41	Emissions (Euro IV and V) heavy duty vehicles	Directive 2005/55/EC		A
			OBD	Maybe waived at the request of the vehicle manufacturer.
41A	Emissions (Euro VI) heavy duty vehicles/access to information	Regulation (EC) No 595/2009		A With the exception of the set of requirements relating to OBDs and access to information.
43A	Spray suppression systems	Regulation (EC) No 661/2009 Regulation (EU) No 109/2011		B

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
45A	Safety glazing materials and their installation on vehicles	Regulation (EC) No 661/2009	(a) Components	X
		UNECE Regulation No 43	(b) Installation	B
46	Tyres	Directive 92/23/EEC	Components	X
46A	Installation of tyres	Regulation (EC) No 661/2009 Regulation (EU) No 458/2011		B Dates for progressive application shall be those set out in Article 13 of Regulation (EC) No 661/2009.
46B	Pneumatic tyres for motor vehicles and their trailers (Class C1)	Regulation (EC) No 661/2009 UNECE Regulation No 30	Components	X
46C	Pneumatic tyres for commercial vehicles and their trailers (Classes C2 and C3)	Regulation (EC) No 661/2009 UNECE Regulation No 54	Components	X
46D	Tyre rolling sound emissions, adhesion on wet surfaces and rolling resistance (Classes C1, C2 and C3)	Regulation (EC) No 661/2009 UNECE Regulation No 117	Components	X
46E	Temporary-use spare unit, run-flat tyres/system and tyre pressure monitoring system	Regulation (EC) No 661/2009	Components	X
		UNECE Regulation No 64	Fitting of a tyre-pressure monitoring system	B The fitting of a TPMS shall not be required
48	Masses and dimensions	Directive 97/27/EC		B
48A	Masses and dimensions	Regulation (EC) No 661/2009		B
		Regulation (EU) No 1230/2012	Hill start test at maximum combination mass	The hill start test at maximum combination mass described in paragraph 5.1 of Part A of Annex 1 to Regulation (EU) No 1230/2012 may be waived at the request of the manufacturer.
49A	Commercial vehicles with regards to their external projections forward of the cab's rear panel	Regulation (EC) No 661/2009		C
		UNECE Regulation No 61	(a) General specifications	The requirements of paragraph 5 of UNECE Regulation No 61 shall apply
			(b) Particular specifications	The requirements of paragraph 6 of UNECE Regulation No 61 shall apply.

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
50A	Mechanical coupling components of combinations of vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 55	(a) Components	X
			(b) Installation	B
54A	Protection of occupants in the event of lateral collision	Regulation (EC) No 661/2009 UNECE Regulation No 95	C	C
			Head form test	The manufacturer shall supply the technical service with suitable information concerning a possible impact of the head of the dummy against the structure of the vehicle or the side glazing if made up of laminated glazing. When such impact is proven likely to happen, then the partial test using the head form test described in paragraph 3.1 of Annex 8 to UNECE Regulation No 95 shall be conducted and the criterion specified in paragraph 5.2.1.1 of UNECE Regulation 95 shall be met. In agreement with the technical service, the test procedure described in Annex 4 to UNECE Regulation No 21 may be used as an alternative to the test mentioned above.
56	Vehicles for the carriage of dangerous goods	Regulation (EC) No 661/2009 UNECE Regulation No 105		A
58	Pedestrian protection	Regulation (EC) No 78/2009	(a) Technical requirements applicable to a vehicle	N/A
			(b) Frontal protection systems	X
59	Recyclability	Directive 2005/64/EC		N/A Only Article 7 on reuse of component parts shall apply.
61	Air-conditioning systems	Directive 2006/40/EC		B Fluorinated greenhouse gases with a global warming potential higher than 150 are permitted until 31 December 2016.
62	Hydrogen system	Regulation (EC) No 79/2009		X
63	General Safety	Regulation (EC) No 661/2009		Under this item, a type-approval may be granted, at the request of the manufacturer. See footnote ⁽¹⁵⁾ of the table for vehicles produced in unlimited series

Item	Subject	Regulatory act	Specific issues	Applicability and specific requirements
67	Specific components for liquefied petroleum gases (LPG) and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 67	(a) Components	X
			(b) Installation	A
68	Vehicle alarm systems (VAS)	Regulation (EC) No 661/2009 UNECE Regulation No 97	(a) Components	X
			(b) Installation	B
69	Electric safety	Regulation (EC) No 661/2009 UNECE Regulation No 100		B
70	Specific components for CNG and their installation on motor vehicles	Regulation (EC) No 661/2009 UNECE Regulation No 110	(a) Components	X
			(b) Installation	A'

(2) Part A of Annex XII is amended as follows:

(a) In Section 1, the fourth line in the table is replaced by the following:

'N1	1 000'
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(b) Section 2 is amended as follows:

(i) The second line in the table is replaced by the following:

'M1	100'
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(ii) The fourth line in the table is replaced by the following:

'N1	500 until 31 October 2016
	250 from 1 November 2016'

COMMISSION REGULATION (EU) No 1230/2012

of 12 December 2012

implementing Regulation (EC) No 661/2009 of the European Parliament and of the Council with regard to type-approval requirements for masses and dimensions of motor vehicles and their trailers and amending Directive 2007/46/EC of the European Parliament and of the Council

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 661/2009 of the European Parliament and of the Council of 13 July 2009 concerning type-approval requirements for the general safety of motor vehicles, their trailers and systems, components and separate technical units intended therefor⁽¹⁾, and in particular Article 14(1)(a) thereof,

Having regard to Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive)⁽²⁾, and in particular Article 39(2), (3) and (5) thereof,

Whereas:

- (1) Regulation (EC) No 661/2009 is a separate Regulation for the purposes of type-approval provided for in Directive 2007/46/EC.
- (2) Regulation (EC) No 661/2009 repeals Council Directive 92/21/EEC of 31 March 1992 on the masses and dimensions of motor vehicles of category M₁⁽³⁾ as well as Directive 97/27/EC of the European Parliament and of the Council of 22 July 1997 relating to the masses and dimensions of certain categories of motor vehicles and their trailers and amending Directive 70/156/EEC⁽⁴⁾. The requirements relating to the masses and dimensions of motor vehicles and their trailers set out in those Directives should be carried over to this Regulation and where necessary, amended in order to adapt them to the development of technical and scientific knowledge.
- (3) Regulation (EC) No 661/2009 lays down fundamental provisions on requirements for the type-approval of

motor vehicles and their trailers with regard to their masses and dimensions. Therefore, it is necessary to also set out the specific procedures, tests and requirements for such type-approval.

- (4) Council Directive 96/53/EC of 25 July 1996 laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic⁽⁵⁾ lays down certain maximum authorised dimensions for both national and international traffic in the Member States. It is therefore important to take into account, for the purposes of the construction of vehicles, the dimensions which have already been harmonised in the Union in order to foster and ensure the free circulation of goods.
- (5) Directive 97/27/EC allowed Member States to grant EC type-approval for vehicles the outermost dimensions of which did not match the maximum authorised dimensions provided for in that Directive. It also allowed Member States to refuse registration of vehicles that had been granted EC type-approval when their outermost dimensions did not meet the requirements of their national law. It is important to maintain the possibility to allow under certain conditions the type-approval of vehicles which exceed the authorised limits where this proves to be advantageous for road traffic and for the environment in the Member States where the road infrastructure is adapted to that situation. Therefore, the possibility to approve such vehicles under small series type-approval or individual approval schemes should be ensured, provided that the quantity of vehicles that may benefit from a derogation pursuant to Article 23 of Directive 2007/46/EC as regards the maximum authorised dimensions is limited to what is necessary for the purposes of this Regulation. Annex XII to Directive 2007/46/EC should therefore be amended to include such quantitative limits.
- (6) Directive 96/53/EC lays down maximum authorised masses that are applicable only to international traffic. However, that Directive allows the Member States to continue to apply their national legislation for national traffic. As a consequence, the harmonisation of the technically permissible maximum laden mass and the technically permissible maximum mass on the axles or on a group of axles for the purposes of circulation in the Member States does not appear to be feasible in the short term. Nevertheless, due to the existence of non-harmonised rules on the construction of the road infrastructure, it is appropriate to require Member States to

⁽¹⁾ OJ L 200, 31.7.2009, p. 1.

⁽²⁾ OJ L 263, 9.10.2007, p. 1.

⁽³⁾ OJ L 129, 14.5.1992, p. 1.

⁽⁴⁾ OJ L 233, 25.8.1997, p. 1.

⁽⁵⁾ OJ L 235, 17.9.1996, p. 59.

determine the registration/in service maximum permissible masses of vehicles that are permitted for national traffic or for international traffic under Directive 96/53/EC and to establish a procedure for such determination.

- (7) Given the experience gained in the application of Union legislation concerning masses and dimensions of vehicles, it is necessary to provide for clearly defined concepts. Some of those concepts have already been defined in Directives 97/27/EC and 92/21/EEC. For reasons of consistency, it is appropriate to take over those definitions and, where necessary, to adapt them in the light of technical and scientific knowledge.
- (8) Given that the definition of the actual mass of an individual vehicle has been included in this Regulation, it is necessary, in order to avoid confusion in filling in the certificate of conformity, to amend Annex IX to Directive 2007/46/EC accordingly.
- (9) Since the White Paper 'Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system' ⁽¹⁾ has underlined the need to improve the aerodynamic performance of road vehicles and research has shown that fuel consumption of motor vehicles and therefore CO₂ emissions could be significantly reduced by fitting aerodynamic devices to vehicles, it is important to allow the fitting of such aerodynamic devices to vehicles. Given that aerodynamic devices consist in add-ons that, due to their design, protrude beyond the outermost part of the vehicles at the back or laterally, they should be included in the list of devices or equipment that are not taken into account for the determination of the outermost dimensions. However, it is essential to limit their protrusion at the back and laterally so that road safety is not impaired and inter-modality transport remains possible. The necessary technical requirements should therefore be set out in this Regulation.
- (10) Available software makes possible the use of virtual testing methods based on computer-aided techniques. Given that those techniques allow for more cost-efficient and less burdensome testing, it is appropriate to provide for the possibility to use them for checking whether a vehicle is able to manoeuvre in a complete trajectory of 360° and for measuring the maximum rear swing-out when the vehicle is manoeuvring inside the trajectory. It is therefore also necessary to add this Regulation to the list of regulatory acts included in Annex XVI to Directive 2007/46/EC.

- (11) With a view to ensuring the proper operation of the type-approval system, it is appropriate to update the Annexes to Directive 2007/46/EC.
- (12) Annexes I, III, IX, XII and XVI to Directive 2007/46/EC should therefore be amended accordingly. Since the provisions of Annex XII are sufficiently detailed and need no further transposition by Member States, it is therefore appropriate to replace it by means of a Regulation in accordance with Article 39(8) of Directive 2007/46/EC.
- (13) The measures provided for in this Regulation are in accordance with the opinion of the Technical Committee — Motor Vehicles,

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation lays down the requirements for the EC type-approval of motor vehicles and their trailers with regard to their masses and dimensions.
2. This Regulation applies to incomplete, complete and completed vehicles of categories M, N and O.

Article 2

Definitions

For the purposes of this Regulation, the following definitions shall apply in addition to the definitions set out in Directive 2007/46/EC and Regulation (EC) No 661/2009:

- (1) 'vehicle type' means a set of vehicles as defined in Part B of Annex II to Directive 2007/46/EC;
- (2) 'standard equipment' means the basic configuration of a vehicle which is equipped with all the features that are required under the regulatory acts referred to in Annex IV and Annex XI to Directive 2007/46/EC, including all features that are fitted without giving rise to any further specifications on configuration or equipment level;
- (3) 'optional equipment' means all the features not included in the standard equipment which are fitted to a vehicle under the responsibility of the manufacturer that can be ordered by the customer;

⁽¹⁾ (COM(2011)144)

- (4) 'mass in running order' means
- (a) in the case of a motor vehicle:
- the mass of the vehicle, with its fuel tank(s) filled to at least 90 % of its or their capacity/ies, including the mass of the driver, of the fuel and liquids, fitted with the standard equipment in accordance with the manufacturer's specifications and, when they are fitted, the mass of the bodywork, the cabin, the coupling and the spare wheel(s) as well as the tools;
- (b) in the case of a trailer:
- the mass of the vehicle including the fuel and liquids, fitted with the standard equipment in accordance with the manufacturer's specifications, and, when they are fitted, the mass of the bodywork, additional coupling(s), the spare wheel(s) and the tools;
- (5) 'mass of the optional equipment' means the mass of the equipment which may be fitted to the vehicle in addition to the standard equipment, in accordance with the manufacturer's specifications;
- (6) 'actual mass of the vehicle' means the mass in running order plus the mass of the optional equipment fitted to an individual vehicle;
- (7) 'technically permissible maximum laden mass' (M) means the maximum mass allocated to a vehicle on the basis of its construction features and its design performances; the technically permissible laden mass of a trailer or of a semi-trailer includes the static mass transferred to the towing vehicle when coupled;
- (8) 'technically permissible maximum laden mass of the combination' (MC) means the maximum mass allocated to the combination of a motor vehicle and one or more trailers on the basis of its construction features and its design performances or the maximum mass allocated to the combination of a tractor unit and a semi-trailer;
- (9) 'technically permissible maximum towable mass' (TM) means the maximum mass of one or more trailers that may be towed by a towing vehicle which corresponds to the total load transmitted to the ground by the wheels of an axle or a group of axles on any trailer coupled to the towing vehicle;
- (10) 'axle' means the common axis of rotation of two or more wheels whether power-driven or freely rotating, and whether in one or more segments located in the same plane perpendicular to the longitudinal centre-line of the vehicle;
- (11) 'group of axles' means a number of axles having an axle spacing that is restricted to one of the axle spacings referred to as distance 'd' in Annex I to Directive 96/53/EC and which interact due to the specific design of the suspension;
- (12) 'solo axle' means an axle that cannot be considered as part of a group of axles;
- (13) 'technically permissible maximum mass on the axle' (m) means the mass corresponding to the maximum permissible static vertical load transmitted to the ground by the wheels of the axle, on the basis of the construction features of the axle and of the vehicle and their design performances;
- (14) 'technically permissible maximum mass on a group of axles' (μ) means the mass corresponding to the maximum permissible static vertical load transmitted to the ground by the wheels of the group of axles, on the basis of the construction features of the group of axles and of the vehicle and their design performances;
- (15) 'coupling' means a mechanical device including component items as defined in points 2.1 to 2.6 of Regulation No 55 of the United Nations Economic Commission for Europe (UNECE) — Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles ⁽¹⁾ and a close-coupling device as defined in point 2.1.1 of UNECE Regulation No 102 — Uniform provisions concerning the approval of I.A close-coupling device (CCD) II. Vehicles with regard to the fitting of an approved type of CCD ⁽²⁾;
- (16) 'coupling point' means the centre of engagement of the coupling fitted to a towed vehicle within the coupling fitted to a towing vehicle;
- (17) 'mass of the coupling' means the mass of the coupling itself and of the parts necessary for the attachment of the coupling to the vehicle;
- (18) 'technically permissible maximum mass at the coupling point' means:
- (a) in the case of a towing vehicle, the mass, corresponding to the maximum permissible static vertical load on the coupling point ('S' or 'U' value) of a towing vehicle, on the basis of the construction features of the coupling and of the towing vehicle;

⁽¹⁾ OJ L 227, 28.8.2010, p. 1.

⁽²⁾ OJ L 351, 20.12.2008, p. 44.

- (b) in the case of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer, the mass corresponding to the maximum permissible static vertical load ('S' or 'U' value) to be transferred by the trailer to the towing vehicle at the coupling point, on the basis of the construction features of the coupling and of the trailer;
- (19) 'mass of the passengers' means a rated mass depending on the vehicle category multiplied by the number of seating positions including, if any, the seating positions for crew members and the number of standees, but not including the driver;
- (20) 'mass of the driver' means a mass rated at 75 kg located at the driver's seating reference point;
- (21) 'pay-mass' means the difference between the technically permissible maximum laden mass and the mass in running order increased by the mass of the passengers and the mass of the optional equipment;
- (22) 'length' means the dimension defined in points 6.1.1, 6.1.2 and 6.1.3 of Standard ISO 612:1978; this definition also applies also to articulated vehicles made up of two or more sections;
- (23) 'width' means the dimension defined in point 6.2 of Standard ISO 612:1978;
- (24) 'height' means the dimension defined in point 6.3 of Standard ISO 612:1978;
- (25) 'wheelbase' means the following:
- (a) the dimension referred to in point 6.4.1 of Standard ISO 612:1978;
- (b) for a centre-axle trailer with one axle, the horizontal distance between the vertical axis of the coupling and the centre of the axle;
- (c) for a centre-axle trailer with more than one axle, the horizontal distance between the vertical axis of the coupling and the centre of the first axle;
- (26) 'axle spacing' means the distance between two consecutive axles referred to in point 6.4 of Standard ISO 612:1978 in the case of vehicles with more than two axles; where the vehicle is fitted with two axles only, or in the case of a semi-trailer, a drawbar trailer or a rigid drawbar trailer, the axle spacing referred to in point 6.4.2 of Standard ISO 612:1978 has the meaning of 'wheelbase' as defined in point (25);
- (27) 'track' means the distance referred to in point 6.5 of Standard ISO 612:1978;
- (28) 'fifth wheel lead' means the distance referred to in point 6.19.2 of Standard ISO 612: 1978, taking into account the note referred to in point 6.19 of the same standard;
- (29) 'front fitting radius of semi-trailer' means the horizontal distance from the axis of the kingpin to any point at the front of the semi-trailer;
- (30) 'front overhang' means the horizontal distance between the vertical plane passing through the first axle or the kingpin axle in the case of a semi-trailer and the foremost point of the vehicle;
- (31) 'rear overhang' means the horizontal distance between the vertical plane passing through the last rear axle and the rearmost point of the vehicle; where the vehicle is fitted with a coupling that is not removable, the rearmost point of the vehicle is the coupling point;
- (32) 'length of the loading area' means the distance from the foremost internal point to the rearmost internal point of the cargo area, measured horizontally in the longitudinal plane of the vehicle;
- (33) 'rear swing-out' means the distance between the actual extreme point reached by the rear end of a vehicle when manoeuvring in the conditions specified in Section 7 of Part B or in Section 6 of Part C of Annex I to this Regulation;
- (34) 'axle-lift device' means a mechanism fitted to a vehicle for the purpose of raising the axle clear off the ground and lowering it to the ground;
- (35) 'lift axle or retractable axle' means an axle which can be raised from its normal position and re-lowered by an axle-lift device;
- (36) 'loadable axle' means an axle the load on which can be varied without the axle being raised by the use of an axle-lift device;
- (37) 'air suspension' means a suspension system on which at least 75 % of the spring effect is caused by the air spring;
- (38) 'class of a bus or of a coach' means a set of vehicles as defined in points 2.1.1 and 2.1.2 of UNECE Regulation No 107 – Uniform provisions concerning the approval of category M₂ or M₃ vehicles with regard to their general construction ⁽¹⁾;

⁽¹⁾ OJ L 255, 29.9.2010, p. 1.

(39) 'articulated vehicle' means a vehicle of category M₂ or M₃ as defined in point 2.1.3 of UNECE Regulation No 107;

(40) 'indivisible load' means a load that cannot, for the purposes of carriage by road, be divided into two or more loads without undue expense or risk of damage and which, owing to its mass or dimension, cannot be carried by a vehicle the masses and dimensions of which comply with the maximum authorised masses and dimensions applicable in a Member State.

Article 3

Obligations of manufacturers

1. The manufacturer shall determine, for each version within a vehicle type, irrespective of the state of completion of the vehicle, the following masses:

- (a) the technically permissible maximum laden mass;
- (b) the technically permissible maximum laden mass of the combination;
- (c) the technically permissible maximum towable mass;
- (d) the technically permissible maximum mass on the axles or the technically permissible maximum mass on a group of axles;
- (e) the technically permissible maximum masses at the coupling point(s) taking into account the technical features of the couplings that are fitted or can be fitted to the vehicle as the case may be.

2. When determining the masses referred to in paragraph 1, the manufacturer shall take into account the best practices of good engineering and the best available technical knowledge in order to minimise the risks of mechanical failure, in particular those due to fatigue of materials, and to avoid damage to the road infrastructure.

3. When determining the masses referred to in paragraph 1, the manufacturer shall take into account the maximum speed by construction of the vehicle.

Where the vehicle is equipped by the manufacturer with a speed limitation device, the maximum speed by construction shall be the true speed permitted by the speed limitation device.

4. When determining the masses referred to in paragraph 1, the manufacturer shall not impose restrictions on the use of the

vehicle except those concerning the tyre capacities that can be adjusted to the speed by construction as is allowed under UNECE Regulation No 54 — Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers⁽¹⁾ and in Section 5 of Annex II to Commission Regulation (EU) No 458/2011⁽²⁾.

5. For incomplete vehicles, including chassis-cabin vehicles, that require a further stage of completion, the manufacturer shall provide all relevant information to the next stage manufacturers so that the requirements of this Regulation continues to be fulfilled.

For the purposes of the first subparagraph, the manufacturer shall specify the position of the centre of gravity of the mass corresponding to the sum of the load.

6. Incomplete vehicles of categories M₂, M₃, N₂ and N₃ not fitted with a bodywork shall be designed so as to allow the subsequent stage manufacturers to be able to fulfil the requirements of Sections 7 and 8 of Part B and Section 6 and 7 of Part C of Annex I.

Article 4

Provisions for EC type-approval of a type of vehicle with regard to its masses and dimensions

1. The manufacturer or his representative shall submit to the type-approval authority the application for EC type-approval of a type of vehicle as regard its masses and dimensions.

2. The application shall be drawn up in accordance with the model information document set out in Part A of Annex V.

3. For the purposes of mass distribution calculations, the manufacturer shall provide the type-approval authority, for each technical configuration within the vehicle type as determined by the set of values of the relevant points in Annex V, with the information necessary to identify the following masses:

- (a) the technically permissible maximum laden mass;
- (b) the technically permissible maximum mass on the axles or group of axles;
- (c) the technically permissible maximum towable mass;
- (d) the technically permissible maximum mass at the coupling point(s);

⁽¹⁾ OJ L 183, 11.7.2008, p. 41.

⁽²⁾ OJ L 124, 13.5.2011, p. 11.

- (e) the technically permissible maximum laden mass of the combination.

The information shall be provided in tabular or any other appropriate format, in agreement with the type-approval authority.

4. Where the optional equipment significantly affects the masses and dimensions of the vehicle, the manufacturer shall provide the technical service with the location, mass and geometrical position of the gravity centre with respect to the axles of the optional equipment that can be fitted to the vehicle.

5. By way of derogation from paragraph 4, where the optional equipment is made up of several parts located in various spaces in the vehicle, the manufacturer may provide the technical service with the distribution of the mass of the optional equipment on the axles only.

6. For groups of axles, the manufacturer shall indicate the load distribution among the axles of the total mass applied to the group.

Where necessary, the manufacturer shall state the distribution formulae or produce the relevant distribution graphs.

7. Where the approval authority or the technical service deems it necessary, they may request the manufacturer to make available a vehicle representative of the type to be approved for the purposes of inspection.

8. The vehicle manufacturer may submit an application for recognition of the equivalence of a suspension to air suspension to the type-approval authority.

The type-approval authority shall recognise the equivalence of a suspension to air suspension where the requirements of Annex III are fulfilled.

Where the technical service has recognised the equivalence, it shall issue a test report. The type-approval authority shall attach the test report and a technical description of the suspension to the EC type-approval certificate.

9. Where the requirements set out in Annexes I to IV, of this Regulation are met, the approval authority shall grant a type-approval in accordance with the numbering system set out in Annex VII to Directive 2007/46/EC.

A Member State shall not assign the same number to another vehicle type.

10. For the purposes of paragraph 9, the type-approval authority shall deliver an EC type-approval certificate established in accordance with the model set out in Part B of Annex V.

11. The permissible deviations referred to in Appendix 2 to Annex I shall apply for the purposes of Article 12(2) of Directive 2007/46/EC.

Article 5

Registration/in-service maximum permissible masses

1. For the purposes of registration and entry into service of vehicles type-approved under this Regulation, national authorities shall determine, for each variant and version within the type of vehicle, all of the following masses that are permitted for national traffic or for international traffic under Directive 96/53/EC:

- (a) the registration/in-service maximum permissible laden mass;
- (b) the registration/in-service maximum permissible mass on the axle(s);
- (c) the registration/in-service maximum permissible mass on the group of axles;
- (d) the registration/in-service maximum permissible towable mass;
- (e) the registration/in-service maximum permissible laden mass of the combination.

National authorities shall establish the procedure for the determination of the registration/in service maximum permissible masses referred to in the first subparagraph. They shall designate the competent authority entrusted with the determination of those masses, and shall specify the information that must be provided to that competent authority.

2. The registration/in-service maximum permissible masses determined in accordance with the procedure referred to in paragraph 1 may not exceed the maximum masses referred to in Article 3(1).

3. The manufacturer shall be consulted by the competent authority as regards the mass distribution on the axles or group of axles in order to ensure the proper functioning of the systems of the vehicle, in particular the brake- and steering system.

4. When determining the registration/in-service maximum permissible masses, national authorities shall ensure that the requirements of the regulatory acts listed in Annex IV and Annex XI to Directive 2007/46/EC continue to be fulfilled.

5. Where national authorities concludes that the requirements of one of the regulatory acts listed in Annex IV and Annex XI to Directive 2007/46/EC, with the exception of this Regulation, are no longer fulfilled, they shall require that fresh tests are conducted and a new type-approval or an extension as the case may be, be granted by the type-approval authority that has granted the initial type-approval under the regulatory act in question.

Article 6

Derogations

1. Without prejudice to Article 4(3) of Directive 96/53/EC, an EC type-approval may be granted for vehicles the dimensions of which exceed the requirements of this Regulation that are intended for the transport of indivisible loads. In such a case, the type-approval certificate and the certificate of conformity shall clearly indicate that the vehicle is intended for the transport of indivisible loads only.

2. Member States may grant approvals under Articles 23 and 24 of Directive 2007/46/EC for vehicles exceeding the maximum authorised dimensions set out in point 1.1 of Parts B, C and D of Annex I to this Regulation.

Type-approvals under Article 23 of Directive 2007/46/EC shall be subject to the quantitative limits set out in Section 3 of Part A of Annex XII to that Directive.

Article 7

Transitional provisions

1. National authorities shall permit the sale and entry into service of vehicles type-approved before the date referred to in Article 13(2) of Regulation (EC) No 661/2009 and shall continue to grant extensions to approvals granted under the terms of Directive 92/21/EEC and Directive 97/27/EC.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 12 December 2012.

2. By way of derogation from paragraph 1, EC type-approvals granted pursuant to Article 7 of Directive 97/27/EC shall cease to be valid on the date referred to in Article 19(1) of Regulation (EC) No 661/2009.

However, Member States may register and permit the sale or entry into service of end-of-series vehicles whose EC type-approval is no longer valid where the manufacturer so requests, in accordance with Article 27 of Directive 2007/46/EC.

3. As from 10 January 2014 manufacturers shall deliver certificates of conformity which are in accordance with this Regulation.

Until 9 January 2014 they shall indicate the actual mass of the vehicle in entry 52 of the certificate of conformity, unless it is indicated in one of the other entries of the certificate of conformity.

Article 8

Amendments to Directive 2007/46/EC

Annexes I, III, IX, and XVI to Directive 2007/46/EC are amended in accordance with Annex VI to this Regulation.

Annex XII to Directive 2007/46/EC is replaced by Annex VII to this Regulation.

Article 9

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

It shall apply to new vehicle types for which type-approval is granted from 1 November 2012.

For the Commission

The President

José Manuel BARROSO

LIST OF ANNEXES

- Annex I PART A: Technical requirements for vehicles of category M₁ and N₁.
 PART B: Technical requirements for vehicles of category M₂ and M₃.
 PART C: Technical requirements for vehicles of category N₂ and N₃.
 PART D: Technical requirements for vehicles of category O.
 Appendix 1 List of devices and equipment that are not required to be taken into account for the determination of the outermost dimensions.
 Appendix 2 Permissible deviations for type-approval and conformity of production.
 Appendix 3 Figures regarding manoeuvrability.
- Annex II Gradeability of off-road vehicles.
- Annex III Conditions of equivalence of a suspension to air-suspension.
- Annex IV Technical requirements for the installation of lift- or loadable axles on vehicles.
- Annex V PART A: Information document.
 PART B: EC type-approval certificate.
- Annex VI Amendments to Annexes I, III, IX, and XVI to Directive 2007/46/EC.
- Annex VII Annex XII to Directive 2007/46/EC.
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ANNEX I

TECHNICAL REQUIREMENTS

PART A

Vehicles of category M₁ and N₁1. **Maximum authorised dimensions**

1.1. The dimensions shall not exceed the following values:

1.1.1. Length: 12,00 m.

1.1.2. Width:

(a) M₁: 2,55 m;

(b) N₁: 2,55 m;

(c) N₁: 2,60 m for vehicles fitted with a bodywork with insulated walls of at least 45 mm thick, as referred to in Appendix 2 of Part C of Annex II to Directive 2007/46/EC;

1.1.3. Height: 4,00 m.

1.2. For the purposes of measurement of the length, width and height, the vehicle shall be at its mass in running order, placed on a horizontal and flat surface with tyres inflated at the pressure recommended by the manufacturer.

1.3. Only the devices and equipment referred to in Appendix 1 of this Annex shall not be taken into account for the determination of the length, width and height.

2. **Mass distribution**

2.1. The sum of the technically permissible maximum mass on the axles shall not be less than the technically permissible maximum laden mass of the vehicle.

2.2. The technically permissible maximum laden mass of the vehicle shall not be less than the mass of the vehicle in running order plus the mass of the passengers plus the mass of the optional equipment plus the mass of the coupling if not included in the mass in running order.

2.3. Where the vehicle is laden to the technically permissible maximum laden mass, the mass on each axle shall not exceed the technically permissible maximum mass on that axle.

2.4. Where the vehicle is laden to the technically permissible maximum laden mass, the mass on the front axle shall in no event be less than 30 % of the technically permissible maximum laden mass of the vehicle.

2.4.1. Where the vehicle is laden to the technically permissible maximum laden mass plus the technically permissible maximum mass at the coupling point, the mass on the front axle shall in no event be less than 20 % of the technically permissible maximum laden mass of the vehicle.

2.5. Where a vehicle is equipped with removable seats, the verification procedure shall be limited to the condition with the maximum number of seating positions.

2.6. For the purposes of verifying the requirements laid down in points 2.2, 2.3 and 2.4:

(a) The seats shall be adjusted as prescribed in point 2.6.1

(b) the masses of the passengers, the pay-mass and the mass of the optional equipment shall be distributed as prescribed in points 2.6.2 to 2.6.4.2.3.

- 2.6.1. Seat adjustment
- 2.6.1.1. The seats where adjustable shall be moved to their rearmost position.
- 2.6.1.2. Where there are other possibilities for adjusting the seat (vertical, angled, seat back, etc.) the adjusted positions shall be as specified by the vehicle manufacturer.
- 2.6.1.3. In the case of suspension seats, the seat shall be locked in the position specified by the manufacturer.
- 2.6.2. Distribution of the mass of passengers
- 2.6.2.1. The mass representing each passenger shall be 75 kg.
- 2.6.2.2. The mass for each passenger shall be located at the seating reference point (i.e. the 'R point' of the seat)
- 2.6.2.3. In the case of special purpose vehicle, the requirement of point 2.6.2.2 shall apply mutatis mutandis (for example, mass of an injured person lying on the stretcher in the case of an ambulance).
- 2.6.3. Distribution of the mass of the optional equipment
- 2.6.3.1. The mass of the optional equipment shall be distributed in accordance with the manufacturer's specifications.
- 2.6.4. Distribution of the pay-mass
- 2.6.4.1. M_1 vehicles
- 2.6.4.1.1. As regards M_1 vehicles, the pay-mass shall be distributed in accordance with the manufacturer's specifications in agreement with the technical service.
- 2.6.4.1.2. As regards motor caravans the minimum pay-mass (PM) shall meet the following requirement:
- $$PM \text{ in kg} \geq 10 (n + L)$$
- Where
- 'n' is the maximum number of passengers plus the driver and
- 'L' is the overall length of the vehicle in metre
- 2.6.4.2. N_1 vehicles
- 2.6.4.2.1. As regards vehicles with bodywork, the pay-mass shall be distributed uniformly on the cargo bed;
- 2.6.4.2.2. As regards vehicles without bodywork (e.g. chassis-cab), the manufacturer shall state the extreme permissible positions of the centre of gravity of the pay-mass increased by the mass of the equipment intended to accommodate goods (e.g. bodywork, tank, etc.) (for instance: from 0,50 m to 1,30 m in front of the first rear axle);
- 2.6.4.2.3. As regards vehicles intended to be fitted with a fifth wheel coupling, the manufacturer shall state the minimum and maximum fifth wheel lead.
- 2.7. Additional requirements where the vehicle is capable of towing a trailer
- 2.7.1. The requirements referred to in points 2.2, 2.3 and 2.4 shall apply taking into account the mass of the coupling and the technically permissible maximum mass at the coupling point.
- 2.7.2. Without prejudice to the requirements of point 2.4, the technically permissible maximum mass on the rear axle(s) may be exceeded by not more than 15 %.
- 2.7.2.1. Where the technically permissible maximum mass on the rear axle(s) is exceeded by not more than 15 %, the requirements of point 5.2 of Annex II to Commission Regulation (EU) No 458/2011 ⁽¹⁾ shall apply.

⁽¹⁾ OJ L 124, 13.5.2011, p. 11.

- 2.7.2.2. In the Member States where the road traffic legislation allows it, the manufacturer may indicate in an appropriate supporting document, such as the owner's manual or the maintenance book that the technically permissible maximum laden mass of the vehicle may be exceeded by not more than 10 % or 100 kg, whichever value is lower.

This allowance shall apply only when towing a trailer in the conditions specified in point 2.7.2.1 provided that the operating speed is restricted to 100 km/h or less.

3. Towable mass and mass at the coupling

- 3.1. As regards the technically permissible maximum towable mass, the following requirements shall apply:

3.1.1. Trailer fitted with a service braking system

- 3.1.1.1. The technically permissible maximum towable mass of the vehicle shall be the lowest of the following values:

- (a) the technically permissible maximum towable mass based on the construction features of the vehicle and the strength of the coupling;
- (b) the technically permissible maximum laden mass of the towing vehicle;
- (c) 1,5 times the technically permissible maximum laden mass of the towing vehicle in the case of an off-road vehicle as defined in Annex II to Directive 2007/46/EC.

- 3.1.1.2. However, the technically permissible maximum towable mass shall in no case exceed 3 500 kg.

3.1.2. Trailer without a service braking system

- 3.1.2.1. The permissible towable mass shall be the lowest of the following values:

- (a) the technically permissible maximum towable mass based on the construction features of the vehicle and the strength of the coupling;
- (b) half of the mass in running order of the towing vehicle.

- 3.1.2.2. The technically permissible maximum towable mass shall in no case exceed 750 kg.

- 3.2. The technically permissible maximum mass at the coupling point shall not be less than 4 % of the maximum permissible towable mass and not be less than 25 kg.

- 3.3. The manufacturer shall specify in the owner's manual the technically permissible maximum mass at the coupling point, the mounting points of the coupling on the towing vehicle and the maximum permissible rear overhang for the coupling point.

- 3.4. The technically permissible maximum towable mass shall not be defined by reference to the number of passengers.

4. Mass of the combination

The technically permissible maximum laden mass of the combination shall not exceed the sum of the technically permissible maximum laden mass plus the technically permissible maximum towable mass.

$$MC \leq M + TM$$

5. Hill starting ability

- 5.1. The towing vehicle shall be able to start the vehicle combination five times on an uphill gradient of at least 12 % within five minutes.

- 5.2. In order to conduct the test described in point 5.1, the towing vehicle and the trailer shall be laden as to equal the technically permissible maximum laden mass of the combination.

PART B

Vehicles of category M₂ and M₃

1. **Maximum authorised dimensions**
 - 1.1. The dimensions shall not exceed the following values:
 - 1.1.1. Length
 - (a) Vehicle with two axles and one section: 13,50 m
 - (b) Vehicle with three or more axles and one section: 15,00 m
 - (c) Articulated vehicle: 18,75 m
 - 1.1.2. Width: 2,55 m;
 - 1.1.3. Height: 4,00 m
 - 1.2. For the purposes of measurement of the length, width and height, the vehicle shall be at its mass in running order, placed on a horizontal and flat surface with tyres inflated at the pressure recommended by the manufacturer.
 - 1.3. Only the devices and equipment referred to in Appendix 1 of this Annex shall not be taken into account for the determination of the length, width and height.
2. **Mass distribution for vehicles fitted with bodywork**
 - 2.1. Calculation procedure

Notations:

'M' technically permissible maximum laden mass;

TM' technically permissible maximum towable mass;

'MC' technically permissible maximum laden mass of the combination;

'm_i' technically permissible maximum laden mass on the solo axle designated 'i', where 'i' varies from 1 to the total number of axles of the vehicle;

'm_c' technically permissible maximum mass at the coupling point;

'μ_j' the technically permissible maximum mass on the group of axles designated 'j', where j varies from 1 to the total number of groups of axles.

 - 2.1.1. Suitable calculations shall be carried out in order to make sure that the following requirements are fulfilled for each technical configuration within the type.
 - 2.1.2. In the case of vehicles fitted with loadable axles, the following calculations shall be carried out with the suspension of the axles loaded in the normal operating configuration.
 - 2.2. General requirements
 - 2.2.1. The sum of the technically permissible maximum mass on the solo axles plus the sum of the technically permissible maximum mass on the groups of axles shall not be less than the technically permissible maximum laden mass of the vehicle.

$$M \leq \Sigma [m_i + \mu_j].$$
 - 2.2.2. The mass of the vehicle in running order, plus the mass of the optional equipment, the mass of the passengers, the masses 'WP' and 'B' referred to in point 2.2.3, plus the mass of the coupling if not included in the mass in running order, plus the technical permissible maximum mass at the coupling point shall not exceed the technically permissible maximum laden mass.

2.2.3. Load distribution

2.2.3.1. Notations

'P' number of seating positions, not including the driver and crew member(s);

'Q' mass of one passenger in kg;

'Q_c' mass of one crew member in kg;

'S₁' area in m² for standing passengers;

'SP' number of standing passengers stated by the manufacturer;

'S_{sp}' rated space for one standing passenger in m²;

'WP' number of wheelchair spaces multiplied by 250 kg representing the mass of a wheelchair and user;

'V' total volume of baggage compartments in m³ including luggage compartments, racks and ski-box;

'B' maximum permissible mass of the luggage in kg stated by the manufacturer, including the maximum permissible mass (B') that may be transported in the ski-box if any.

2.2.3.2. The mass Q and Q_c of the seated passengers shall be located at the seating reference points (i.e. the 'R point' of the seat).

2.2.3.3. The mass corresponding to the number SP of standing passengers of mass Q shall be uniformly distributed over the surface available for standing passenger S₁.

2.2.3.4. Where appropriate, the mass WP shall be uniformly distributed over each wheelchair space.

2.2.3.5. A mass equal to B (kg) shall be uniformly distributed in the luggage compartments.

2.2.3.6. A mass equal to B' (kg) shall be located at the centre of gravity of the ski-box.

2.2.3.7. The technically permissible maximum mass at the coupling point shall be located at the coupling point the rear overhang of which is stated by the vehicle manufacturer.

2.2.3.8. Values of Q and S_{sp} values

Vehicle class	Q (kg)	S _{sp} (m ²)
Class I and A	68	0,125 m ²
Class II	71	0,15 m ²
Class III and B	71	Not applicable

The mass of each crew member shall be 75 kg.

2.2.3.9. The number of standing passengers shall not exceed the value S₁/S_{sp}, where S_{sp} is the rated space provided for one standing passenger as specified in the table in point 2.2.3.8.

2.2.3.10. The value of the maximum permissible mass of the luggage shall be not less than: $B = 100 \times V$

2.2.4. Calculations

2.2.4.1 The requirements of point 2.2.2 shall be verified in all interior arrangement configurations.

2.2.4.2. In the conditions specified in point 2.2.3 the mass on each solo axle and on each group of axles shall not exceed the technically permissible maximum mass on that axle or group of axles.

2.2.4.3. In the case of a vehicle equipped with a variable seating capacity, with an area available for standing passengers (S_1) and equipped for the carriage of wheelchairs, compliance with the requirements of points 2.2.2 and 2.2.4.2 shall be verified for each of the following conditions as applicable:

- (a) with all possible seats occupied followed by the remaining area for standing passengers (up to the standing capacity limit declared by the manufacturer, if reached) and, if space remains, any wheelchair spaces occupied;
- (b) with all possible standing areas occupied (up to the standing capacity limit stated by the manufacturer) followed by the remaining seats available for seated passengers and, if space remains, any wheelchair spaces occupied;
- (c) with all possible wheelchair spaces occupied followed by the remaining area for standing passengers (up to the standing capacity limit stated by the manufacturer, if reached) and then the remaining seats available for use occupied.

2.2.5. Where the vehicle is laden as specified in point 2.2.2 the mass corresponding to the load on the front steering axle(s) shall in no case be less than 20 % of the technically permissible maximum laden mass 'M'.

2.2.6. Where a vehicle is to be type-approved to more than one class, the requirements of Section 2 shall apply to each class.

3. **Towing capacity**

3.1. The technically permissible maximum laden mass of the combination shall not exceed the sum of the technically permissible maximum laden mass plus the technically permissible maximum towable mass.

$$MC \leq M + TM$$

3.2. The technically permissible maximum towable mass shall not exceed 3 500 kg.

4. **Technically permissible maximum mass at the coupling point**

4.1. The technically permissible maximum mass at the coupling point shall be at least equal to 4 % of its technically permissible maximum towable mass, or 25 kg, whichever is the greater.

4.2. The manufacturer shall specify in the owner's manual the conditions for the attachment of the coupling to the motor vehicle.

4.2.1. Where appropriate the conditions referred to in point 4.2 shall include the technically permissible maximum mass at the coupling point of the towing vehicle, the maximum permissible mass of the coupling device, the mounting points of the coupling and the maximum permissible rear overhang of the coupling.

5. **Hill-starting ability**

5.1. Vehicles designed to tow a trailer shall be capable of starting five times within five minutes at an up-hill gradient of at least 12 %.

5.2. For performing the test described in point 5.1, the towing vehicle and the trailer shall be laden so as to equal the technically permissible maximum laden mass of the combination.

6. **Engine power**

6.1. The engine shall provide a power output of at least 5 kW per tonne of the technically permissible maximum laden mass of the combination or of the technically permissible maximum laden mass of the solo vehicle where the vehicle is not designed to tow a trailer.

6.2. The engine power shall be measured in accordance with Council Directive 80/1269/EEC ⁽¹⁾ or UNECE Regulation No 85 ⁽²⁾.

⁽¹⁾ OJ L 375, 31.12.1980, p. 46.

⁽²⁾ OJ L 326, 24.11.2006, p. 55.

7. Manoeuvrability

- 7.1. The vehicle shall be capable of manoeuvring on either side of a complete trajectory of 360° as shown in Figure 1 in Appendix 3 to this Annex without any of the vehicle's outermost points protruding beyond the outer circle or intruding inside the inner circle as the case may be.
- 7.1.1. The test shall be conducted with the vehicle in both the unladen conditions (i.e. at its mass in running order) and loaded to its technically maximum permissible laden mass.
- 7.1.2. For the purposes of point 7.1, the parts permitted to protrude beyond the vehicle width referred to in Appendix 1 to this Annex shall not be taken into account.
- 7.2. For vehicles fitted with a loadable axle, the requirement of point 7.1 shall also apply where the loadable axle(s) is in service.
- 7.3. The requirements of section 7.1 shall be verified as follows:
- 7.3.1. The vehicle shall manoeuvre inside a circular area defined by two concentric circles, the outer circle having a radius of 12,50 m and the inner circle having a radius of 5,30 m
- 7.3.2. The outermost front point of the motor vehicle shall be guided along the contour of the outer circle (see Figure 1 in Appendix 3 to this Annex).

8. Rear swing-out

- 8.1. Vehicle with one section
- 8.1.1. The vehicle shall be tested in accordance with the drive-in test method described in point 8.1.2.
- 8.1.2. Drive-in test method
- The vehicle shall be stationary, a vertical plane tangential to the side of the vehicle and facing outwards from the circle shall be established by marking a line on the ground.
- The vehicle shall be moved from a straight line approach into the circular area described in Figure 1 with its front wheels turned such as the front outermost point follows the contour of the outer circle (see Figure 2a of Appendix 3 to this Annex).
- 8.1.3. The vehicle shall be set to its mass in running order.
- 8.1.4. The maximum rear swing-out shall not exceed 0,60 m.
- 8.2. Vehicles with two or more sections
- 8.2.1. The requirements of point 8.1 shall apply *mutatis mutandis* as regards vehicles with two or more sections.
- In such a case, the two or more rigid sections shall be aligned with the plane as shown in Figure 2b of Appendix 3 to this Annex.

PART C**Vehicles of category N₂ and N₃****1. Maximum authorised dimensions**

- 1.1. The dimensions shall not exceed the following values:
- 1.1.1. Length: 12,00 m.
- 1.1.2. Width:
- (a) 2,55 m for any vehicle;
- (b) 2,60 m for vehicles fitted with a bodywork with insulated walls of at least 45 mm thick, as referred to in Appendix 2 to Annex II to Directive 2007/46/EC;

- 1.1.3. Height: 4,00 m
- 1.2. For the purposes of measurement of the length, width and height, the vehicle shall be at its mass in running order, placed on a horizontal and flat surface with tyres inflated at the pressure recommended by the manufacturer.
- 1.3. Only the devices and equipment referred to in Appendix 1 of this Annex shall not be taken into account for the determination of the length, width and height.
2. **Mass distribution for vehicles fitted with bodywork**
- 2.1. Calculation procedure
- Notations:
- ‘M’ technically permissible maximum laden mass;
- ‘TM’ technically permissible maximum towable mass;
- ‘MC’ technically permissible maximum laden mass of the combination;
- ‘ m_i ’ the technically permissible maximum mass on the solo axle designated ‘i’, where i varies from 1 to the total number of axles of the vehicle;
- ‘ m_c ’ technically permissible maximum mass at the coupling point;
- ‘ μ_j ’ the technically permissible maximum mass on the group of axles designated ‘j’, where j varies from 1 to the total number of groups of axles.
- 2.1.1. Suitable calculations shall be carried out in order to make sure that the requirements set out in points 2.2 and 2.3 are fulfilled for each technical configuration within the type.
- 2.1.2. In the case of vehicles fitted with loadable axles, the calculations required under points 2.2 and 2.3 shall be carried out with the suspension of loadable axles in the normal running configuration.
- 2.1.3. In the case of vehicles fitted with lift axles, the calculations required under points 2.2 and 2.3 shall be carried out with the axles lowered.
- 2.2. General requirements
- 2.2.1. The sum of the technically permissible maximum mass on the solo axles plus the sum of the technically permissible maximum mass on the groups of axles shall not be less than the technically permissible maximum laden mass of the vehicle.
- $$M \leq \Sigma [m_i + \mu_j]$$
- 2.2.2. For each group of axles designated ‘j’, the sum of the technically permissible maximum mass on its axles shall not be less than the technically permissible maximum mass on the group of axles.
- In addition, each of the masses m_i shall not be less than the part of μ_j applying on the axle ‘i’ as determined by the mass distribution for that group of axles.
- 2.3. Specific requirements
- 2.3.1. The mass of the vehicle in running order, plus the mass of the optional equipment plus the mass of the passengers, plus the mass of the coupling if not included in the mass in running order plus the technically permissible maximum mass at the coupling point shall not exceed the technically permissible maximum laden mass of the vehicle.
- 2.3.2. Where the vehicle is laden to its technically permissible maximum laden mass, the mass distributed on an axle ‘i’ shall not exceed the mass m_i on that axle, and the mass on the group of axles ‘j’ shall not exceed the mass μ_j .

2.3.3. The requirements of point 2.3.2 shall be complied with in the following load configurations:

2.3.3.1. Uniform distribution of the pay-mass:

the vehicle shall be at its mass in running order plus the mass of the optional equipment plus the mass of the passengers located at the seating reference points, plus the mass of the coupling (if not included in the mass in running order), plus the maximum permissible mass at the coupling point, plus the pay-mass being distributed uniformly on the cargo area.

2.3.3.2. Non-uniform distribution of pay-mass:

the vehicle shall be at its mass in running order plus the mass of the optional equipment plus the mass of the passengers located at the seating reference points, plus the mass of the coupling (if not included in the mass in running order), plus the maximum permissible mass at the coupling point, plus the pay-mass located in accordance with the manufacturers specifications.

For such purposes the manufacturer shall state the extreme permissible possible positions of the centre of gravity of the pay-mass and/or body and/or equipment or interior fittings (for instance: from 0,50 m to 1,30 m in front of the first rear axle).

2.3.3.3. Combination of uniform and non-uniform distribution:

The requirements of points 2.3.3.1 and 2.3.3.2 shall be fulfilled simultaneously.

Example, a tipper lorry (distributed load) equipped with an additional crane (localised load).

2.3.3.4. Mass transferred by the fifth wheel coupling (tractor unit for semi-trailer):

the vehicle shall be at its mass in running order plus the mass of the optional equipment plus the mass of the passengers located at the seating reference points, plus the mass of the coupling if not included in the mass in running order, plus the maximum permissible mass at the fifth wheel coupling point located in accordance with the manufacturers' specifications (minimum and maximum fifth-wheel lead).

2.3.3.5. The requirements of points 2.3.3.1 shall always be fulfilled where the vehicle is fitted with a flat cargo area.

2.3.4. Where the vehicle is laden to its technically permissible maximum laden mass, plus the mass of the coupling if not included in the mass in running order, plus the maximum permissible mass at the coupling point in such a way that the maximum permissible maximum mass on the rear group of axle (μ) or the maximum permissible maximum on the rear axle (m) is reached, the mass on the front steering axle(s) shall not be less than 20 % of the technically permissible maximum laden mass of the vehicle.

2.3.5. As regards special purposes vehicles of category N_2 and N_3 , the technical service shall check compliance with the requirements of Section 2 in agreement with the manufacturer, taking into account the specific design of the vehicle (for example, mobile cranes).

3. **Towing capacity**

3.1. The technically permissible maximum laden mass of the combination shall not exceed the sum of the technically permissible maximum laden mass plus the technically permissible maximum towable mass.

$$MC \leq M + TM$$

4. **Hill-starting ability and gradeability**

4.1. Vehicles designed to tow a trailer and laden to their technically permissible maximum laden mass of the combination shall be capable of starting five times within five minutes at an up-hill gradient of at least 12 %.

4.2. As regard gradeability, off road vehicles shall be tested against the technical requirements of Annex II.

- 4.2.1. The requirements of Section 5 of Appendix 1 to Annex II to Directive 2007/46/EC shall also apply.

5. **Engine power**

- 5.1. Vehicles shall provide an engine power output of at least 5 kW per tonne of the technically permissible maximum laden mass of the combination.
- 5.1.1. In the case of a road tractor, or a tractor unit for semi-trailer intended for the transport of indivisible loads, the engine power shall be at least 2 kW per tonne of the technically permissible maximum laden mass of the combination.
- 5.2. The engine power shall be measured of in accordance with Directive 80/1269/EEC or UNECE Regulation No 85.

6. **Manoeuvrability**

- 6.1. The vehicle shall be capable of manoeuvring on either side of a complete trajectory of 360° as shown in Figure 1 of Appendix 3 to this Annex without any of the vehicle's outermost points protruding beyond the outer circle or intruding inside the inner circle as the case may be.
- 6.1.1. The test shall be conducted with the vehicle in both the unladen conditions (i.e. at its mass in running order) and loaded to its technically maximum permissible laden mass.
- 6.1.2. For the purposes of point 6.1, the parts permitted to protrude beyond the vehicle width referred to in Appendix 1 to this Annex shall not be taken into account.
- 6.2. For vehicles fitted with axle-lift devices, the requirement of point 6.1 shall also apply with the lift axle(s) in the lifted position and where the loadable axle(s) is in service.
- 6.3. The requirements of point 6.1 shall be verified as follows
- 6.3.1. The vehicle shall manoeuvre inside an area defined by two concentric circles, the outer circle having a radius of 12,50 m and the inner circle having a radius of 5,30 m
- 6.3.2. The outermost front point of the motor vehicle shall be guided along the contour of the outer circle (see Figure 1 of Appendix 3 to this Annex)

7. **Maximum rear swing-out**

- 7.1. The vehicle shall be tested in accordance with the steady-state test method described in point 7.1.1.
- 7.1.1. Steady-state test method
- 7.1.1.2. The vehicle shall be stationary and shall have its front steered wheels so directed that if the vehicle moves, its outermost point would describe a circle of 12,50 m radius.

A vertical plane tangential to the side of the vehicle and facing outwards from the circle shall be established by marking a line on the ground.

The vehicle shall move forward such as the front outermost point follows the contour of the outer circle of 12,50 m radius.

- 7.2. The maximum rear swing-out shall not exceed: (see Figure 3 of Appendix 3 to this Annex)

- (a) 0,80 m;
- (b) 1,00 m where the vehicle is fitted with an axle-lift device and the axle is cleared off the ground;
- (c) 1,00 m where the rearmost axle is a steered axle.

PART D

Vehicles of category O**1. Maximum authorised dimensions**

1.1. The dimensions shall not exceed the following values:

1.1.1. Length

(a) Trailer: 12,00 m including drawbar;

(b) Semi-trailer: 12,00 m plus the front overhang.

1.1.2. Width

(a) 2,55 m for any vehicle;

(b) 2,60 m for vehicles fitted with a bodywork with insulated walls of at least 45 mm thick, as referred to in Appendix 2 to Annex II to Directive 2007/46/EC.

1.1.3. Height: 4,00 m.

1.1.4. Front fitting radius of semi-trailer: 2,04 m.

1.2. For the purposes of measurement of the length, width and height, the vehicle shall be at its mass in running order, placed on a horizontal and flat surface with tyres inflated at the pressure recommended by the manufacturer.

1.3. The measurement of the length, height and front fitting radius shall be conducted where the loading surface or the reference surface referred to in point 1.2.1 second subparagraph of Annex 7 to UNECE Regulation No 55 is horizontal.

Adjustable drawbars shall be horizontal and aligned with the centre-line of the vehicle. They shall be set at their horizontal most elongated position.

1.4. Only the devices and equipment referred to in Appendix 1 to this Annex shall not be taken into account for the determination of the dimensions referred to in point 1.1.

2. Mass distribution for vehicles fitted with bodywork

2.1. Calculation procedure

Notations:

'M' technically permissible maximum laden mass;

' m_0 ' technically permissible maximum mass at the front coupling point;

' m_i ' the technically permissible maximum mass on the axle designated 'i', where i varies from 1 to the total number of axles of the vehicle;

' m_c ' technically permissible maximum mass at the rear coupling point;

' μ_j ' the technically permissible maximum mass on the group of axles designated 'j', where j varies from 1 to the total number of groups of axles.

2.1.1. Suitable calculations shall be carried out in order to make sure that the requirements set out in points 2.2 and 2.3 are fulfilled for each technical configuration within the type.

2.1.2. In the case of vehicles fitted with loadable axles, the calculations required under points 2.2 and 2.3 shall be carried out with the suspension of loadable axles in the normal running configuration.

- 2.1.3. In the case of vehicles fitted with lift axles, the calculations required under points 2.2 and 2.3 shall be carried out with the axles lowered.

2.2. General requirements

- 2.2.1. The sum of the technically permissible maximum mass at the front coupling point plus the technically permissible maximum mass on the solo axles or group of axles plus the technically permissible maximum mass at the rear coupling point shall be not less than the technically permissible maximum laden mass of the vehicle.

$$M \leq \Sigma [m_0 + m_i + \mu_j + m_c]$$

- 2.2.2. For each group of axles designated 'j', the sum of the masses m_i on its axles shall not be less than the mass μ_j .

In addition, each of the masses m_i shall not be less than the part of μ_j applying on the axle 'i' as determined by the mass distribution for that group of axles.

2.3. Specific requirements

- 2.3.1. The mass of the vehicle in running order, plus the mass of the optional equipment plus the technically permissible maximum mass at the coupling point(s) shall not exceed the technically permissible maximum laden mass of the vehicle.

- 2.3.2. Where the vehicle is laden to its technically permissible maximum laden mass, the mass distributed on a solo axle 'i' shall neither exceed the mass m_i on that axle, nor the mass μ_j on the group of axles, nor the technically permissible maximum mass at the coupling point m_0 .

- 2.3.3. The requirements of point 2.3.2 shall be complied with in the following load configurations:

2.3.3.1. Uniform distribution of the pay-mass

The vehicle shall be at its mass in running order plus the mass of the optional equipment plus the pay-mass being distributed uniformly on the cargo area;

2.3.3.2. Non-uniform distribution of the pay-mass

The vehicle shall be at its mass in running order plus the mass of the optional equipment plus the pay-mass located in accordance with the manufacturer's specifications.

For such purposes the manufacturer shall state the extreme permissible possible positions of the centre of gravity of the pay-mass and/or body and/or equipment or interior fittings (for instance: from 0,50 m to 1,30 m in front of the first rear axle);

2.3.3.3. Combination of uniform and non-uniform distribution:

The requirements of points 2.3.3.1 and 2.3.3.2 shall be fulfilled simultaneously.

- 2.3.3.4. The requirements of points 2.3.3.1 shall always be fulfilled where the vehicle is fitted with a flat cargo area.

2.3.4. Specific requirements for trailer caravans

- 2.3.4.1. The minimum pay-mass (PM) shall meet the following requirement:

$$PM \text{ in kg} \geq 10 (n + L)$$

Where

'n' is the maximum number of berths and

'L' is the overall length of the body length as defined in point 6.1.2 of Standard ISO 7237:1981.

3. **Manoeuvrability requirements**

- 3.1. Trailers and semi-trailers shall be so designed that, when coupled to a towing vehicle, the combination is capable of manoeuvring on either side of a complete trajectory of 360° made up of two concentric circles, the outer circle having a radius of 12,50 m and the inner circle having a radius of 5,30 m without any of the vehicle's outermost points of the towing vehicle protruding beyond the outer circle or any of the outermost points of the trailer or semi-trailer intruding inside the inner circle.
- 3.2. A semi-trailer shall be deemed to comply with the requirement of point 3.1. if its reference wheelbase 'RWB' meets the following requirement:

$$RWB \leq [(12,50 - 2,04)^2 - (5,30 + \frac{1}{2}W)^2]^{\frac{1}{2}}$$

where:

'RWB' is the distance between the king-pin axis and the centre line of the non-steering axles.

'W' is the semi-trailer's width

- 3.3. Where one or more of the non-steering axles has an axle lift device the reference wheelbase with the axle lowered or the axle lifted — whichever is the longest — shall be taken into account.
-

Appendix 1

List of devices and equipment that are not required to be taken into account for the determination of the outermost dimensions

1. Subject to the additional restrictions provided in the following tables, the devices and equipment listed in Tables I, II and III are not required to be taken into account for the determination of the outermost dimensions where the following requirements are fulfilled:

(a) Where several devices are fitted at the front, the total protrusion of those devices shall not exceed 250 mm;

(b) The total protrusion of devices and equipment added to the length of the vehicle shall not exceed 750 mm;

(c) With the exception of rear-view mirrors, the total protrusion of devices and equipment added to the width of the vehicle shall not exceed 100 mm.

2. The requirements set out in points (a) and (b) of paragraph 1 shall not apply to devices for indirect vision.

Table I

Vehicle length

Item		Vehicles categories									
		M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
1.	Devices for indirect vision as defined in point 2.1 of UNECE Regulation No 46 ⁽¹⁾	x	x	x	x	x	x	x	x	x	x
2.	Wiper and washer devices	x	x	x	x	x	x				
3.	External sun visors	—	—	—	—	x	x	—	—	—	—
4.	Frontal protection system type-approved in accordance with Regulation (EC) No 78/2009 of the European Parliament and of the Council ⁽²⁾	x			x						
5.	Access steps and hand-holds	—	x	x	x	x	x	x	x	x	x
6.	Coupling (when removable)	x	x	x	x	x	x	—	—	—	—
7.	Additional coupling at the rear of a trailer (when removable)	—	—	—	—	—	—	x	x	x	x
8.	Bike carrier (when removable or retractable)	x			x	—	—	—	—	—	—
9.	Lift platforms, access ramps or similar equipment (when they are in undeployed position and do not protrude by more than 300 mm) provided that the loading capacity of the vehicle is not increased.	x	x	x	x	x	x	x	x	x	x
10.	Watching and detection aids including radars	—	x	x	—	x	x	x	x	x	x
11.	Resilient buffers and similar equipment	—	—	—	—	x	x	x	x	x	x
12.	Custom sealing devices and their protections	—	—	—	x	x	x	x	x	x	x

[illegible]

[illegible]

Item		Vehicles categories									
		M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
17.	Safety railings on vehicle transporters. Only for vehicles designed and constructed to transport at least two other vehicles and for which the safety railings are more than 2,0 m but not more than 3,70 m from the ground and do not project by more than 50 mm from the outermost side of the vehicle. The vehicle width shall not exceed 2 650 mm.	—	—	—	—	x	x	—	—	x	x

(¹) OJ L 34, 9.2.2011, p. 2.

Table III

Vehicle height

		M ₁	M ₂	M ₃	N ₁	N ₂	N ₃	O ₁	O ₂	O ₃	O ₄
1.	Radio or radio-navigation antenna	x	x	x	x	x	x	x	x	x	x
2.	Pantographs or trolley booms in their elevated position	—	—	x	—	—	—	—	—	—	—

*Appendix 2***Permissible deviations for type-approval and conformity of production****1. Dimensions**

- 1.1. Measurement of the overall length, width and height shall be carried out in accordance with point 1.2 of Parts A to D of this Annex.
- 1.2. Under the condition that the limits specified in point 1.1 of Part A to D of this Annex are not exceeded, the actual dimensions may differ from those stated by the manufacturer by not more than 3 %.

2. Mass in running order and actual mass of the vehicle

- 2.1. The mass in running order shall be checked from the actual mass by weighing the vehicle and deducting the mass of the optional equipment fitted. For such purposes the weighing instrument shall comply with the requirements of Directive 2009/23/EC of the European Parliament and of the Council ⁽¹⁾.
- 2.2. The mass in running order determined in accordance with the requirements of point 2.1 may deviate from the nominal value stated in point 2.6(b) of Annex I or in Part I, section A or B of Annex III to Directive 2007/46/EC or in the relevant entry of the certificate of conformity by not more than:
 - (a) 3 % as regards the permissible lower and upper deviations (= the negative and positive deviation around the declared value) as regards M, N and O vehicles with the exception of special purpose vehicles;
 - (b) 5 % as regards the permissible lower and upper deviations (= the negative and positive deviation around the declared value) as regards special purpose vehicles;
 - (c) 5 % as regards the permissible lower and upper deviations (= the negative and positive deviation around the declared value) for the purposes of Article 12(2) of Directive 2007/46/EC.

⁽¹⁾ OJ L 122, 16.5.2009, p. 6.

Appendix 3

Figures regarding manoeuvrability requirements

Figure 1

Manoeuvrability circle $r = 5,3$ m $R = 12,5$ m

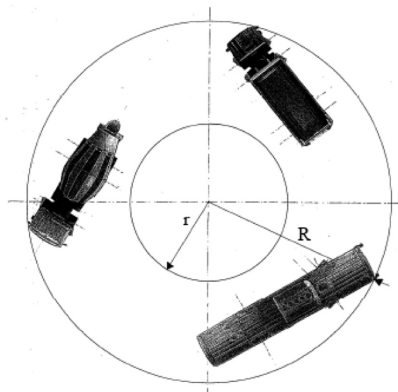


Figure 2

Drive-in method for M_2 and M_3 vehicles

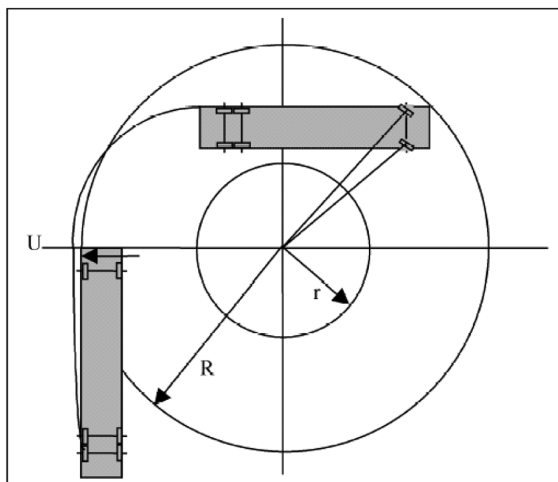


Figure 2a:
rear swing-out (non-articulated
vehicles)
 $R = 12,5$ m
 $r = 5,3$ m
 $U_{\max} \leq 60$ cm

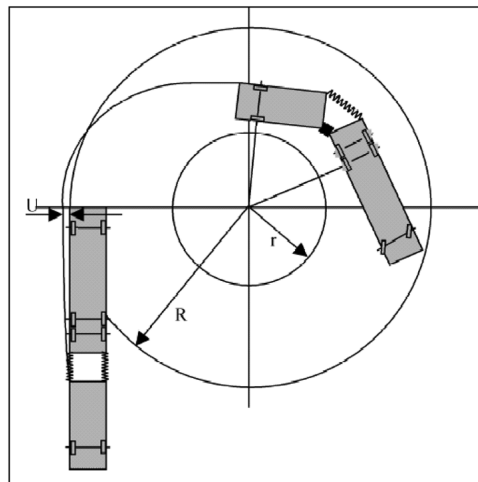
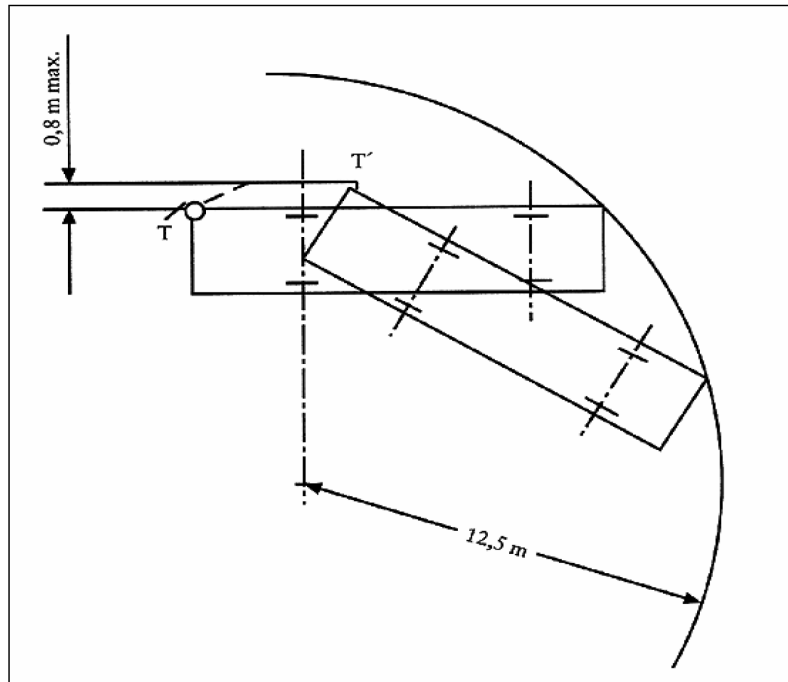


Figure 2b:
rear swing-out (articulated
vehicles)
 $R = 12,5$ m
 $r = 5,3$ m
 $U_{\max} \leq 60$ cm

Figure 3

Steady-state method for N_2 and N_3 vehicles

ANNEX II

GRADEABILITY OF OFF-ROAD VEHICLES

1. **General**

- 1.1. This Annex lays down the technical requirements for the purposes of verifying the gradeability of a vehicle in order to be categorised as off-road vehicle in accordance with Section 4 of Part A of Annex II to Directive 2007/46/EC.
- 1.2. The technical service shall verify if the complete or completed vehicle, or tractor unit for semi-trailer is to be considered as an off-road vehicle in accordance with the requirements laid down in Annex II to 2007/46/EC.
- 1.3. For incomplete vehicles, this verification shall be carried out only at the request of the manufacturer.

2. **Test conditions**

2.1. Vehicle conditions

- 2.1.1. The vehicle shall be set in the conditions recommended by the manufacturer and fitted with the equipment referred to in Annex I to Directive 2007/46/EC.
- 2.1.2. The adjustment of the brakes, clutch (or equivalent), engine and gear box shall be set in accordance with the manufacturer's recommendations for the purposes of use off the normal roads.
- 2.1.3. The tyres shall be those recommended for off-roads use. They shall have a tread depth of not less than 90 % of the tread depth of a new tyre. The tyre pressure shall be adjusted to the value recommended by the tyre manufacturer.
- 2.1.4. The vehicle shall be loaded at its technically permissible maximum laden mass with a load distribution proportional to the distribution of the maximum mass on the axles as stated by the manufacturer.

For example a vehicle of 7,5 tonnes with a maximum mass on the front axle of 4 tonnes and a maximum mass on the rear axle of 6 tonnes shall be tested with a mass of 3 tonnes (40 %) on the front axle and 4,5 tonnes (60 %) on the rear axle.

2.2. Test track conditions

- 2.2.1. The surface of the test track shall be dry, made of asphalt or concrete
- 2.2.2. The gradient shall show a continuous percentage of 25 % with a tolerance of + 3 % ($\vartheta = 14$ degrees).
- 2.2.3. In agreement with the manufacturer, the test may be performed on a gradient that shows a percentage greater than 25 %. The test shall be conducted with maximum masses reduced in relation to the test conditions.

These conditions shall be reported.

- 2.2.4. The surface of the track shall show a good coefficient of adhesion.

The Skid Resistance Index ('SRI') of the surface shall be measured in accordance with Standard CEN/TS 13036-2: 2010 Road and airfield surface characteristics – Test methods – Part 2: Assessment of the skid resistance of a road pavement surface by use of dynamic measuring systems.

The mean value of the SRI shall be reported.

3. **Test procedure**

- 3.1. The vehicle shall be first placed on a horizontal surface.
 - 3.2. The mode of traction shall be set as for off-roads use. The gear(s) engaged shall allow a steady speed.
 - 3.3. Sections 4 and 5 of Appendix 1 to Annex II to Directive 2007/46/EC shall apply.
-

ANNEX III

CONDITIONS OF EQUIVALENCE OF A SUSPENSION TO AIR-SUSPENSION

1. This Annex lays down the technical conditions relating to the equivalence of a suspension to air-suspension for vehicle driving axle(s).
2. In order to be recognised as equivalent to air suspension, a suspension shall comply with the following requirements:
 - 2.1. During free transient low-frequency vertical oscillation of the sprung mass above a driving axle or group of axles, the measured frequency and damping with the suspension carrying its maximum load shall fall within the limits defined in points 2.3 to 2.6
 - 2.2. Each axle shall be fitted with hydraulic dampers. On groups of axles, the dampers shall be positioned to minimise the oscillation of the groups of axles.
 - 2.3. The mean damping ratio D_m shall be more than 20 % of critical damping for the suspension in its normal condition with hydraulic dampers in place and operating.
 - 2.4. The damping ratio D_r of the suspension with all hydraulic dampers removed or incapacitated shall be not more than 50 % of D_m .
 - 2.5. The frequency of the sprung mass above the driving axle or group of axles in a free transient vertical oscillation shall not be higher than 2,0 Hz.
 - 2.6. The test procedures for measuring the frequency and damping shall be laid down in point 3.
3. **Test procedure**
 - 3.1. *Frequency and damping*
 - 3.1.1. The free oscillation of the sprung mass shall be given by the following equation:

$$M \frac{d^2 Z}{dt^2} + C \frac{dZ}{dt} + KZ = 0$$

Where

'M' is the sprung mass (kg),

'Z' is the vertical displacement of the sprung mass (m),

'C' is the total damping coefficient (N.s/m) and

'K' is the total vertical stiffness between the road surface and the sprung mass (N/m).

- 3.1.2. The frequency of oscillation ('F' in Hz) of the sprung mass shall be given by the following equation:

$$F = \frac{1}{2\pi} \sqrt{\frac{K}{M} - \frac{C^2}{4M^2}}$$

- 3.1.3. The damping is critical when $C = C_0$

where:

$$C_0 = 2\sqrt{KM}$$

The damping ratio as a fraction of critical is C/C_0 .

- 3.1.4. During free transient oscillation of the sprung mass the vertical motion of the mass will follow a damped sinusoidal path (Figure 2). The frequency can be estimated by measuring the time for as many cycles of oscillation as can be observed. The damping can be estimated by measuring the heights of successive peaks of the oscillation in the same direction.
- 3.1.5. If the peak amplitudes of the first and second cycles of the oscillation are A_1 and A_2 , then the damping ratio D is given by the following equation:

$$D = \frac{C}{C_0} = \frac{1}{2\pi} \ln \frac{A_1}{A_2}$$

'ln' being the natural logarithm of the amplitude ratio.

3.2. Test procedure

To establish by test the damping ratio D_m , the damping ratio D_r , with hydraulic dampers removed, and the frequency F of the suspension, the loaded vehicle shall be either:

- driven at low speed ($5 \text{ km/h} \pm 1 \text{ km/h}$) over an 80 mm step with the profile shown in Figure 1. The transient oscillation to be analysed for frequency and damping occurs after the wheels of the driving axle have left the step;
- pulled down by its chassis so that the driving axle load is 1,5 times its maximum static value. The vehicle held down is suddenly released and the subsequent oscillation analysed;
- pulled up by its chassis so that the sprung mass is lifted by 80 mm above the driving axle. The vehicle held up is suddenly dropped and the subsequent oscillation analysed;
- subjected to other procedures insofar as it has been proved by the manufacturer, to the satisfaction of the technical service, that they are equivalent.

3.3. Test equipment of the vehicle and loading conditions

- 3.3.1 The vehicle shall be fitted with a vertical displacement transducer between driving axle and chassis, directly above the driving axle. From the trace, the time interval between the first and second compression peaks shall be measured to obtain the damping.

For twin driving groups of axles, vertical displacement transducers shall be fitted between each driving axle and the chassis directly above it.

- 3.3.2. The tyres shall be inflated to the appropriate pressure recommended by the manufacturer.

- 3.3.3 The test for verifying the equivalence of the suspensions shall be made at the technically permissible maximum mass on the axle or group of axles, and the equivalence assumed to cover all the lower masses.

Figure 1

Step for suspension tests

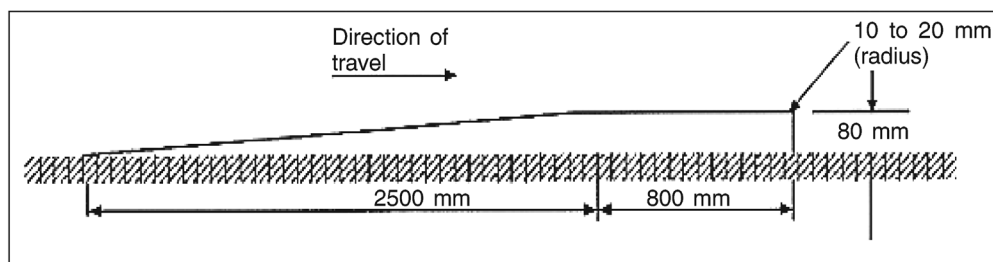
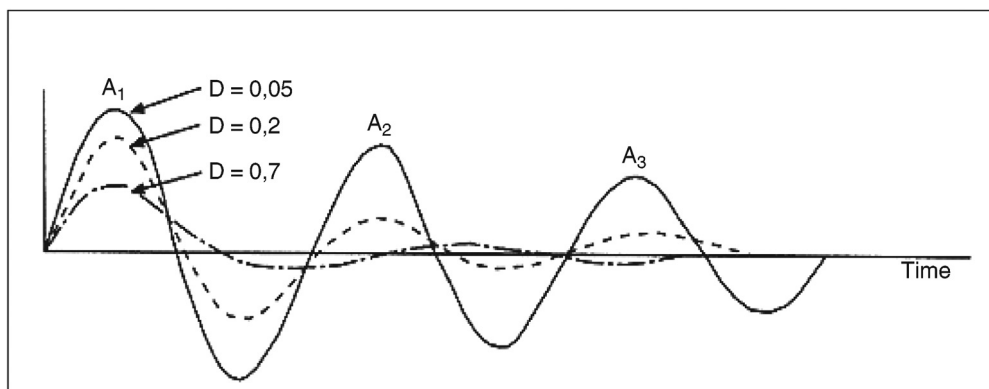


Figure 2

A damped transient response



ANNEX IV

TECHNICAL REQUIREMENTS FOR THE INSTALLATION OF LIFT- OR LOADABLE AXLE(S) ON VEHICLES

1. If a vehicle is fitted with one or more lift- or loadable axles it shall be ensured that under normal driving conditions the registration/in-service maximum permissible masses on solo axles or groups of axles are not exceeded. To that end the lift- or loadable axle(s) shall be lowered to the ground or be loaded automatically if the nearest axle(s) of the group or the front axle(s) of the motor vehicle is/are laden to its/their registration/in- service maximum permissible mass(es).

Where a lift axle is in elevated position, it shall be ensured that the mass on the steering axle(s) continues to be sufficient to ensure the safe driving of the vehicle in all circumstances. For such purposes, the vehicle manufacturer shall specify, in the case of incomplete vehicles, the minimum mass on the steering axle(s).

2. Every axle-lift device fitted to a vehicle, as well as the systems for its operation, shall be designed and installed in such a manner as to protect them against any improper use or tampering.
3. Requirements for moving off vehicles on slippery surfaces and to improve their manoeuvrability
- 3.1. By way of derogation from the requirements of point 1 and to help motor vehicles or vehicle combinations to move off on slippery ground and to increase the traction of the tyres on these surfaces as well to improve their manoeuvrability, the axle lift device may actuate the lift- or loadable axle(s) of a motor vehicle or semi-trailer to increase or decrease the mass on the driving axle of the motor vehicle, subject to the following conditions:
 - (a) the mass corresponding to the load on each axle of the vehicle may exceed the maximum authorised mass on the axle in force in the Member State by up to 30 % provided it does not exceed the value stated by the manufacturer for this special purpose;
 - (b) the mass corresponding to the remaining load on the front axle(s) shall remain above zero (i.e. in case of a rear loadable axle with long rear overhang, the vehicle may not tip up);
 - (c) the lift- or loadable axle(s) shall be actuated only by a specific control;
 - (d) after the vehicle has moved off and before its speed exceeds 30 km/h, the axle(s) shall automatically be lowered again to the ground or be reloaded.

ANNEX V

PART A

INFORMATION DOCUMENT

MODEL TO BE USED

Information document No ... relating to the EC type-approval of a motor vehicle and their trailers with regard the masses and dimensions of a vehicle.

The following information shall be supplied in triplicate and include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient detail.

- 0. GENERAL
- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
- 0.2.1. Commercial name(s) (if available):
- 0.4. Category of vehicle (°):
- 0.5. Company name and address of manufacturer:
- 0.8. Name(s) and address(es) of assembly plant(s):
- 0.9. Name and address of the manufacturer's representative (if any):
- 1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
- 1.1. Photographs and/or drawings of a representative vehicle:
- 1.2. Dimensional drawing of the whole vehicle:
- 1.3. Number of axles and wheels:
- 1.3.1. Number and position of axles with twin wheels:
- 1.3.2. Number and position of steered axles:
- 1.3.3. Powered axles (number, position, interconnection):
- 1.4. Chassis (if any) (overall drawing):
- 1.7. Driving cab (forward control or bonneted) (°):
- 1.9. Specify if the towing vehicle is intended to tow semi-trailers or other trailers and, if the trailer is a semi-, drawbar-, centre-axle- or rigid drawbar trailer:
- 1.10. Specify if the vehicles is specially designed for the controlled-temperature carriage of goods:

2. MASSES AND DIMENSIONS ⁽¹⁾ ⁽⁸⁾ ⁽⁷⁾
(in kg and mm) (Refer to drawing where applicable)
 - 2.1. **Wheel base(s) (fully loaded)** ⁽⁸¹⁾:
 - 2.1.1. Two-axle vehicles:
 - 2.1.2. Vehicles with three or more axles
 - 2.1.2.1. Axle spacing between consecutive axles going from the foremost to the rearmost axle:
 - 2.1.2.2. Total axle spacing:
 - 2.2. **Fifth wheel**
 - 2.2.1. In the case of semi-trailers
 - 2.2.1.1. Distance between the axis of the fifth wheel kingpin and the rearmost end of the semi-trailer:
 - 2.2.1.2. Maximum distance between the axis of the fifth wheel king pin and any point on the front of the semi-trailer:
 - 2.2.1.3. Semi-trailer reference wheelbase (as required in point 3.2 of Part D of Annex I to Regulation (EU) No 1230/2012:
 - 2.2.2. In the case of semi-trailer towing vehicles
 - 2.2.2.1. Fifth wheel lead (maximum and minimum; indicate the permissible values in the case of an incomplete vehicle) ⁽⁸²⁾:
 - 2.3. **Axle track(s) and width(s)**
 - 2.3.1. Track of each steered axle ⁽⁸⁴⁾:
 - 2.3.2. Track of all other axles ⁽⁸⁴⁾:
 - 2.4. **Range of vehicle dimensions (overall)**
 - 2.4.1. For chassis without bodywork
 - 2.4.1.1. Length ⁽⁸⁵⁾:
 - 2.4.1.1.1. Maximum permissible length:
 - 2.4.1.1.2. Minimum permissible length:
 - 2.4.1.1.3. In the case of trailers, maximum permissible drawbar length ⁽⁸⁶⁾:
 - 2.4.1.2. Width ⁽⁸⁷⁾:
 - 2.4.1.2.1. Maximum permissible width:
 - 2.4.1.2.2. Minimum permissible width:
 - 2.4.1.3. Height ⁽⁸⁸⁾ (for suspensions adjustable for height, indicate normal running position):
 - 2.4.1.4. Front overhang ⁽⁸⁹⁾:
 - 2.4.1.4.1. Approach angle ⁽⁹¹⁰⁾ ⁽⁴⁾: degrees.
 - 2.4.1.5. Rear overhang ⁽⁹¹¹⁾:
 - 2.4.1.5.1. Departure angle ⁽⁹¹²⁾ ⁽⁴⁾: degrees.
 - 2.4.1.5.2. Minimum and maximum permissible overhang of the coupling point ⁽⁹¹³⁾:

- 2.4.1.6. Ground clearance (as defined in points 3.1.1 and 3.2.1 of Appendix 1 to Annex II to Directive 2007/46/EC)
- 2.4.1.6.1. Between the axles:
- 2.4.1.6.2. Under the front axle(s):
- 2.4.1.6.3. Under the rear axle(s):
- 2.4.1.8. Position of the centre of gravity of the bodywork and/or interior fittings and/or equipment and/or pay-mass (minimum and maximum):
- 2.4.2. For chassis with bodywork
- 2.4.2.1. Length ^(g5):
- 2.4.2.1.1. Length of the loading area:
- 2.4.2.2. Width ^(g7):
- 2.4.2.2.1. Thickness of the walls (in the case of vehicles designed for controlled-temperature carriage of goods):
- 2.4.2.3. Height ^(g8) (for suspensions adjustable for height, indicate normal running position):
- 2.4.2.4. Front overhang ^(g9):
- 2.4.2.4.1. Approach angle ^(g10) ⁽⁴⁾: degrees.
- 2.4.2.5. Rear overhang ^(g11):
- 2.4.2.5.1. Departure angle ^(g12) ⁽⁴⁾: degrees.
- 2.4.2.5.2. Minimum and maximum permissible overhang of the coupling point ^(g13):
- 2.4.2.6. Ground clearance (as defined in points 3.1.1 and 3.2.1 of Appendix 1 to Annex II to Directive 2007/46/EC) ⁽⁴⁾
- 2.4.2.6.1. Between the axles:
- 2.4.2.6.2. Under the front axle(s):
- 2.4.2.6.3. Under the rear axle(s):
- 2.4.2.8. Positions of the centre of gravity of the pay-mass (in the case of non-uniform load):
- 2.4.3. For bodywork approved without chassis (vehicles M₂ and M₃)
- 2.4.3.1. Length ^(g5):
- 2.4.3.2. Width ^(g7):
- 2.4.3.3. Height ^(g8) on intended chassis type(s) (for suspensions adjustable for height, indicate normal running position):
- 2.5. **Minimum mass on the steering axle(s) for incomplete vehicles:**
- 2.6. **Mass in running order** ^(h)
- (a) minimum and maximum for each variant:

- 2.6.1. Distribution of this mass among the axles and, in the case of a semi-trailer, centre-axle trailer or rigid drawbar trailer, the mass on the coupling point:
- (a) minimum and maximum for each variant:
- 2.6.2. Mass of the optional equipment (see definition No 5 of Article 2 of Regulation (EU) No 1230/2012:
- 2.8. **Technically permissible maximum laden mass ⁽ⁱ⁾:**
- 2.8.1. Distribution of this mass among the axles and, in the case of a semi-trailer, centre-axle trailer or rigid drawbar trailer, load on the coupling point:
- 2.9. **Technically permissible maximum mass on each axle:**
- 2.10. **Technically permissible maximum mass on each group of axles:**
- 2.11. **Technically permissible maximum towable mass of the towing vehicle**
in case of:
- 2.11.1. Drawbar trailer:
- 2.11.2. Semi-trailer:
- 2.11.3. Centre-axle trailer:
- 2.11.4. Rigid drawbar trailer:
- 2.11.4.1. Maximum ratio of the coupling overhang ⁽ⁱ⁾ to the wheel base:
- 2.11.4.2. Maximum V-value: kN.
- 2.11.5. Technically permissible maximum laden mass of the combination:
- 2.11.6. Maximum mass of unbraked trailer:
- 2.12. **Technically permissible maximum mass at the coupling point:**
- 2.12.1. of a towing vehicle:
- 2.12.2. of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer:
- 2.12.3. Maximum permissible mass of the coupling device (if not fitted by the manufacturer):
- 2.16. **Intended registration/in service maximum permissible masses (optional)**
- 2.16.1. Registration/in service maximum permissible laden mass ⁽⁵⁾:
- 2.16.2. Registration/in service maximum permissible mass on each axle and, in the case of a semi-trailer or centre-axle trailer, intended load on the coupling point stated by the manufacturer if lower than the technically permissible maximum mass on the coupling point ⁽⁵⁾:
- 2.16.3. Registration/in service maximum permissible mass on each group of axles ⁽⁵⁾:
- 2.16.4. Registration/in service maximum permissible towable mass ⁽⁵⁾:
- 2.16.5. Registration/in service maximum permissible mass of the combination ⁽⁵⁾:

3. POWER PLANT ^(k)
- 3.1. **Manufacturer of the engine:**
- 3.2. **Internal combustion engine**
- 3.2.1.8. Maximum net power ⁽ⁿ⁾: kW at min⁻¹ (manufacturer's declared value)

Note: for the purposes of this Regulation, it is permitted to refer to the engine that shows the lowest power
- 3.3. **Electric motor**
- 3.3.1.1. Maximum hourly output: kW
- 3.4. **Engine or motor combination**
- 3.4.1. Hybrid electric vehicle: yes/no ^(l)
- 3.4.5.4. Maximum power: kW
4. TRANSMISSION ^(p)
- 4.1. **Drawing of the transmission ⁽⁴⁾:**
5. AXLES
- 5.1. Description of each axle:
- 5.2. Make:
- 5.3. Type:
- 5.4. Position of lift axle(s):
- 5.5. Position of loadable axle(s):
6. SUSPENSION
- 6.1. Drawing of the suspension arrangements:
- 6.2. Type and design of the suspension of each axle or group of axles or wheel:
- 6.2.3. Air-suspension for driving axle(s): yes/no ^(l)
- 6.2.3.1. Suspension of driving axle(s) equivalent to air-suspension: yes/no ^(l)
- 6.2.3.2. Frequency and damping of the oscillation of the sprung mass:
- 6.2.4. Air-suspension for non-driving axle(s): yes/no ^(l)
- 6.2.4.1. Suspension of non-driving axle(s) equivalent to air-suspension: yes/no ^(l)
- 6.2.4.2. Frequency and damping of the oscillation of the sprung mass:
- 6.3. Distribution of the mass between the axles which are part of a group of axles (where necessary, provide appropriate graphs):
- 6.6. Tyres and wheels
- 6.6.1. Tyre/wheel combination(s) ^(t)
(a) for tyres indicate

(i) size designation:

- (ii) load-capacity index:
- (iii) speed category symbol:
- 6.6.1.1. Axles
 - 6.6.1.1.1. Axle 1:
 - 6.6.1.1.2. Axle 2:
 - etc.
- 9. BODYWORK
 - 9.1. Type of bodywork using the codes defined in Part C of Annex II:
 - 9.10.3. Seats
 - 9.10.3.1. Number of seating positions ^(*):
 - 9.10.3.1.1. Location and arrangement:
 - 9.10.3.5. Coordinates or drawing of the R-point ^(†)
 - 9.10.3.5.1. Driver's seat:
 - 9.10.3.5.2. All other seating positions:
 - 9.25 Devices designed to reduce aerodynamic drag
 - 9.25.1. Drawing and description of the device
- 11. CONNECTIONS BETWEEN TOWING VEHICLES AND TRAILERS AND SEMI-TRAILERS
 - 11.1. Class and type of the coupling device(s) fitted or to be fitted:
 - 11.2. Characteristics D, U, S and V of the coupling device(s) fitted or minimal characteristics D, U, S and V of the coupling device(s) to be fitted: daN
- 13. SPECIAL PROVISIONS FOR BUSES AND COACHES
 - 13.1. Class of vehicle: Class I/Class II/Class III/Class A/Class B ^(†)
 - 13.2. Area for passengers (m²)
 - 13.2.1. Total (S₀):
 - 13.2.2. Upper deck (S_{0a}) ^(†):
 - 13.2.3. Lower deck (S_{0b}) ^(†):
 - 13.2.4. For standing passengers (S₁):
 - 13.3. Number of passengers (seated and standing)
 - 13.3.1. Total (N):
 - 13.3.2. Upper deck (N_a) ^(†):
 - 13.3.3. Lower deck (N_b) ^(†):
 - 13.4. Number of passengers seated
 - 13.4.1. Total (A):

- 13.4.2. Upper deck (A_a) ⁽¹⁾:
- 13.4.3. Lower deck (A_b) ⁽¹⁾:
- 13.4.4. Number of wheelchair positions for category M₂ and M₃ vehicles:
- 13.7. Volume of luggage compartments (m³):
- 13.12. Drawing with dimensions showing the interior arrangement as regards the seating positions, area for standees, wheelchair user(s), luggage compartments including racks and ski-box, if any

Explanatory notes

- ⁽¹⁾ Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable).
- ⁽⁴⁾ Only for the purpose of definition of off-road vehicles.
- ⁽⁵⁾ Set out in such a way as to make the actual value clear for each technical configuration of the vehicle type.
- ⁽⁷⁾ Optional equipment that affects the dimensions of the vehicle shall be specified.
- ^(b) If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this information document, such characters shall be represented in the documentation by the symbol '?' (e.g. ABC??123??).
- ^(c) Classified according to the definitions set out in Part A of Annex II.
- ^(e) 'Forward control' as defined in point 2.7 of Annex I to Council Directive 74/297/EEC ⁽¹⁾.
- ⁽¹⁾ OJ L 165, 20.6.1974, p. 16.
- ^(f) Where there is one version with a normal cab and another with a sleeper cab, both sets of masses and dimensions are to be stated
- ^(g) Standard ISO 612: 1978 – Road vehicles – Dimensions of motor vehicles and towed vehicles – terms and definitions.
- ^(g¹) — term No 6.4.
- ^(g²) — term No 6.19.2.
- ^(g³) — term No 6.20.
- ^(g⁴) — term No 6.5.
- ^(g⁵) — term No 6.1 and for vehicles other than those of category M₁.
In the case of trailers, the lengths shall be specified as mentioned in term No 6.1.2 of Standard ISO 612: 1978.
- ^(g⁶) — term No 6.17.
- ^(g⁷) — term No 6.2 and for vehicles other than those of category M₁.
- ^(g⁸) — term No 6.3 and for vehicles other than those of category M₁.
- ^(g⁹) — term No 6.6.
- ^(g¹⁰) — term No 6.10.
- ^(g¹¹) — term No 6.7.
- ^(g¹²) — term No 6.11.
- ^(g¹³) — term No 6.18.1.
- ^(g¹⁴) — term No 6.9.
- ^(h) The mass of the driver is assessed at 75 kg.
The liquid containing systems (except those for used water that must remain empty) are filled to 100 % of the capacity specified by the manufacturer.
The information referred to in points 2.6(a) and 2.6.1(a) do not need to be provided for vehicle categories N₂, N₃, M₂, M₃, O₃, and O₄.
- ⁽ⁱ⁾ For trailers or semi-trailers, and for vehicles coupled with a trailer or a semi-trailer, which exert a significant vertical load on the coupling device or the fifth wheel, this load, divided by standard acceleration of gravity, is included in the maximum technically permissible mass.
- ^(j) 'Coupling overhang' is the horizontal distance between the coupling for centre-axle trailers and the centreline of the rear axle(s).
- ^(k) In the case of a vehicle that can run either on petrol, diesel, etc., or also in combination with another fuel, items shall be repeated. In the case of non-conventional engines and systems, particulars equivalent to those referred to here shall be supplied by the manufacturer.
- ^(l) This figure shall be rounded off to the nearest tenth of a millimetre.
- ⁽ⁿ⁾ Determined in accordance with the requirements of Council Directive 80/1269/EEC ⁽¹⁾.
- ⁽¹⁾ OJ L 375, 31.12.1980, p. 46.
- ^(o) Determined in accordance with the requirements of Council Directive 80/1268/EEC ⁽¹⁾.
- ⁽¹⁾ OJ L 375, 31.12.1980, p. 36.
- ^(p) The specified particulars are to be given for any proposed variants.
- ^(t) For tyres of category Z intended to be fitted on vehicles whose maximum speed exceeds 300 km/h equivalent information shall be provided.
- ^(v) The number of seating positions to be mentioned shall be the one when the vehicle is in motion. A range can be specified in case of modular arrangement.
- ^(v) 'R-point' or 'seating reference point' means a design point defined by the vehicle manufacturer for each seating position and established with respect to the three-dimensional reference system as specified in Annex III to Directive 77/649/EEC ⁽¹⁾.
- ⁽¹⁾ OJ L 267, 19.10.1977, p. 1.

PART B

EC type-approval certificate

MODEL

Format: A4 (210 × 297 mm)

EC TYPE-APPROVAL CERTIFICATE

Stamp of type-approval authority

Communication concerning:

- | | | |
|---|---|---|
| — EC type-approval ⁽¹⁾ | } | of a type of vehicle with regard to its masses and dimensions |
| — extension of EC type-approval ⁽¹⁾ | | |
| — refusal of EC type-approval ⁽¹⁾ | | |
| — withdrawal of EC type-approval ⁽¹⁾ | | |

with regard to Regulation (EU) No. .../...,

EC type-approval number:

Reason for extension:

SECTION I

- 0.1. Make (trade name of manufacturer):
- 0.2. Type:
 - 0.2.1. Commercial name(s) (if available):
- 0.4. Category of vehicle (2):
- 0.5. Company name and address of manufacturer:
- 0.8. Name(s) and address(es) of assembly plant(s):
- 0.9. Name and address of the manufacturer's representative (if any):

SECTION II

1. Additional information (where applicable): see Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any):
6. Place:
7. Date:
8. Signature:

Attachments: (1) Information package (all pages must bear the stamp of the type-approval authority).

(2) Test report.

(3) For vehicles fitted with a suspension that is recognised to be equivalent to air suspension, the test report and the technical description of the suspension.

Addendum
to EC type-approval certificate No ...

Remarks

1. The vehicle has been type-approved in accordance with Article 6(1) of this Regulation (i.e. the outermost dimensions of the vehicle exceeds the maximum dimensions mentioned in Part A, B, C or D of Annex I): yes/no ⁽¹⁾
2. The vehicle is fitted with air-suspensions: yes/no ⁽¹⁾
3. The vehicle is fitted with a suspension recognised to be equivalent to air-suspension: yes/no ⁽¹⁾
4. The vehicle fulfils the requirements for off-road vehicle: yes/no ⁽¹⁾

Legend:

⁽¹⁾ Delete where not applicable.

⁽²⁾ As defined in Annex II, Section A.

ANNEX VI

Amendments to Annexes I, III, IX, and XVI to Directive 2007/46/EC

Directive 2007/46/EC is amended as follows:

(1) Annex I is amended as follows:

(a) point 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(b) point 1.9 is replaced by the following:

‘1.9. Specify if the towing vehicle is intended to tow semi-trailers or other trailers and, if the trailer is a semi-, drawbar-, centre-axle- or rigid drawbar trailer:’

(c) the following point 1.10 is added:

‘1.10. Specify if the vehicle is specially designed for the controlled-temperature carriage of goods:’

(d) point 2 is replaced by the following:

‘2. MASSES AND DIMENSIONS ^(f) ^(g) ⁽⁷⁾
(in kg and mm) (Refer to drawing where applicable)’

(e) points 2.1.1.1, 2.1.1.1.1 and 2.1.1.1.2 are replaced by the following:

‘2.1.2. Vehicles with three or more axles

2.1.2.1. Axle spacing between consecutive axles going from the foremost to the rearmost axle:’

2.1.2.2. Total axle spacing:’

(f) points 2.5 and 2.5.1 are replaced by the following:

‘2.5. **Minimum mass on the steering axle(s) for incomplete vehicles:**

.....’

(g) points 2.6 and 2.6.1 are replaced by the following:

‘2.6. **Mass in running order** ^(h)

(a) minimum and maximum for each variant:’

(b) mass of each version (a matrix must be provided):’

2.6.1. Distribution of this mass among the axles and, in the case of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer, the mass on the coupling point:’

(a) minimum and maximum for each variant:’

(b) mass of each version (a matrix must be provided):’

(h) The following point 2.6.2 is inserted to read:

‘2.6.2. Mass of the optional equipment (see the definition set out in point (5) of Article 2 of Commission Regulation (EU) No 1230/2012 (*)):’

(*) OJ L 353, 21.12.2012, p. 31.’

(i) point 2.10 is replaced by the following:

‘2.10. **Technically permissible mass on each group of axles:**’

(j) point 2.11 is replaced by the following:

‘2.11 **Technically permissible maximum towable mass of the towing vehicle**
in case of:’

(k) point 2.11.4. is replaced by the following:

‘2.11.4. Rigid drawbar trailer:’

(l) point 2.11.5 is replaced by the following:

‘2.11.5 Technically permissible maximum laden mass of the combination ⁽³⁾:’

(m) points 2.12, 2.12.1 and 2.12.2 are replaced by the following:

‘2.12. **Technically permissible maximum mass at the coupling point:**

2.12.1. of a towing vehicle:

2.12.2. of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer:’

(n) points 2.16 to 2.16.5 are replaced by the following:

‘2.16. **Registration/in service maximum permissible masses (optional)**

2.16.1. Registration/in service maximum permissible laden mass:

2.16.2. Registration/in service maximum permissible mass on each axle and, in the case of a semi-trailer or centre-axle trailer, intended load on the coupling point stated by the manufacturer if lower than the technically permissible maximum mass on the coupling point:

2.16.3. Registration/in service maximum permissible mass on each group of axles:

2.16.4. Registration/in service maximum permissible towable mass:

2.16.5. Registration/in service maximum permissible mass of the combination:’

(o) the following point 13.12 is added:

‘13.12. Drawing with dimensions showing the interior arrangement as regards the seating positions, area for standees, wheelchair user(s), luggage compartments including racks and ski-box, if any’

(p) the explanatory notes are amended as follows:

(i) The following note ⁽⁷⁾ is inserted:

‘⁽⁷⁾ Optional equipment that affects the dimensions of the vehicle shall be specified.’

(ii) Note ^(h) is replaced by the following:

‘^(h) The mass of the driver is assessed at 75 kg.

The liquid containing systems (except those for used water that must remain empty) are filled to 100 % of the capacity specified by the manufacturer.

The information referred to in points 2.6(b) and 2.6.1(b) do not need to be provided for vehicle categories N₂, N₃, M₂, M₃, O₃, and O₄.’

(2) Part I of Annex III is amended as follows:

(a) Section A is amended as follows:

(i) point 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(ii) The following points 1.9 and 1.10 are added:

‘1.9. Specify if the towing vehicle is intended to tow semi-trailers or other trailers and, if the trailer is a semi-, drawbar-, centre-axle- or rigid drawbar trailer:’

1.10. Specify if the vehicle is specially designed for the controlled-temperature carriage of goods:’

(iii) point 2 is replaced by the following:

‘2. MASSES AND DIMENSIONS ^(f) ^(g) ⁽⁷⁾

(in kg and mm) (Refer to drawing where applicable)’

(iv) The following point 2.5 is inserted:

‘2.5. **Minimum mass on the steering axle(s) for incomplete vehicles:**’

(v) point 2.6 and 2.6.1 are replaced by the following:

‘2.6. Mass in running order ^(h)

(a) minimum and maximum for each variant:

(b) mass of each version (a matrix must be provided):

2.6.1. Distribution of this mass among the axles and, in the case of a semi-trailer a rigid drawbar trailer or a centre-axle trailer, the mass on the coupling:

(a) minimum and maximum for each variant:

(b) mass of each version (a matrix must be provided):’

(vi) the following point 2.6.2 is inserted:

‘2.6.2. Mass of the optional equipment (as defined in point (5) of Article 2 of Regulation (EU) No 1230/2012:’

(vii) point 2.10 is replaced by the following:

‘2.10. **Technically permissible mass on each group of axles:**’

(viii) point 2.11 is replaced by the following:

‘2.11 **Technically permissible maximum towable mass of the towing vehicle**

in case of:

(ix) point 2.11.4 is replaced by the following:

‘2.11.4. Rigid drawbar trailer:’

(x) point 2.11.5 is replaced by the following:

‘2.11.5 Technically permissible maximum laden mass of the combination ⁽³⁾:’

(xi) points 2.12, 2.12.1 and 2.12.2 are replaced by the following:

‘2.12. **Technically permissible maximum mass at the coupling point:**

2.12.1. of a towing vehicle:

2.12.2. of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer:’

(xii) points 2.16 to 2.16.5 are replaced by the following:

‘2.16. **Registration/in service maximum permissible masses (optional)**

2.16.1. Registration/in service maximum permissible laden mass:

2.16.2. Registration/in service maximum permissible mass on each axle and, in the case of a semi-trailer or centre-axle trailer, intended load on the coupling point stated by the manufacturer if lower than the technically permissible maximum mass on the coupling point:

2.16.3. Registration/in service maximum permissible mass on each group of axles:

2.16.4. Registration/in service maximum permissible towable mass:

2.16.5. Registration/in service maximum permissible mass of the combination:’

(b) Section B is amended as follows:

(i) point 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(ii) the following points 1.9 and 1.10 are added:

‘1.9. Specify if the towing vehicle is intended to tow semi-trailers or other trailers and, if the trailer is a semi-, drawbar-, centre-axle- or rigid drawbar trailer:’

1.10. Specify if the vehicle is specially designed for the controlled-temperature carriage of goods:’

(iii) point 2. is replaced by the following:

‘2. **MASSSES AND DIMENSIONS ^(f) ^(g) ⁽⁷⁾**

(in kg and mm) (Refer to drawing where applicable)’

(iv) points 2.6 and 2.6.1 are replaced by the following:

‘2.6. Mass in running order ^(h)

(a) minimum and maximum for each variant:

(b) mass of each version (a matrix must be provided):

2.6.1. Distribution of this mass among the axles and, in the case of a semi-trailer a rigid drawbar trailer or a centre-axle trailer, the mass on the coupling:

(a) minimum and maximum for each variant:

(b) mass of each version (a matrix must be provided):’

(v) the following point 2.6.2 is inserted:

‘2.6.2. Mass of the optional equipment (as defined in point (5) of Article 2 of Regulation (EU) No 1230/2012:’

(vi) point 2.10 is replaced by the following:

‘2.10. Technically permissible mass on each group of axles:’

(vii) points 2.12 and 2.12.2 are replaced by the following:

‘2.12. Technically permissible maximum mass at the coupling point:

2.12.2. of a semi-trailer, a centre-axle trailer or a rigid drawbar trailer:’

(viii) points 2.16 to 2.16.3 are replaced by the following:

‘2.16. Registration/in service maximum permissible masses (optional)

2.16.1. Registration/in service maximum permissible laden mass:

2.16.2. Registration/in service maximum permissible mass on each axle and, in the case of a semi-trailer or centre-axle trailer, intended load on the coupling point stated by the manufacturer if lower than the technically permissible maximum mass on the coupling point:

2.16.3. Registration/in service maximum permissible mass on each group of axles:’

(ix) point 2.16.5 is deleted

3. Annex IX is amended as follows:

(a) in ‘Model A1 — Side 1 – Complete vehicles — EC Certificate of Conformity’, entry 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(b) in ‘Model A2 — Side 1 – Complete vehicles type-approved in small series – [Year] – [Sequential number] - EC Certificate of Conformity’, entry 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(c) in ‘Model B — Side 1 – Completed vehicles — EC Certificate of Conformity’, entry 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(d) in ‘Model C1 — Side 1 – Incomplete vehicles — EC Certificate of Conformity’, entry 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

(e) in ‘Model C2 — Side 1 – Incomplete vehicles type-approved in small series – [Year] – [Sequential number] - EC Certificate of Conformity’, entry 0.5 is replaced by the following:

‘0.5 Company name and address of manufacturer:’

- (f) in 'Side 2 – Vehicle category M_1 (complete and completed vehicles)' entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (g) in 'Side 2 – Vehicle category M_1 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (h) in 'Side 2 – Vehicle category M_2 (complete and completed vehicles)', entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (i) in 'Side 2 – Vehicle category M_2 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (j) in 'Side 2 – Vehicle category M_3 (complete and completed vehicles)', entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (k) in 'Side 2 – Vehicle category M_3 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (l) in 'Side 2 – Vehicle category N_1 (complete and completed vehicles)', entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (m) in 'Side 2 – Vehicle category N_1 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (n) in 'Side 2 – Vehicle category N_2 (complete and completed vehicles)', entry 13. is replaced by the following:
- ‘13. Mass in running order:kg’
- (o) in 'Side 2 – Vehicle category N_2 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (p) in 'Side 2 – Vehicle category N_3 (complete and completed vehicles)', entry 13. is replaced by the following:
- ‘13. Mass in running order:kg’
- (q) in 'Side 2 – Vehicle category N_3 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (r) in 'Side 2 – Vehicle category O_1 and O_2 (complete and completed vehicles)', entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (s) in 'Side 2 – Vehicle category O_1 and O_2 (complete and completed vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’
- (t) in 'Side 2 – Vehicle category O_3 and O_4 (complete and completed vehicles)', entry 13 is replaced by the following:
- ‘13. Mass in running order:kg’
- (u) in 'Side 2 – Vehicle category M_1 (incomplete vehicles)', the following entry 13.2 is inserted:
- ‘13.2. Actual mass of the vehicle:kg’

(v) in 'Side 2 – Vehicle category M₁ (incomplete vehicles)', entry 14 is replaced by the following:

'14. Actual mass of the vehicle:kg'

(w) in 'Side 2 – Vehicle category M₂ (incomplete vehicles)', entry 14 is replaced by the following:

'14. Actual mass of the vehicle:kg'

(x) in 'Side 2 – Vehicle category M₃ (incomplete vehicles)', entry 14 is replaced by the following:

'14. Actual mass of the vehicle:kg'

(y) in 'Side 2 – Vehicle category N₁ (incomplete vehicles)', entry 13 is inserted:

'13. Mass in running order:kg'

(z) in 'Side 2 – Vehicle category N₁ (incomplete vehicles)', entry 14 is replaced by the following:

'14. Actual mass of the vehicle:kg'

(aa) in 'Side 2 – Vehicle category N₂ (incomplete vehicles)', entry 14 is replaced by the following:

'14 Actual mass of the vehicle:kg'

(ab) in 'Side 2 – Vehicle category N₃ (incomplete vehicles)', entry 14. is replaced by the following:

'14. Actual mass of the vehicle:kg'

(ac) in 'Side 2 – Vehicle category O₁ and O₂ (incomplete vehicles)', entry 14 is replaced by the following:

'14 Actual mass of the vehicle:kg'

(ad) in 'Side 2 – Vehicle category O₃ and O₄ (incomplete vehicles)', entry 14 is replaced by the following:

'14 Actual mass of the vehicle:kg'

(ae) in the 'Explanatory notes relating to Annex IX', note ^(f) is deleted.

4. Annex XVI is amended as follows:

(a) the following entry 44 is inserted in the list of regulatory acts:

'44 Regulation (EU) No 1230/2012'

(b) The following entry 44 is inserted in Appendix 2

	Regulatory act reference	Annex and paragraph	Specific conditions
'44	Commission Regulation (EU) No 1230/2012	Sections 7 and 8 of Part B of Annex I	(a) Check of compliance with the manoeuvrability requirements including manoeuvrability of vehicles fitted with lift- or loadable axles.
		Sections 6 and 7 of Part C of Annex I	(b) Measurement of the maximum rear swing-out.'

ANNEX VII

‘ANNEX XII

SMALL SERIES AND END-OF-SERIES LIMITS

A. SMALL SERIES LIMITS

1. The number of units of one type of vehicle to be registered, sold or put into service per year in the European Union pursuant to Article 22 may not exceed the figures shown below for the vehicle category in question:

Category	Units
M ₁	1 000
M ₂ , M ₃	0
N ₁	0
N ₂ , N ₃	0
O ₁ , O ₂	0
O ₃ , O ₄	0

2. The number of units of one type of vehicle to be registered, sold or put into service per year in one Member State pursuant to Article 23 shall be determined by that Member State but shall not exceed the figures shown below for the vehicle category in question:

Category	Units
M ₁	75
M ₂ , M ₃	250
N ₁	500
N ₂ , N ₃	250
O ₁ , O ₂	500
O ₃ , O ₄	250

3. The number of units of one type of vehicle to be registered, sold or put into service per year in one Member State for the purposes of Article 6(2) of Regulation (EU) No 1230/2012 shall be determined by each Member State but shall not exceed the figures shown below for the vehicle category in question:

Category	Units
M ₂ , M ₃	1 000
N ₂ , N ₃	1 200
O ₃ , O ₄	2 000

B. END-OF-SERIES LIMITS

The maximum number of complete and completed vehicles put into service in each Member State under the procedure ‘End-of-Series’ shall be restricted in one of the following ways to be chosen by the Member State:

1. the maximum number of vehicles of one or more types may not exceed 10 %, in the case of category M₁, and may not exceed 30 % of the vehicles of all types concerned put into service in that Member State during the previous year, in the case of all other categories.

Should 10 %, respectively 30 %, be less than 100 vehicles, then the Member State may allow the putting into service of a maximum of 100 vehicles.

2. vehicles of any one type shall be restricted to those for which a valid certificate of conformity was issued on or after the date of manufacture and which remained valid for at least three months after its date of issue but subsequently lost its validity due to the entry into force of a regulatory act.'
-

DIRECTIVES

COMMISSION DIRECTIVE 2012/46/EU

of 6 December 2012

amending Directive 97/68/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery⁽¹⁾, and in particular Article 14 thereof,

Whereas:

- (1) Directive 2004/26/EC of the European Parliament and of the Council of 21 April 2004 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery⁽²⁾ introduced new emission Stages IIIA, IIIB and IV to Directive 97/68/EC, in order to increase environmental protection and preserve human health. The test methods have been amended accordingly, first by Directive 2004/26/EC and later by Commission Directive 2010/26/EU of 31 March 2010 amending Directive 97/68/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery⁽³⁾.
- (2) The Stage IV limit values will become mandatory for type approvals issued as of 1 January 2013 for engines of category Q and as of 1 October 2013 for engines of category R. Based on the experience gained with heavy duty euro V and VI engines under Regulation (EC) No 595/2009 of the European Parliament and of the Council

of 18 June 2009 on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (euro VI) and on access to vehicle repair and maintenance information and amending Regulation (EC) No 715/2007 and Directive 2007/46/EC and repealing Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC⁽⁴⁾, certain gaps have been identified in the test requirements for Stage IV engines. In order to enable type approval of Stage IV engines of categories Q and R, taking into account technical progress, and in order to increase global harmonisation, it is necessary to revise and complement certain provisions of Directive 97/68/EC. It is also necessary in order to reduce the margin of interpretation of test results and to limit the errors in the appreciation of engine emissions.

- (3) Directive 2010/26/EU introduced provisions on NO_x control which are necessary to ensure that the sophisticated after treatment systems, required in order to meet the new emission limits for Stage IIIB and IV engines, function properly. In particular, to avoid that operators circumvent compliance with emission limits, it is appropriate to complement the provisions on NO_x control by introducing an operator warning system based on the corresponding provisions of Regulation (EC) No 595/2009 for heavy duty vehicles (euro VI), combined with a two-stage inducement system which reduces significantly the equipment's performance thus enforcing compliance.
- (4) With the introduction of electronically controlled engines it is necessary to adapt the test procedure in order to ensure that engine tests better reflect real use conditions, further preventing circumvention of emission requirements (cycle beating). Therefore, during type approval, compliance should be demonstrated at a working area of the tested engine which has been selected on the basis of the ISO 8178 standard. It is also necessary to specify the engine operating conditions under which those tests are carried out and to modify the calculation methods for specific emissions in order to correspond to those required for heavy duty vehicles (euro VI) and to align them with the provisions of the major trading partners of the Union.

⁽¹⁾ OJ L 59, 27.2.1998, p. 1.

⁽²⁾ OJ L 146, 30.4.2004, p. 1.

⁽³⁾ OJ L 86, 1.4.2010, p. 29.

⁽⁴⁾ OJ L 188, 18.7.2009, p. 1.

- (5) Directive 97/68/EC requires the manufacturer to specify the engine emission performance under specific ambient control conditions relating to altitude or pressure and temperature. In order to better reflect the real use of engines, it is appropriate to extend the temperature/pressure and altitude criteria by aligning the provisions more closely with the requirements for heavy duty euro VI engines.
- (6) The durability requirements should also be revised in order to guarantee the efficiency of the emission reduction once the engine is in operation. Due to the technological changes associated with Stage IV engines and their respective after treatment system, the durability provisions laid down in Directive 97/68/EC are not appropriate for those engines, and therefore provisions based on those of Regulation (EC) No 595/2009 regarding heavy duty euro VI engines should be integrated in Directive 97/68/EC.
- (7) A globally harmonised test procedure for Stage IV engines has been adopted at the level of the United Nations Economic Commission for Europe (UNECE Regulation No 96.03 series of amendments). It is appropriate to provide that that procedure also applies to the testing of those engines in the Union.
- (8) Directive 97/68/EC provides that approvals issued under other specific Union or UNECE legislation are equivalent to type approvals issued under that Directive. The references to the legal acts considered as equivalent should be adapted to current versions in force. With regard to heavy duty euro VI engines it is necessary to specify that the equivalency can only be met if certain additional inducement requirements are respected.
- (9) The reporting of carbon dioxide (CO₂) emissions provides further indication about the performance of an engine. Reporting of CO₂ emissions on the engine test cycles is part of the provisions of Regulation (EC) No 595/2009 for heavy duty vehicles (euro VI and Environmental Protection Agency (EPA) 40CFR Greenhouse Gas Emissions Standards). It is therefore appropriate to introduce such provisions also in Directive 97/68/EC.
- (10) Directive 97/68/EC does not contain specific requirements for crankcase emissions, which are secondary engine emissions. In order to avoid interpretation problems, it is necessary to clarify how crankcase emissions are taken into account in judging whether the emission test is passed or not. Those provisions should be aligned with Heavy Duty euro VI and US Tier 4 provisions (EPA 40CFR part 1039).
- (11) Directive 97/68/EC specifies that engines are categorised in different engine power ranges due to the net engine power and thus emission limit requirements. With new electronically controlled engines, the maximal engine power could be different from the rated engine power. In order to ensure that the emission requirements are met, the engine power to be considered should be the maximum engine power.
- (12) The information documents laid down in Directive 97/68/EC should be updated to reflect technical

progress and the changes introduced. The new documents should allow a complete reporting.

- (13) Directive 97/68/EC should therefore be amended accordingly.
- (14) In accordance with the Joint Political Declaration of Member States and the Commission on explanatory documents of 28 September 2011, Member States have undertaken to accompany, in justified cases, the notification of their transposition measures with one or more documents explaining the relationship between the components of a directive and the corresponding parts of national transposition instruments.
- (15) The measures provided for in this Directive are in accordance with the opinion of the Technical Committee of Motor Vehicles competent under Article 15 of Directive 97/68/EC,

HAS ADOPTED THIS DIRECTIVE:

Article 1

Amendments to Directive 97/68/EC

Directive 97/68/EC is amended as follows:

- (1) Annex I is amended in accordance with Annex I to this Directive;
- (2) Annex II is amended in accordance with Annex II to this Directive;
- (3) Annex III is amended in accordance with Annex III to this Directive;
- (4) Annex VI is amended in accordance with Annex IV to this Directive;
- (5) Annex VII is amended in accordance with Annex V to this Directive;
- (6) Annex XI is replaced by the text set out in Annex VI to this Directive;
- (7) Annex XII is replaced by the text set out in Annex VII to this Directive.

Article 2

Transposition

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with the Directive by 21 December 2013 at the latest. They shall forthwith communicate to the Commission the text of those provisions.

When Member States adopt those provisions, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

*Article 3***Entry into force**

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

*Article 4***Addressees**

This Directive is addressed to the Member States.

Done at Brussels, 6 December 2012.

For the Commission

The President

José Manuel BARROSO

ANNEX I

Annex I to Directive 97/68/EC is amended as follows:

(1) the following Sections 3.2.3 and 3.2.4 are added:

‘3.2.3. The parenthesised number of the emissions stage, in roman numerals, which shall be prominently visible and located near to the type approval number.

3.2.4. The parenthesised letters SV which are referring to small volume engine manufacturer and which shall be prominently visible and located near to the type approval number on each engine placed on the market under the small volume derogation set out in Article 10(4).’;

(2) Section 8.3.2.2 is replaced by the following:

‘8.3.2.2. The control conditions applicable for Stage IIIB and Stage IV are the following:

(a) Control conditions for Stage III B engines:

- (i) an altitude not exceeding 1 000 metres (or equivalent atmospheric pressure of 90 kPa);
- (ii) an ambient temperature within the range 275 K to 303 K (2 °C to 30 °C);
- (iii) the engine coolant temperature above 343 K (70 °C).

Where the auxiliary emission control strategy is activated when the engine is operating within the control conditions set out in points (i), (ii) and (iii), the strategy shall only be activated exceptionally.

(b) Control conditions for Stage IV engines:

- (i) the atmospheric pressure greater than or equal to 82,5 kPa;
- (ii) the ambient temperature within the following range:
 - equal to or above 266 K (– 7 °C),
 - less than or equal to the temperature determined by the following equation at the specified atmospheric pressure: $T_c = -0,4514 \cdot (101,3 - p_b) + 311$, where: T_c is the calculated ambient air temperature, K and P_b is the atmospheric pressure, kPa;
- (iii) the engine coolant temperature above 343 K (70 °C).

Where the auxiliary emission control strategy is activated when the engine is operating within the control conditions set out in points (i), (ii) and (iii), the strategy shall only be activated when demonstrated to be necessary for the purposes identified in Section 8.3.2.3. and approved by the Type Approval authority.

(c) Cold temperature operation

By derogation from the requirements of point (b), an auxiliary emission control strategy may be used on a Stage IV engine equipped with exhaust gas recirculation (EGR) when the ambient temperature is below 275 K (2 °C) and if one of the two following criteria is met:

- (i) intake manifold temperature is less than or equal to the temperature defined by the following equation: $IMT_c = P_{IM}/15,75 + 304,4$, where: IMT_c is the calculated intake manifold temperature, K and P_{IM} is the absolute intake manifold pressure in kPa;
- (ii) engine coolant temperature is less than or equal to the temperature defined by the following equation: $ECT_c = P_{IM}/14,004 + 325,8$, where: ECT_c is the calculated engine coolant temperature, K and P_{IM} is the absolute intake manifold pressure, kPa.’;

(3) in Section 8.3.2.3, point (b) is replaced by the following:

‘(b) for operational safety reasons’;

(4) the title of Section 8.4 is replaced by the following:

‘Requirements on NO_x control measures for Stage IIIB engines’;

(5) the following Sections 8.5, 8.6 and 8.7 are added:

‘8.5. *Requirements on NO_x control measures for Stage IV engines*

8.5.1. The manufacturer shall provide information that fully describes the functional operational characteristics of the NO_x control measures using the documents set out in Section 2 of Appendix 1 to Annex II and in Section 2 of Appendix 3 to Annex II.

- 8.5.2. The engine emission control strategy shall be operational under all environmental conditions regularly pertaining in the territory of the Union, especially at low ambient temperatures. This requirement is not restricted to the conditions under which a base emission control strategy must be used as specified in Section 8.3.2.2.
- 8.5.3. When a reagent is used, the manufacturer shall demonstrate that the emission of ammonia over the hot NRTC or NRSC at the type approval procedure does not exceed a mean value of 10 ppm.
- 8.5.4. If reagent containers are installed on or connected to a non-road mobile machine, means for taking a sample of the reagent inside the containers must be included. The sampling point must be easily accessible without requiring the use of any specialised tool or device.
- 8.5.5. The type approval shall be made conditional, in accordance with Article 4(3), upon the following:
- (a) providing to each operator of non-road mobile machinery written maintenance instructions;
 - (b) providing to the OEM installation documents for the engine, inclusive of the emission control system that is part of the approved engine type;
 - (c) providing to the OEM instructions for an operator warning system, an inducement system and (where applicable) reagent freeze protection;
 - (d) the application of provisions on operator instruction, installation documents, operator warning system, inducement system and reagent freeze protection that are set out in Appendix 1 to this Annex.
- 8.6. *Control area for stage IV*
- In accordance with paragraph 4.1.2.7 of this Annex, for stage IV engines the emissions sampled within the control area defined in Annex I Appendix 2 shall not exceed by more than 100 % the limit values of the emissions in table 4.1.2.6 of this Annex.
- 8.6.1. *Demonstration requirements*
- The technical service shall select up to three random load and speed points within the control area for testing. The technical service shall also determine a random running order of the test points. The test shall be run in accordance with the principal requirements of the NRSC, but each test point shall be evaluated separately. Each test point shall meet the limit values defined in Section 8.6.
- 8.6.2. *Test requirements*
- The test shall be carried out immediately after the discrete mode test cycles as described in Annex III.
- However, where the manufacturer, pursuant to point 1.2.1 of Annex III, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments the test shall be carried out as follows:
- (a) the test shall be carried out immediately after the discrete mode test cycles as described in points (a) to (e) of paragraph 7.8.1.2 of Annex 4B to UNECE Regulation No 96.03 series of amendments but before the post test procedures (f) or after the Ramped Modal Cycle (RMC) test in points (a) to (d) of paragraph 7.8.2.2 of Annex 4B to UNECE Regulation No 96.03 series of amendments but before the post test procedures (e) as relevant;
 - (b) the tests shall be carried out as required in points (b) to (e) of paragraph 7.8.1.2 of Annex 4B to UNECE Regulation No 96.03 series of amendments using the multiple filter method (one filter for each test point) for each of the three chosen test points;
 - (c) a specific emission value shall be calculated (in g/kWh) for each test point;
 - (d) emissions values may be calculated on a molar basis using Appendix A.7 or on a mass basis using Appendix A.8, but should be consistent with the method used for the discrete mode or RMC test;
 - (e) for gaseous summation calculations the N_{mode} shall be set to 1 and a weighting factor of 1 shall be used;
 - (f) for particulate calculations use the multiple filter method and for summation calculations N_{mode} shall be set to 1 and a weighting factor of 1 shall be used.
- 8.7. *Verifying Emissions of Crankcase Gases for stage IV engines*
- 8.7.1. No crankcase emissions shall be discharged directly into the ambient atmosphere, with the exception given in paragraph 8.7.3.

8.7.2. Engines may discharge crankcase emissions into the exhaust upstream of any after treatment device during all operation.

8.7.3. Engines equipped with turbochargers, pumps, blowers, or superchargers for air induction may discharge crankcase emissions to the ambient atmosphere. In this case the crankcase emissions shall be added to the exhaust emissions (either physically or mathematically) during all emission testing in accordance with paragraph 8.7.3.1 of this section.

8.7.3.1. Crankcase emissions

No crankcase emissions shall be discharged directly into the ambient atmosphere, with the following exception: engines equipped with turbochargers, pumps, blowers, or superchargers for air induction may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during all emission testing. Manufacturers taking advantage of this exception shall install the engines so that all crankcase emission can be routed into the emissions sampling system. For the purpose of this paragraph, crankcase emissions that are routed into the exhaust upstream of exhaust after treatment during all operation are not considered to be discharged directly into the ambient atmosphere.

Open crankcase emissions shall be routed into the exhaust system for emission measurement, as follows:

- (a) the tubing materials shall be smooth-walled, electrically conductive, and not reactive with crankcase emissions. Tube lengths shall be minimised as far as possible;
 - (b) the number of bends in the laboratory crankcase tubing shall be minimised, and the radius of any unavoidable bend shall be maximised;
 - (c) the laboratory crankcase exhaust tubing shall meet the engine manufacturer's specifications for crankcase back pressure;
 - (d) the crankcase exhaust tubing shall connect into the raw exhaust downstream of any after treatment system, downstream of any installed exhaust restriction, and sufficiently upstream of any sample probes to ensure complete mixing with the engine's exhaust before sampling. The crankcase exhaust tube shall extend into the free stream of exhaust to avoid boundary-layer effects and to promote mixing. The crankcase exhaust tube's outlet may orient in any direction relative to the raw exhaust flow.;
- (6) the following Section 9 is added:
- '9. SELECTION OF ENGINE POWER CATEGORY
- 9.1. For the purposes of establishing the conformity of variable speed engines defined by Section 1.A.(i) and 1.A.(iv) of this Annex with the emission limits given in Section 4 of this Annex they shall be allocated to power bands on the basis of the highest value of the net power measured in accordance with paragraph 2.4 of Annex I.
- 9.2. For other engine types rated net power shall be used.;
- (7) the following Appendices 1 and 2 are added:

'Appendix 1

Requirements to ensure the correct operation of NO_x control measures

1. Introduction

This Annex sets out the requirements to ensure the correct operation of NO_x control measures. It includes requirements for engines that rely on the use of a reagent in order to reduce emissions.

1.1. Definitions and abbreviations

"NO_x Control Diagnostic system (NCD)" means a system on-board the engine which has the capability of:

- (a) detecting a NO_x Control Malfunction;
- (b) identifying the likely cause of NO_x control malfunctions by means of information stored in computer memory and/or communicating that information off-board.

“NO_x Control Malfunction (NCM)” means an attempt to tamper with the NO_x control system of an engine or a malfunction affecting that system that might be due to tampering, that is considered by this Directive as requiring the activation of a warning or an inducement system once detected.

“Diagnostic trouble code (DTC)” means a numeric or alphanumeric identifier which identifies or labels a NO_x Control Malfunction.

“Confirmed and active DTC” means a DTC that is stored during the time the NCD system concludes that a malfunction exists.

“Scan-tool” means an external test equipment used for off-board communication with the NCD system.

“NCD engine family” means a manufacturer’s grouping of engine systems having common methods of monitoring/diagnosing NCMs.

2. General requirements

The engine system shall be equipped with a NO_x Control Diagnostic system (NCD) able to identify the NO_x control malfunctions (NCMs) considered by this Annex. Any engine system covered by this section shall be designed, constructed and installed so as to be capable of meeting these requirements throughout the normal life of the engine under normal conditions of use. In achieving this objective it is acceptable that engines which have been used in excess of the useful life period as specified in Section 3.1 of Appendix 5 to Annex III to this Directive show some deterioration in the performance and the sensitivity of the NO_x Control Diagnostic system (NCD), such that the thresholds specified in this Annex may be exceeded before the warning and/or inducement systems are activated.

2.1. Required information

2.1.1. If the emission control system requires a reagent, the characteristics of that reagent, including the type of reagent, information on concentration when the reagent is in solution, operational temperature conditions and reference to international standards for composition and quality must be specified by the manufacturer, in Section 2.2.1.13 of Appendix 1 and in Section 2.2.1.13 of Appendix 3 to Annex II.

2.1.2. Detailed written information fully describing the functional operation characteristics of the operator warning system in paragraph 4 and of the operator inducement system in paragraph 5 shall be provided to the approval authority at the time of type-approval.

2.1.3. The manufacturer shall provide installation documents that, when used by the OEM, will ensure that the engine, inclusive of the emission control system that is part of the approved engine type, when installed in the machine, will operate, in conjunction with the necessary machinery parts, in a manner that will comply with the requirements of this Annex. This documentation shall include the detailed technical requirements and the provisions of the engine system (software, hardware, and communication) needed for the correct installation of the engine system in the machine.

2.2. Operating conditions

2.2.1. The NO_x control diagnostic system shall be operational at the following conditions:

(a) ambient temperatures between 266 K and 308 K (– 7 °C and 35 °C);

(b) all altitudes below 1 600 m;

(c) engine coolant temperatures above 343 K (70 °C).

This section shall not apply in the case of monitoring for reagent level in the storage tank where monitoring shall be conducted under all conditions where measurement is technically feasible (for instance, under all conditions when a liquid reagent is not frozen).

2.3. Reagent freeze protection

2.3.1. It is permitted to use a heated or a non-heated reagent tank and dosing system. A heated system shall meet the requirements of paragraph 2.3.2. A non-heated system shall meet the requirements of paragraph 2.3.3.

2.3.1.1. The use of a non-heated reagent tank and dosing system shall be indicated in the written instructions to the owner of the machine.

2.3.2. Reagent tank and dosing system

2.3.2.1. If the reagent has frozen, the reagent shall be available for use within a maximum of 70 minutes after the start of the engine at 266 K (– 7 °C) ambient temperature.

2.3.2.2. Design criteria for a heated system

A heated system shall be so designed that it meets the performance requirements set out in this section when tested using the procedure defined.

2.3.2.2.1. The reagent tank and dosing system shall be soaked at 255 K (– 18 °C) for 72 hours or until the reagent becomes solid, whichever occurs first.

2.3.2.2.2. After the soak period in paragraph 2.3.2.2.1, the machine/engine shall be started and operated at 266 K (– 7 °C) ambient temperature or lower as follows:

(a) 10 to 20 minutes idling,

(b) followed by up to 50 minutes at no more than 40 per cent of rated load.

2.3.2.2.3. At the conclusion of the test procedure in paragraph 2.3.2.2.2, the reagent dosing system shall be fully functional.

2.3.2.3. Evaluation of the design criteria may be performed in a cold chamber test cell using an entire machine or parts representative of those to be installed on a machine or based on field tests.

2.3.3. Activation of the operator warning and inducement system for a non-heated system

2.3.3.1. The operator warning system described in paragraph 4 shall be activated if no reagent dosing occurs at an ambient temperature ≤ 266 K (– 7 °C).

2.3.3.2. The severe inducement system described in paragraph 5.4 shall be activated if no reagent dosing occurs within a maximum of 70 minutes after engine start at an ambient temperature ≤ 266 K (– 7 °C).

2.4. Diagnostic requirements

2.4.1. The NO_x Control Diagnostic system (NCD) shall be able to identify the NO_x control malfunctions (NCMs) considered by this Annex by means of Diagnostic Trouble Codes (DTCs) stored in the computer memory and to communicate that information off-board upon request.

2.4.2. Requirements for recording Diagnostic Trouble Codes (DTCs)

2.4.2.1. The NCD system shall record a DTC for each distinct NO_x Control Malfunction (NCM).

2.4.2.2. The NCD system shall conclude within 60 minutes of engine operation whether a detectable malfunction is present. At this time, a “confirmed and active” DTC shall be stored and the warning system be activated according to paragraph 4.

2.4.2.3. In cases where more than 60 minutes running time is required for the monitors to accurately detect and confirm a NCM (e.g. monitors using statistical models or with respect to fluid consumption on the machine), the Approval Authority may permit a longer period for monitoring provided the manufacturer justifies the need for the longer period (for example by technical rationale, experimental results, in-house experience, etc.).

2.4.3. Requirements for erasing Diagnostic trouble codes (DTCs):

(a) DTCs shall not be erased by the NCD system itself from the computer memory until the failure related to that DTC has been remedied;

(b) the NCD system may erase all the DTCs upon request of a proprietary scan or maintenance tool that is provided by the engine manufacturer upon request, or using a pass code provided by the engine manufacturer.

2.4.4. An NCD system shall not be programmed or otherwise designed to partially or totally deactivate based on age of the machine during the actual life of the engine, nor shall the system contain any algorithm or strategy designed to reduce the effectiveness of the NCD system over time.

2.4.5. Any reprogrammable computer codes or operating parameters of the NCD system shall be resistant to tampering.

2.4.6. NCD engine family

The manufacturer is responsible for determining the composition of an NCD engine family. Grouping engine systems within an NCD engine family shall be based on good engineering judgement and be subject to approval by the Approval Authority.

Engines that do not belong to the same engine family may still belong to the same NCD engine family.

2.4.6.1. Parameters defining an NCD engine family

An NCD engine family is characterised by basic design parameters that shall be common to engine systems within the family.

In order that engine systems are considered to belong to the same NCD engine family, the following list of basic parameters shall be similar:

- (a) emission control systems;
- (b) methods of NCD monitoring;
- (c) criteria for NCD monitoring;
- (d) monitoring parameters (e.g. frequency).

These similarities shall be demonstrated by the manufacturer by means of relevant engineering demonstration or other appropriate procedures and subject to the approval of the Approval Authority.

The manufacturer may request approval by the Approval Authority of minor differences in the methods of monitoring/diagnosing the NCD system due to engine system configuration variation, when these methods are considered similar by the manufacturer and they differ only in order to match specific characteristics of the components under consideration (for example size, exhaust flow, etc.); or their similarities are based on good engineering judgement.

3. **Maintenance requirements**

- 3.1. The manufacturer shall furnish or cause to be furnished to all owners of new engines or machines written instructions about the emission control system and its correct operation.

These instructions shall state that if the emission control system is not functioning correctly, the operator will be informed of a problem by the operator warning system and that activation of the operator inducement system as a consequence of ignoring this warning will result in the machine being unable to conduct its mission.

- 3.2. The instructions shall indicate requirements for the proper use and maintenance of engines in order to maintain their emissions performance, including where relevant the proper use of consumable reagents.
- 3.3. The instructions shall be written in a clear and non-technical manner using the same language as is used in the operator's manual on the non-road mobile machinery or engine.
- 3.4. The instructions shall specify whether consumable reagents have to be refilled by the operator between normal maintenance intervals. The instructions shall also specify the required reagent quality. They shall indicate how the operator should refill the reagent tank. The information shall also indicate a likely rate of reagent consumption for the engine type and how often it should be replenished.
- 3.5. The instructions shall state that use of, and refilling of, a required reagent of the correct specifications is essential in order for the engine to comply with the requirements for the issuing of the type approval for that engine type.
- 3.6. The instructions shall explain how the operator warning and inducement systems work. In addition, the consequences, in terms of performance and fault logging, of ignoring the warning system and not replenishing the reagent or rectifying the problem shall be explained.

4. **Operator warning system**

- 4.1. The machine shall include an operator warning system using visual alarms that informs the operator when a low reagent level, incorrect reagent quality, interruption of dosing or a malfunction of the type specified in paragraph 9 has been detected that will lead to activation of the operator inducement system if not rectified in a timely manner. The warning system shall remain active when the operator inducement system described in paragraph 5 has been activated.
- 4.2. The warning shall not be the same as the warning used for the purposes of signalling a malfunction or other engine maintenance, though it may use the same warning system.
- 4.3. The operator warning system may consist of one or more lamps, or display short messages, which may include, for example, messages indicating clearly:

- the remaining time before activation of the low-level and/or severe inducements,
- the amount of low-level and/or severe inducement, for example the amount of torque reduction,
- the conditions under which machine disablement can be cleared.

Where messages are displayed, the system used for displaying these messages may be the same as the one used for other maintenance purposes.

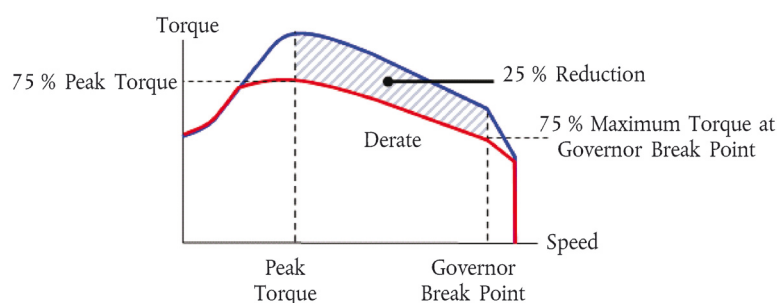
- 4.4. At the choice of the manufacturer, the warning system may include an audible component to alert the operator. The cancelling of audible warnings by the operator is permitted.
- 4.5. The operator warning system shall be activated as specified in paragraphs 2.3.3.1, 6.2, 7.2, 8.4, and 9.3 respectively.
- 4.6. The operator warning system shall be deactivated when the conditions for its activation have ceased to exist. The operator warning system shall not be automatically deactivated without the reason for its activation having been remedied.
- 4.7. The warning system may be temporarily interrupted by other warning signals providing important safety related messages.
- 4.8. Details of the operator warning system activation and deactivation procedures are described in Section 11.
- 4.9. As part of the application for type-approval under this Directive, the manufacturer shall demonstrate the operation of the operator warning system, as specified in Section 11.

5. Operator inducement system

- 5.1. The machine shall incorporate an operator inducement system based on one of the following principles:
 - 5.1.1. a two-stage inducement system starting with a low-level inducement (performance restriction) followed by a severe inducement (effective disablement of machine operation);
 - 5.1.2. a one-stage severe inducement system (effective disablement of machine operation) activated under the conditions of a low-level inducement system as specified in paragraphs 6.3.1, 7.3.1, 8.4.1, and 9.4.1.
- 5.2. Upon prior approval of the type approval authority, the engine may be fitted with a means to disable the operator inducement during an emergency declared by a national or regional government, their emergency services or their armed services.
- 5.3. *Low-level inducement system*
 - 5.3.1. The low-level inducement system shall be activated after any of the conditions specified in paragraphs 6.3.1, 7.3.1, 8.4.1, and 9.4.1 has occurred.
 - 5.3.2. The low-level inducement system shall gradually reduce the maximum available engine torque across the engine speed range by at least 25 per cent between the peak torque speed and the governor breakpoint as shown in Figure 1. The rate of torque reduction shall be a minimum of 1 % per minute.
 - 5.3.3. Other inducement measures that are demonstrated to the type approval authority as having the same or greater level of severity may be used.

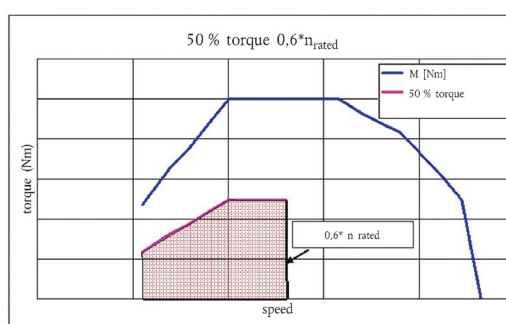
Figure 1

Low-level inducement torque reduction scheme



- 5.4. *Severe inducement system*
- 5.4.1. The severe inducement system shall be activated after any of the conditions specified in paragraphs 2.3.3.2, 6.3.2, 7.3.2, 8.4.2, and 9.4.2 has occurred.
- 5.4.2. The severe inducement system shall reduce the machine's utility to a level that is sufficiently onerous as to cause the operator to remedy any problems related to Sections 6 to 9. The following strategies are acceptable:
- 5.4.2.1. Engine torque between the peak torque speed and the governor breakpoint shall be gradually reduced from the low-level inducement torque in Figure 1 by a minimum of 1 per cent per minute to 50 per cent of maximum torque or lower and engine speed shall be gradually reduced to 60 per cent of rated speed or lower within the same time period as the torque reduction, as shown in Figure 2.

Figure 2

Severe inducement torque reduction scheme

- 5.4.2.2. Other inducement measures that are demonstrated to the type approval authority as having the same or greater level of severity may be used.
- 5.5. In order to account for safety concerns and to allow for self-healing diagnostics, use of an inducement override function for releasing full engine power is permitted provided it
- is active for no longer than 30 minutes, and
 - is limited to three activations during each period that the operator inducement system is active.
- 5.6. The operator inducement system shall be deactivated when the conditions for its activation have ceased to exist. The operator inducement system shall not be automatically deactivated without the reason for its activation having been remedied.
- 5.7. Details of the operator inducement system activation and deactivation procedures are described in Section 11.
- 5.8. As part of the application for type-approval under this Directive, the manufacturer shall demonstrate the operation of the operator inducement system, as specified in Section 11.
6. **Reagent availability**
- 6.1. *Reagent level indicator*
- The machine shall include an indicator that clearly informs the operator of the level of reagent in the reagent storage tank. The minimum acceptable performance level for the reagent indicator is that it shall continuously indicate the reagent level whilst the operator warning system referred to in paragraph 4 is activated. The reagent indicator may be in the form of an analogue or digital display, and may show the level as a proportion of the full tank capacity, the amount of remaining reagent, or the estimated operating hours remaining.
- 6.2. *Activation of the operator warning system*
- 6.2.1. The operator warning system specified in paragraph 4 shall be activated when the level of reagent goes below 10 % of the capacity of the reagent tank or a higher percentage at the choice of the manufacturer.

- 6.2.2. The warning provided shall be sufficiently clear, in conjunction with the reagent indicator, for the operator to understand that the reagent level is low. When the warning system includes a message display system, the visual warning shall display a message indicating a low level of reagent (for example "urea level low", "AdBlue level low", or "reagent low").
- 6.2.3. The operator warning system does not initially need to be continuously activated (for example a message does not need to be continuously displayed), however activation shall escalate in intensity so that it becomes continuous as the level of the reagent approaches empty and the point where the operator inducement system will come into effect is approached (for example frequency at which a lamp flashes). It shall culminate in an operator notification at a level that is at the choice of the manufacturer, but sufficiently more noticeable at the point where the operator inducement system in paragraph 6.3 comes into effect than when it was first activated.
- 6.2.4. The continuous warning shall not be easily disabled or ignored. When the warning system includes a message display system, an explicit message shall be displayed (for example "fill up urea", "fill up AdBlue", or "fill up reagent"). The continuous warning may be temporarily interrupted by other warning signals providing important safety related messages.
- 6.2.5. It shall not be possible to turn off the operating warning system until the reagent has been replenished to a level not requiring its activation.
- 6.3. *Activation of the operator inducement system*
- 6.3.1. The low-level inducement system described in paragraph 5.3 shall be activated if the reagent tank level goes below 2,5 % of its nominally full capacity or a higher percentage at the choice of the manufacturer.
- 6.3.2. The severe inducement system described in paragraph 5.4 shall be activated if the reagent tank is empty (that is, when the dosing system is unable to draw further reagent from the tank) or at any level below 2,5 % of its nominally full capacity at the discretion of the manufacturer.
- 6.3.3. Except to the extent permitted by paragraph 5.5, it shall not be possible to turn off the low-level or severe inducement system until the reagent has been replenished to a level not requiring their respective activation.
7. **Reagent quality monitoring**
- 7.1. The engine or machine shall include a means of determining the presence of an incorrect reagent on board a machine.
- 7.1.1. The manufacturer shall specify a minimum acceptable reagent concentration CDmin, which results in tailpipe NO_x emissions not exceeding a threshold of 0,9 g/kWh.
- 7.1.1.1. The correct value of CDmin shall be demonstrated during type approval by the procedure defined in Section 12 and recorded in the extended documentation package as specified in Section 8 of Annex I.
- 7.1.2. Any reagent concentration lower than CDmin shall be detected and be regarded, for the purpose of Section 7.1, as being incorrect reagent.
- 7.1.3. A specific counter ("the reagent quality counter") shall be attributed to the reagent quality. The reagent quality counter shall count the number of engine operating hours with an incorrect reagent.
- 7.1.3.1. Optionally, the manufacturer may group the reagent quality failure together with one or more of the failures listed in Sections 8 and 9 into a single counter.
- 7.1.4. Details of the reagent quality counter activation and deactivation criteria and mechanisms are described in Section 11.
- 7.2. *Activation of the operator warning system*
- When the monitoring system confirms that the reagent quality is incorrect, the operator warning system described in paragraph 4 shall be activated. When the warning system includes a message display system, it shall display a message indicating the reason of the warning (for example "incorrect urea detected", "incorrect AdBlue detected", or "incorrect reagent detected").

- 7.3. *Activation of the operator inducement system*
- 7.3.1. The low-level inducement system described in paragraph 5.3 shall be activated if the reagent quality is not rectified within a maximum of 10 engine operating hours after the activation of the operator warning system described in paragraph 7.2.
- 7.3.2. The severe inducement system described in paragraph 5.4 shall be activated if the reagent quality is not rectified within a maximum of 20 engine operating hours after the activation of the operator warning system in described paragraph 7.2.
- 7.3.3. The number of hours prior to activation of the inducement systems shall be reduced in case of a repetitive occurrence of the malfunction according to the mechanism described in Section 11.
8. **Reagent dosing activity**
- 8.1. The engine shall include a means of determining interruption of dosing.
- 8.2. *Reagent dosing activity counter*
- 8.2.1. A specific counter shall be attributed to the dosing activity (the "dosing activity counter"). The counter shall count the number of engine operating hours which occur with an interruption of the reagent dosing activity. This is not required where such interruption is demanded by the engine ECU because the machine operating conditions are such that the machine's emission performance does not require reagent dosing.
- 8.2.1.1. Optionally, the manufacturer may group the reagent dosing failure together with one or more of the failures listed in Sections 7 and 9 into a single counter.
- 8.2.2. Details of the reagent dosing activity counter activation and deactivation criteria and mechanisms are described in Section 11.
- 8.3. *Activation of the operator warning system*
- The operator warning system described in paragraph 4 shall be activated in the case of interruption of dosing which sets the dosing activity counter in accordance with paragraph 8.2.1. When the warning system includes a message display system, it shall display a message indicating the reason of the warning (e.g. "urea dosing malfunction", "AdBlue dosing malfunction", or "reagent dosing malfunction").
- 8.4. *Activation of the operator inducement system*
- 8.4.1. The low-level inducement system described in paragraph 5.3 shall be activated if an interruption in reagent dosing is not rectified within a maximum of 10 engine operating hours after the activation of the operator warning system in paragraph 8.3.
- 8.4.2. The severe inducement system described in paragraph 5.4 shall be activated if an interruption in reagent dosing is not rectified within a maximum of 20 engine operating hours after the activation of the operator warning system in paragraph 8.3.
- 8.4.3. The number of hours prior to activation of the inducement systems shall be reduced in case of a repetitive occurrence of the malfunction according to the mechanism described in Section 11.
9. **Monitoring failures that may be attributed to tampering**
- 9.1. In addition to the level of reagent in the reagent tank, the reagent quality, and the interruption of dosing, the following failures shall be monitored because they may be attributed to tampering:
- (i) impeded EGR valve;
- (ii) failures of the NO_x Control Diagnostic (NCD) system, as described in paragraph 9.2.1.
- 9.2. *Monitoring requirements*
- 9.2.1. The NO_x Control Diagnostic (NCD) system shall be monitored for electrical failures and for removal or deactivation of any sensor that prevents it from diagnosing any other failures mentioned in paragraphs 6 to 8 (component monitoring).
- A non-exhaustive list of sensors that affect the diagnostic capability are those directly measuring NO_x concentration, urea quality sensors, ambient sensors and sensors used for monitoring reagent dosing activity, reagent level, or reagent consumption.
- 9.2.2. *EGR valve counter*
- 9.2.2.1. A specific counter shall be attributed to an impeded EGR valve. The EGR valve counter shall count the number of engine operating hours when the DTC associated to an impeded EGR valve is confirmed to be active.

- 9.2.2.1.1. Optionally, the manufacturer may group the impeded EGR valve failure together with one or more of the failures listed in Sections 7, 8 and 9.2.3 into a single counter.
- 9.2.2.2. Details of the EGR valve counter activation and deactivation criteria and mechanisms are described in Section 11.
- 9.2.3. NCD system counter(s)
- 9.2.3.1. A specific counter shall be attributed to each of the monitoring failures considered in paragraph 9.1 (ii). The NCD system counters shall count the number of engine operating hours when the DTC associated to a malfunction of the NCD system is confirmed to be active. Grouping of several faults into a single counter is permitted.
- 9.2.3.1.1. Optionally, the manufacturer may group the NCD system failure together with one or more of the failures listed in Sections 7, 8 and 9.2.2 into a single counter.
- 9.2.3.2. Details of the NCD system counter(s) activation and deactivation criteria and mechanisms are described in Section 11.
- 9.3. *Activation of the operator warning system*
- The operator warning system described in paragraph 4 shall be activated in case any of the failures specified in paragraph 9.1 occur, and shall indicate that an urgent repair is required. When the warning system includes a message display system, it shall display a message indicating the reason of the warning (for example “reagent dosing valve disconnected”, or “critical emission failure”).
- 9.4. *Activation of the operator inducement system*
- 9.4.1. The low-level inducement system described in paragraph 5.3 shall be activated if a failure specified in paragraph 9.1 is not rectified within a maximum of 36 engine operating hours after the activation of the operator warning system in paragraph 9.3.
- 9.4.2. The severe inducement system described in paragraph 5.4 shall be activated if a failure specified in paragraph 9.1 is not rectified within a maximum of 100 engine operating hours after the activation of the operator warning system in paragraph 9.3.
- 9.4.3. The number of hours prior to activation of the inducement systems shall be reduced in case of a repetitive occurrence of the malfunction according to the mechanism described in Section 11.
- 9.5. As an alternative to the requirements in paragraph 9.2, the manufacturer may use a NO_x sensor located in the exhaust gas. In this case,
- the NO_x value shall not exceed a threshold of 0,9 g/kWh,
 - use of a single failure “high NO_x — root cause unknown” may be used,
 - Section 9.4.1 shall read “within 10 engine hours”,
 - Section 9.4.2 shall read “within 20 engine hours”.

10. **Demonstration requirements**

10.1. *General*

The compliance to the requirements of this Annex shall be demonstrated during type-approval by performing, as illustrated in Table 1 and specified in this section:

- (a) a demonstration of the warning system activation;
- (b) a demonstration of the low level inducement system activation, if applicable;
- (c) a demonstration of the severe inducement system activation.

Table 1

Illustration of the content of the demonstration process according to the provisions in Sections 10.3 and 10.4 of this Appendix

Mechanism	Demonstration elements
Warning system activation specified in Section 10.3 of this Appendix	— Two activation tests (incl. lack of reagent) — Supplementary demonstration elements, as appropriate
Low-level inducement activation specified in Section 10.4 of this Appendix	— Two activation tests (incl. lack of reagent) — Supplementary demonstration elements, as appropriate — One torque reduction test

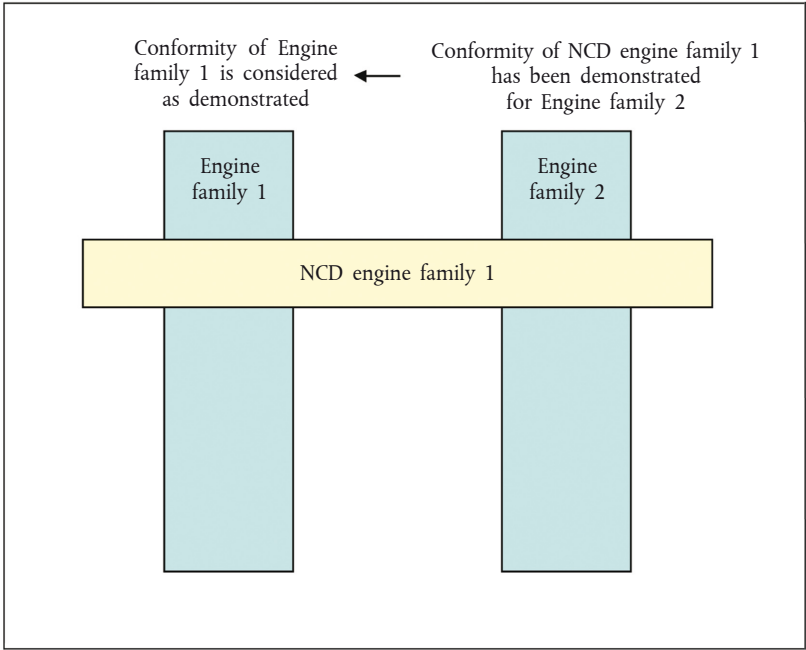
Mechanism	Demonstration elements
Severe inducement activation specified in Section 10.4.6 of this Appendix	— Two activation tests (incl. lack of reagent) — Supplementary demonstration elements, as appropriate

- 10.2. *Engine families And NCD engine families*

The compliance of an engine family or an NCD engine family with the requirements of this Section 10 may be demonstrated by testing one of the members of the considered family, provided the manufacturer demonstrates to the approval authority that the monitoring systems necessary for complying with the requirements of this Annex are similar within the family.
- 10.2.1. The demonstration that the monitoring systems for other members of the NCD family are similar may be performed by presenting to the approval authorities such elements as algorithms, functional analyses, etc.
- 10.2.2. The test engine is selected by the manufacturer in agreement with the approval authority. It may or may not be the parent engine of the considered family.
- 10.2.3. In the case where engines of an engine family belong to an NCD engine family that has already been type-approved according to paragraph 10.2.1 (Figure 3), the compliance of that engine family is deemed to be demonstrated without further testing, provided the manufacturer demonstrates to the authority that the monitoring systems necessary for complying with the requirements of this Annex are similar within the considered engine and NCD engine families.

Figure 3

Previously demonstrated conformity of an NCD engine family



- 10.3. *Demonstration of the warning system activation*

The compliance of the warning system activation shall be demonstrated by performing two tests: lack of reagent, and one failure category considered in Section 7 to 9 of this Annex.
- 10.3.2. Selection of the failures to be tested
- 10.3.2.1. For the purpose of demonstrating the activation of the warning system in case of a wrong reagent quality, a reagent shall be selected with a dilution of the active ingredient at least as dilute as that communicated by the manufacturer according to the requirements of Section 7 of this Annex

10.3.2.2. For the purpose of demonstrating the activation of the warning system in case of failures that may be attributed to tampering, and are defined in Section 9 of this Annex the selection shall be performed according to the following requirements:

10.3.2.2.1. The manufacturer shall provide the approval authority with a list of such potential failures.

10.3.2.2.2. The failure to be considered in the test shall be selected by the approval authority from this list referred to in Section 10.3.2.2.1.

10.3.3. Demonstration

10.3.3.1. For the purpose of this demonstration, a separate test shall be performed for each of the failures considered in Section 10.3.1.

10.3.3.2. During a test, no failure shall be present other than the one addressed by the test.

10.3.3.3. Prior to starting a test, all DTC shall have been erased.

10.3.3.4. At the request of the manufacturer, and with the agreement of the approval authority, the failures subject to testing may be simulated.

10.3.3.5. Detection of failures other than lack of reagent

For failures other than lack of reagent, once the failure installed or simulated, the detection of that failure shall be performed as follows:

10.3.3.5.1. The NCD system shall respond to the introduction of a failure selected as appropriate by the type approval authority in accordance to the provisions of this Appendix. This is considered to be demonstrated if activation occurs within two consecutive NCD test-cycles according to paragraph 10.3.3.7 of this Appendix.

When it has been specified in the monitoring description and agreed by the Approval Authority that a specific monitor needs more than two NCD test-cycles to complete its monitoring, the number of NCD test-cycles may be increased to three NCD test-cycles.

Each individual NCD test-cycle in the demonstration test may be separated by an engine shut-off. The time until the next start-up shall take into consideration any monitoring that may occur after engine shut-off and any necessary condition that must exist for monitoring to occur at the next start-up.

10.3.3.5.2. The demonstration of the warning system activation is deemed to be accomplished if, at the end of each demonstration test performed according to Section 10.3.2.1, the warning system has been properly activated and the DTC for the selected failure has got the "confirmed and active" status.

10.3.3.6. Detection in case of lack of reagent

For the purpose of demonstrating the activation of the warning system in case of lack of reagent, the engine system shall be operated over one or more NCD test cycles at the discretion of the manufacturer.

10.3.3.6.1. The demonstration shall start with a level of reagent in the tank to be agreed between the manufacturer and the approval authority but representing not less than 10 per cent of the nominal capacity of the tank.

10.3.3.6.2. The warning system is deemed to have performed in the correct manner if the following conditions are met simultaneously:

(a) the warning system has been activated with a reagent availability greater or equal to 10 per cent of the capacity of the reagent tank, and

(b) the "continuous" warning system has been activated with a reagent availability greater or equal to the value declared by the manufacturer according to the provisions of Section 6 of this Annex.

10.3.3.7. NCD test cycle

10.3.3.7.1. The NCD test cycle considered in this Section 10 for demonstrating the correct performance of the NCD system is the hot NRTC cycle.

10.3.3.7.2. On request of the manufacturer and with approval of the Approval Authority, an alternative NCD test-cycle can be used (e.g. the NRSC) for a specific monitor. The request shall contain elements (technical considerations, simulation, test results, etc.) demonstrating:

- (a) the requested test-cycle results in a monitor that will run in real world driving, and
 - (b) the applicable NCD test-cycle specified in paragraph 10.3.3.7.1 is shown to be less appropriate for the considered monitoring.
- 10.3.4. The demonstration of the warning system activation is deemed to be accomplished if, at the end of each demonstration test performed according to Section 10.3.3, the warning system has been properly activated.
- 10.4. *Demonstration of the inducement system activation*
- 10.4.1. The demonstration of the inducement system activation shall be done by tests performed on an engine test bench.
- 10.4.1.1. Any components or subsystems not physically mounted on the engine system, such as, but not limited to, ambient temperature sensors, level sensors, and operator warning and information systems, that are required in order to perform the demonstrations shall be connected to the engine system for that purpose, or shall be simulated, to the satisfaction of the approval authority.
- 10.4.1.2. If the manufacturer chooses, and subject to the agreement of the approval authority, the demonstration tests may be performed on a complete machine or machinery either by mounting the machine on a suitable test bed or by running it on a test track under controlled conditions.
- 10.4.2. The test sequence shall demonstrate the activation of the inducement system in case of lack of reagent and in case of one of the failures defined in Sections 7, 8, or 9 of this Annex.
- 10.4.3. For the purpose of this demonstration:
 - (a) the approval authority shall select, in addition to the lack of reagent, one of the failures defined in Sections 7, 8 or 9 of this Annex that has been previously used in the demonstration of the warning system activation;
 - (b) the manufacturer shall, in agreement with the approval authority, be permitted to accelerate the test by simulating the achievement of a certain number of operating hours;
 - (c) the achievement of the torque reduction required for low-level inducement may be demonstrated at the same time as the general engine performance approval process performed in accordance with this Directive. Separate torque measurement during the inducement system demonstration is not required in this case;
 - (d) the severe inducement shall be demonstrated according to the requirements of Section 10.4.6 of this Appendix.
- 10.4.4. The manufacturer shall, in addition, demonstrate the operation of the inducement system under those failure conditions defined in Sections 7, 8 or 9 of this Annex which have not been chosen for use in demonstration tests described in Sections 10.4.1 to 10.4.3.

These additional demonstrations may be performed by presentation to the approval authority of a technical case using evidence such as algorithms, functional analyses, and the result of previous tests.
- 10.4.4.1. These additional demonstrations shall in particular demonstrate to the satisfaction of the approval authority the inclusion of the correct torque reduction mechanism in the engine ECU.
- 10.4.5. *Demonstration test of the low level inducement system*
- 10.4.5.1. This demonstration starts when the warning system or when appropriate “continuous” warning system has been activated as a result of the detection of a failure selected by the approval authority.
- 10.4.5.2. When the system is being checked for its reaction to the case of lack of reagent in the tank, the engine system shall be run until the reagent availability has reached a value of 2,5 per cent of the nominal full capacity of the tank or the value declared by the manufacturer in accordance with Section 6.3.1 of this Annex at which the low-level inducement system is intended to operate.
- 10.4.5.2.1. The manufacturer may, with the agreement of the approval authority, simulate continuous running by extracting reagent from the tank, either whilst the engine is running or is stopped.
- 10.4.5.3. When the system is checked for its reaction in the case of a failure other than a lack of reagent in the tank, the engine system shall be run for the relevant number of operating hours indicated in Table 3 of this Appendix or, at the choice of the manufacturer, until the relevant counter has reached the value at which the low-level inducement system is activated.

- 10.4.5.4. The demonstration of the low level inducement system shall be deemed to be accomplished if, at the end of each demonstration test performed according to Sections 10.4.5.2 and 10.4.5.3, the manufacturer has demonstrated to the approval authority that the engine ECU has activated the torque reduction mechanism.
- 10.4.6. Demonstration test of the severe inducement system
- 10.4.6.1. This demonstration shall start from a condition where the low-level inducement system has been previously activated and may be performed as a continuation of the tests undertaken to demonstrate the low-level inducement system.
- 10.4.6.2. When the system is checked for its reaction in the case of lack of reagent in the tank, the engine system shall be run until the reagent tank is empty, or has reached the level below 2,5 per cent of the nominal full capacity of the tank at which the manufacturer has declared to activate the severe inducement system.
- 10.4.6.2.1. The manufacturer may, with the agreement of the approval authority, simulate continuous running by extracting reagent from the tank, either whilst the engine is running or is stopped.
- 10.4.6.3. When the system is checked for its reaction in the case of a failure that is not a lack of reagent in the tank, the engine system shall then be run for the relevant number of operating hours indicated in Table 3 of this Appendix or, at the choice of the manufacturer, until the relevant counter has reached the value at which the severe inducement system is activated.
- 10.4.6.4. The demonstration of the severe inducement system shall be deemed to be accomplished if, at the end of each demonstration test performed according to paragraphs 10.4.6.2 and 10.4.6.3, the manufacturer has demonstrated to the type-approval authority that the severe inducement mechanism considered in this Annex has been activated.
- 10.4.7. Alternatively, if the manufacturer chooses, and subject to the agreement of the approval authority, the demonstration of the inducement mechanisms may be performed on a complete machine in accordance with the requirements of Section 5.4, either by mounting the machine on a suitable test bed or by running it on a test track under controlled conditions.
- 10.4.7.1. The machine shall be operated until the counter associated with the selected failure has reached the relevant number of operating hours indicated in Table 3 of this Appendix or, as appropriate, until either the reagent tank is empty or, has reached the level below 2,5 per cent of the nominal full capacity of the tank at which the manufacturer has chosen to activate the severe inducement system.
11. **Description of the operator warning and inducement activation and deactivation mechanisms**
- 11.1. To complement the requirements specified in this Annex concerning the warning and inducement activation and deactivation mechanisms, this Section 11 specifies the technical requirements for an implementation of those activation and deactivation mechanisms.
- 11.2. *Activation and deactivation mechanisms of the warning system*
- 11.2.1. The operator warning system shall be activated when the diagnostic trouble code (DTC) associated with a NCM justifying its activation has the status defined in Table 2 of this Appendix.

Table 2

Activation of the operator warning system

Failure type	DTC status for activation of the warning system
Poor reagent quality	confirmed and active
Interruption of dosing	confirmed and active
Impeded EGR valve	confirmed and active
Malfunction of the monitoring system	confirmed and active
NO _x threshold, if applicable	confirmed and active

- 11.2.2. The operator warning system shall be deactivated when the diagnostic system concludes that the malfunction relevant to that warning is no longer present or when the information including DTCs relative to the failures justifying its activation is erased by a scan tool.

- 11.2.2.1. Requirements for erasing "NO_x control information"

- 11.2.2.1.1. Erasing/resetting "NO_x control information" by a scan-tool

On request of the scan tool, the following data shall be erased or reset to the value specified in this Appendix from the computer memory (see Table 3).

Table 3

Erasing/resetting "NO_x control information" by a scan-tool

NO _x control information	Erasable	Resetable
All DTCs	X	
The value of the counter with the highest number of engine operating hours		X
The number of engine operating hours from the NCD counter(s)		X

- 11.2.2.1.2. NO_x control information shall not be erased by disconnection of the machine's battery(s).

- 11.2.2.1.3. The erasing of "NO_x control information" shall only be possible under "engine-off" conditions.

- 11.2.2.1.4. When "NO_x control information" including DTCs are erased, any counter reading associated with these failures and which is specified in this Annex shall not be erased, but reset to the value specified in the appropriate section of this Annex.

- 11.3. *Activation and deactivation mechanism of the operator inducement system*

- 11.3.1. The operator inducement system shall be activated when the warning system is active and the counter relevant to the type of NCM justifying its activation has reached the value specified in Table 4 of this Appendix.

- 11.3.2. The operator inducement system shall be deactivated when the system no longer detects a malfunction justifying its activation, or if the information including the DTCs relative to the NCMs justifying its activation has been erased by a scan tool or maintenance tool.

- 11.3.3. The operator warning and inducement systems shall be immediately activated or deactivated as appropriate according to the provisions of Section 6 of this Annex after assessment of the reagent quantity in the reagent tank. In that case, the activation or deactivation mechanisms shall not depend upon the status of any associated DTC.

- 11.4. *Counter mechanism*

- 11.4.1. General

- 11.4.1.1. To comply with the requirements of this Annex, the system shall contain at least four counters to record the number of hours during which the engine has been operated while the system has detected any of the following:

- (a) an incorrect reagent quality;
- (b) an interruption of reagent dosing activity;
- (c) an impeded EGR valve;
- (d) a failure of the NCD system according to Section 9.1(ii) of this Annex.

- 11.4.1.1.1. Optionally, the manufacturer may use one or more counters for grouping the failures indicated in Section 11.4.1.1.

- 11.4.1.2. Each of the counters shall count up to the maximum value provided in a 2 byte counter with 1 hour resolution and hold that value unless the conditions allowing the counter to be reset to zero are met.
- 11.4.1.3. A manufacturer may use a single or multiple NCD system counters. A single counter may accumulate the number of hours of two or more different malfunctions relevant to that type of counter, none of them having reached the time the single counter indicates.
- 11.4.1.3.1. When the manufacturer decides to use multiple NCD system counters, the system shall be capable of assigning a specific monitoring system counter to each malfunction relevant according to this Annex to that type of counters.
- 11.4.2. Principle of counters mechanism
- 11.4.2.1. Each of the counters shall operate as follows:
- 11.4.2.1.1. If starting from zero, the counter shall begin counting as soon as a malfunction relevant to that counter is detected and the corresponding diagnostic trouble code (DTC) has the status defined in Table 2.
- 11.4.2.1.2. In case of repeated failures, one of the following provisions shall apply at the choice of the manufacturer.
- (i) If a single monitoring event occurs and the malfunction that originally activated the counter is no longer detected or if the failure has been erased by a scan tool or a maintenance tool, the counter shall halt and hold its current value. If the counter stops counting when the severe inducement system is active, the counter shall be kept frozen at the value defined in Table 4 of this Appendix or a value of greater than or equal to the counter value for severe inducement minus 30 minutes.
- (ii) The counter shall be kept frozen at the value defined in Table 4 of this Appendix or a value greater than or equal to the counter value for severe inducement minus 30 minutes.
- 11.4.2.1.3. In the case of a single monitoring system counter, that counter shall continue counting if a NCM relevant to that counter has been detected and its corresponding Diagnostic trouble code (DTC) has the status "confirmed and active". It shall halt and hold one of the values specified in Section 11.4.2.1.2, if no NCM that would justify the counter activation is detected or if all the failures relevant to that counter have been erased by a scan tool or a maintenance tool.

Table 4

Counters and inducement

	DTC status for first activation of the counter	Counter value for low-level inducement	Counter value for severe inducement	Frozen value held by the counter
Reagent quality counter	confirmed and active	≤ 10 hours	≤ 20 hours	≥ 90 % of counter value for severe inducement
Dosing counter	confirmed and active	≤ 10 hours	≤ 20 hours	≥ 90 % of counter value for severe inducement
EGR valve counter	confirmed and active	≤ 36 hours	≤ 100 hours	≥ 95 % of counter value for severe inducement
Monitoring system counter	confirmed and active	≤ 36 hours	≤ 100 hours	≥ 95 % of counter value for severe inducement
NO _x threshold, if applicable	confirmed and active	≤ 10 hours	≤ 20 hours	≥ 90 % of counter value for severe inducement

11.4.2.1.4. Once frozen, the counter shall be reset to zero when the monitors relevant to that counter have run at least once to completion of their monitoring cycle without having detected a malfunction and no malfunction relevant to that counter has been detected during 40 engine operating hours since the counter was last held (see Figure 4).

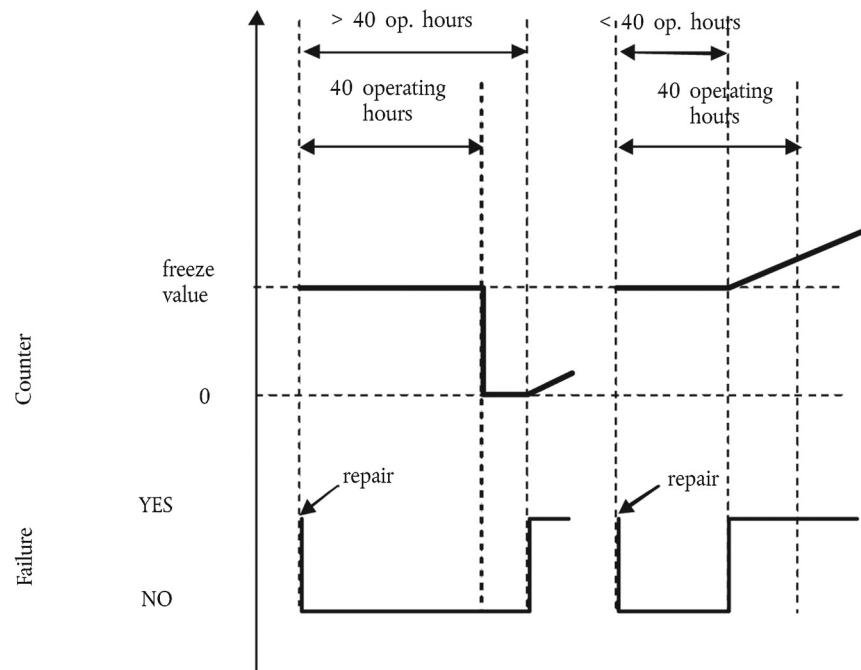
11.4.2.1.5. The counter shall continue counting from the point at which it had been held if a malfunction relevant to that counter is detected during a period when the counter is frozen (see Figure 4).

11.5. *Illustration of the activation and deactivation and counter mechanisms*

11.5.1. This paragraph illustrates the activation and deactivation and counter mechanisms for some typical cases. The figures and descriptions given in paragraphs 11.5.2, 11.5.3 and 11.5.4 are provided solely for the purposes of illustration in this Annex and should not be referenced as examples of either the requirements of this Directive or as definitive statements of the processes involved. The counter hours in Figures 6 and 7 refer to the maximum severe inducement values in Table 4. For simplification purposes, for example, the fact that the warning system will also be active when the inducement system is active has not been mentioned in the illustrations given.

Figure 4

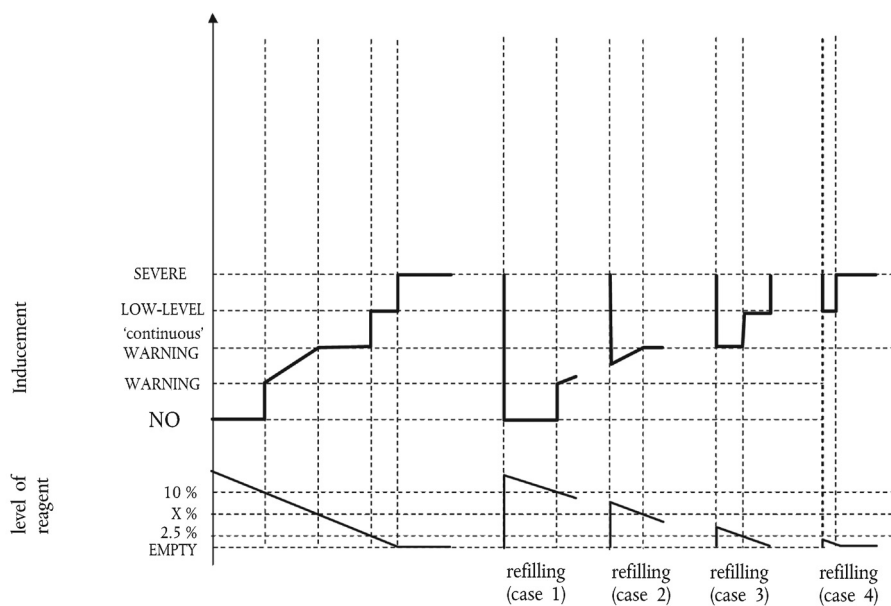
Reactivation and resetting to zero of a counter after a period when its value has been frozen



11.5.2. Figure 5 illustrates the operation of the activation and deactivation mechanisms when monitoring the reagent availability for five cases:

- use case 1: the operator continues operating the machine in spite of the warning until machine operation is disabled;
- refilling case 1 ("adequate" refilling): the operator refills the reagent tank so that a level above the 10 % threshold is reached. Warning and inducement are de-activated;
- refilling cases 2 and 3 ("inadequate" refilling): the warning system is activated. The level of warning depends on the amount of available reagent;
- refilling case 4 ("very inadequate" refilling): the low level inducement is activated immediately.

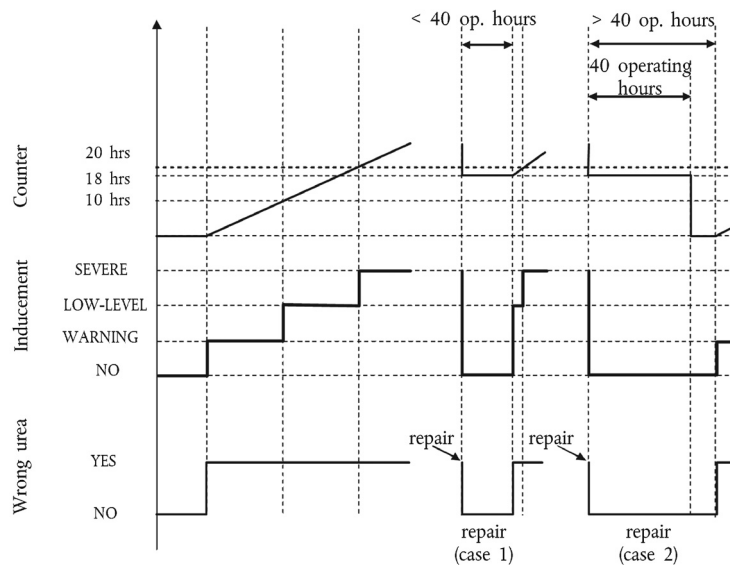
Figure 5

Reagent availability

11.5.3. Figure 6 illustrates three cases of wrong reagent quality:

- use case 1: the operator continues operating the machine in spite of the warning until machine operation is disabled;
- repair case 1 (“bad” or “dishonest” repair): after disablement of the machine, the operator changes the quality of the reagent, but soon after, changes it again for a poor quality one. The inducement system is immediately reactivated and machine operation is disabled after 2 engine operating hours;
- repair case 2 (“good” repair): after disablement of the machine, the operator rectifies the quality of the reagent. However some time afterwards, he refills again with a poor quality reagent. The warning, inducement and counting processes restart from zero.

Figure 6

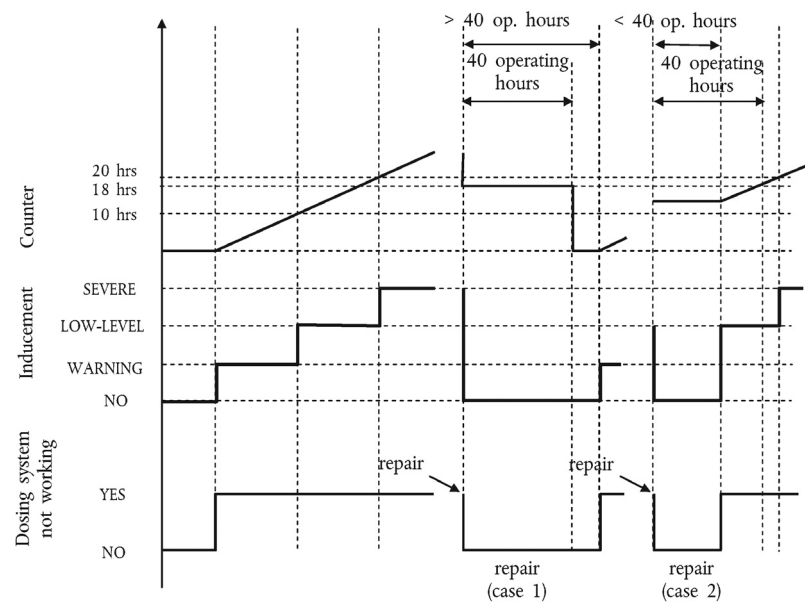
Filling with poor reagent quality

11.5.4. Figure 7 illustrates three cases of failure of the urea dosing system. This figure also illustrates the process that applies in the case of the monitoring failures described in Section 9 of this Annex:

- use case 1: the operator continues operating the machine in spite of the warning until machine operation is disabled;
- repair case 1 ("good" repair): after disablement of the machine, the operator repairs the dosing system. However some time afterwards, the dosing system fails again. The warning, inducement and counting processes restart from zero;
- repair case 2 ("bad" repair): during the low-level inducement time (torque reduction), the operator repairs the dosing system. Soon after, however, the dosing system fails again. The low-level inducement system is immediately reactivated and the counter restarts from the value it had at the time of repair.

Figure 7

Failure of the reagent dosing system



12. **Demonstration of the minimum acceptable reagent concentration CD_{min}**
- 12.1. The manufacturer shall demonstrate the correct value of CD_{min} during type approval by performing the hot part of the NRTC cycle using a reagent with the concentration CD_{min} .
- 12.2. The test shall follow the appropriate NCD cycle(s) or manufacturer defined pre-conditioning cycle, permitting a closed loop NO_x control system to perform adaptation to the quality of the reagent with the concentration CD_{min} .
- 12.3. The pollutant emissions resulting from this test shall be lower than the NO_x threshold specified in Section 7.1.1 of this Annex.

Appendix 2

Control Area requirements for stage IV engines**1. Engine control area**

The control area (see Figure 1) is defined as follows:

speed range: speed A to high speed;

where:

speed A = low speed + 15 % (high speed — low speed).

High speed and low speed as defined in Annex III or, if the manufacturer, based on the option indicated in Section 1.2.1 of Annex III, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments, the definition of paragraphs 2.1.33 and 2.1.37 to UNECE Regulation No 96.03 series of amendments shall be used.

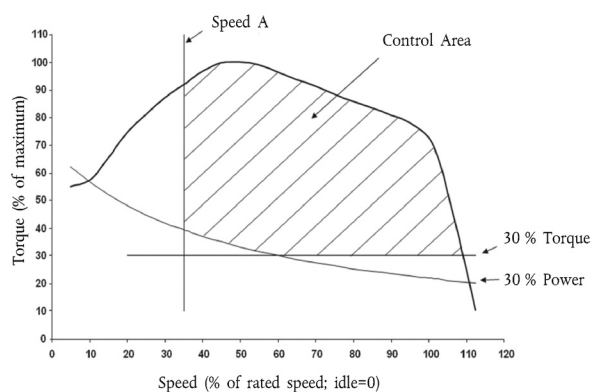
If the measured engine speed A is within $\pm 3\%$ of the engine speed declared by the manufacturer, the declared engine speeds shall be used. If the tolerance is exceeded for any of the test speeds, the measured engine speeds shall be used.

2. The following engine operating conditions shall be excluded from testing:

- (a) points below 30 % of maximum torque;
- (b) points below 30 % of maximum power.

The manufacturer may request that the Technical Service excludes operating points from the control area defined in Section 1 and 2 of this Appendix during the certification/type approval. Subject to the positive opinion of the Approval Authority, the Technical Service may accept this exclusion if the manufacturer can demonstrate that the engine is never capable of operating at such points when used in any machine combination.

Figure 1

Control area

ANNEX II

Annex II to Directive 97/68/EC is amended as follows:

(1) Appendix 1 is amended as follows:

(a) the heading of Section 3 is replaced by the following:

‘FUEL FEED FOR DIESEL ENGINES’;

(b) Section 4 is replaced by the following:

‘4. FUEL FEED FOR PETROL ENGINES (*)

4.1. Carburettor:

4.1.1. Make(s):

4.1.2. Type(s):

4.2. Port fuel injection: single-point or multi-point:

4.2.1. Make(s):

4.2.2. Type(s):

4.3. Direct injection:

4.3.1. Make(s):

4.3.2. Type(s):

4.4. Fuel flow [g/h] and air/fuel ratio at rated speed and wide open throttle’;

(c) the following Sections 5, 6 and 7 are added:

‘5. VALVE TIMING

5.1. Maximum lift and angles of opening and closing in relation to dead centres or equivalent data:

5.2. Reference and/or setting ranges (*)

5.3. Variable valve timing system (if applicable and where intake and/or exhaust)

5.3.1. Type: continuous or on/off (*)

5.3.2. Cam phase shift angle:

6. PORTING CONFIGURATION

6.1. Position, size and number:

7. IGNITION SYSTEM

7.1. Ignition coil

7.1.1. Make(s):

7.1.2. Type(s):

7.1.3. Number:

7.2. Spark plug(s):

7.2.1. Make(s):

7.2.2. Type(s):

7.3. Magneto:

7.3.1. Make(s):

7.3.2. Type(s):

7.4. Ignition timing:

7.4.1. Static advance with respect to top dead centre [crank angle degrees]

7.4.2. Advance curve, if applicable:

(*) Strike out what does not apply.;

(2) Appendix 2 is amended as follows:

(a) Section 1.8 is replaced by the following:

‘1.8. Exhaust after-treatment system (*):

(*) If not applicable mark n.a.’;

(b) the table in Section 2.2 is replaced by the following:

	Parent Engine (*)	Engines within family (**)			
Engine Type					
No of cylinders					
Rated speed (min ⁻¹)					
Fuel delivery per stroke (mm ³) for diesel engines, fuel flow (g/h) for petrol engines, at rated net power					
Rated net power (kW)					
Maximum power speed (min ⁻¹)					
Maximum net power (kW)					
Maximum torque speed (min ⁻¹)					
Fuel delivery per stroke (mm ³) for diesel engines, fuel flow (g/h) for petrol engines, at maximum torque					
Maximum torque (Nm)					
Low idle speed (min ⁻¹)					
Cylinder displacement (in % of parent engine)	100				

(*) For full details see Appendix 1.

(**) For full details see Appendix 3.’

ANNEX III

Annex III to Directive 97/68/EC is amended as follows:

(1) Section 1.2 is replaced by the following:

1.2. Selection of test procedure

The test shall be carried out with the engine mounted on a test bench and connected to a dynamometer.

1.2.1. Test procedure for stages I, II, IIIA, IIIB and IV

The test shall be carried out in accordance with the procedure in this Annex or, at the choice of the manufacturer, the test procedure as specified in Annex 4B to UNECE Regulation No 96.03 series of amendments shall be applied.

In addition, the following requirements apply:

- (i) durability requirements as set out in Appendix 5 to this Annex;
- (ii) engine control area provisions as set out in Section 8.6 of Annex I (stage IV engines only);
- (iii) CO₂ reporting requirements as set out in Appendix 6 to this Annex for engines tested according to the procedure in this Annex. In case of engines tested according to the procedure in Annex 4B to UNECE Regulation No 96.03 series of amendments, Appendix 7 to this Annex shall apply;
- (iv) the reference fuel in Annex V to this Directive shall be used for engines tested according to the requirements in this Annex. The reference fuel in Annex V to this Directive shall be used in case of engines tested according to the requirements in Annex 4B to UNECE Regulation No 96.03 series of amendments.

1.2.1.1. In case that the manufacturer chooses in accordance with Annex I, Section 8.6.2 to use the test procedure specified in Annex 4B to UNECE Regulation No 96.03 series of amendments for testing engines of stages I, II, IIIA or IIIB, the test cycles specified in Section 3.7.1 shall be used.;

(2) Appendix 5 is replaced by the following:

Appendix 5

Durability requirements

1. VERIFYING THE DURABILITY OF STAGE IIIA AND STAGE IIIB CI ENGINES

This Appendix shall apply to CI engines Stage IIIA and IIIB only.

1.1. Manufacturers shall determine a Deterioration Factor (DF) value for each regulated pollutant for all Stage IIIA and IIIB engine families. Such DFs shall be used for type approval and production line testing.

1.1.1. Test to establish DFs shall be conducted as follows:

1.1.1.1. The manufacturer shall conduct durability tests to accumulate engine operating hours according to a test schedule that is selected on the basis of good engineering judgement to be representative of in-use engine operation in respect to characterising emission performance deterioration. The durability test period should typically represent the equivalent of at least one quarter of the emission durability period (EDP).

Service accumulation operating hours may be acquired through running engines on a dynamometer test bed or from actual infield machine operation. Accelerated durability tests can be applied whereby the service accumulation schedule is performed at a higher load factor than typically experienced in the field. The acceleration factor relating the number of engine durability test hours to the equivalent number of EDP hours shall be determined by the engine manufacturer based on good engineering judgement.

During the period of the durability test, no emission sensitive components can be serviced or replaced other than to the routine service schedule recommended by the manufacturer.

The test engine, subsystems, or components to be used to determine exhaust emission DFs for an engine family, or for engine families of equivalent emission control system technology, shall be selected by the engine manufacturer on the basis of good engineering judgement. The criterion is that the test engine should represent the emission deterioration characteristics of the engine families that will apply the resulting DF values for type approval. Engines of different bore and stroke, different configuration, different air management systems, different fuel systems can be considered as equivalent in respect to emissions deterioration characteristics if there is a reasonable technical basis for such determination.

DF values from another manufacturer can be applied if there is a reasonable basis for considering technology equivalence with respect to emissions deterioration, and evidence that the tests have been carried according to the specified requirements. Emissions testing shall be performed according to the procedures defined in this Directive for the test engine after initial run-in but before any service accumulation test, and at the completion of the durability test. Emission tests can also be performed at intervals during the service accumulation test period and applied in determining the deterioration trend.

- 1.1.1.2. The service accumulation tests or the emissions tests performed to determine deterioration need not be witnessed by the approval authority.

- 1.1.1.3. Determination of DF values from durability tests

An additive DF is defined as the value obtained by subtraction of the emission value determined at the beginning of the EDP from the emissions value determined to represent the emission performance at the end of the EDP.

A multiplicative DF is defined as the emission level determined for the end of the EDP divided by the emission value recorded at the beginning of the EDP.

Separate DF values shall be established for each of the pollutants covered by the legislation. In the case of establishing a DF value relative to the $\text{NO}_x + \text{HC}$ standard, for an additive DF, this is determined based on the sum of the pollutants notwithstanding that a negative deterioration for one pollutant may not offset deterioration for the other. For a multiplicative $\text{NO}_x + \text{HC}$ DF, separate HC and NO_x DFs shall be determined and applied separately when calculating the deteriorated emission levels from an emissions test result before combining the resultant deteriorated NO_x and HC values to establish compliance with the standard.

In cases where the testing is not conducted for the full EDP, the emission values at the end of the EDP is determined by extrapolation of the emission deterioration trend established for the test period, to the full EDP.

When emissions test results have been recorded periodically during the service accumulation durability testing, standard statistical processing techniques based on good practice shall be applied to determine the emission levels at the end of the EDP; statistical significance testing can be applied in the determination of the final emissions values.

If the calculation results in a value of less than 1,00 for a multiplicative DF, or less than 0,00 for an additive DF, then the DF shall be 1,0 or 0,00, respectively.

- 1.1.1.4. A manufacturer may, with the approval of the type approval authority, use DF values established from results of durability tests conducted to obtain DF values for certification of on-road HD CI engines. This will be allowed if there is technological equivalency between the test on-road engine and the non-road engine families applying the DF values for certification. The DF values, derived from on-road engine emission durability test results, must be calculated on the basis of EDP values defined in Section 3.

- 1.1.1.5. In the case where an engine family uses established technology, an analysis based on good engineering practices may be used in lieu of testing to determine a deterioration factor for that engine family subject to approval of the type approval authority.

1.2. DF information in approval applications

- 1.2.1. Additive DFs shall be specified for each pollutant in an engine family approval application for CI engines not using any after treatment device.

- 1.2.2. Multiplicative DFs shall be specified for each pollutant in an engine family certification application for CI engines using an after treatment device.

- 1.2.3. The manufacture shall furnish the type-approval authority on request with information to support the DF values. This would typically include emission test results, service accumulation schedule, maintenance procedures together with information to support engineering judgements of technological equivalency, if applicable.

2. VERIFYING THE DURABILITY OF STAGE IV CI ENGINES

2.1. General

- 2.1.1. This section shall apply to CI engines Stage IV. At the request of the manufacturer it may also be applied to CI engines stage IIIA and IIIB as an alternative to the requirements in Section 1 of this Appendix.
- 2.1.2. This Section 2 details the procedures for selecting engines to be tested over a service accumulation schedule for the purpose of determining deterioration factors for stage IV engine type approval and conformity of production assessments. The deterioration factors shall be applied in accordance with paragraph 2.4.7 to the emissions measured according to Annex III to this Directive.
- 2.1.3. The service accumulation tests or the emissions tests performed to determine deterioration need not be witnessed by the approval authority.
- 2.1.4. This Section 2 also details the emission-related and non-emission-related maintenance that should be or may be carried out on engines undergoing a service accumulation schedule. Such maintenance shall conform to the maintenance performed on in-service engines and communicated to owners of new engines.
- 2.1.5. At the request of the manufacturer, the type-approval authority may allow the use of deterioration factors that have been established using alternative procedures to those specified in Sections 2.4.1 to 2.4.5. In this case, the manufacturer must demonstrate to the satisfaction of the approval authority that the alternative procedures that have been used are no less rigorous than those contained in Sections 2.4.1 to 2.4.5.

2.2. Definitions

Applicable for Section 2 of Appendix 5.

- 2.2.1. "Ageing cycle" means the machine or engine operation (speed, load, power) to be executed during the service accumulation period.
- 2.2.2. "Critical emission-related components" means the components which are designed primarily for emission control, that is, any exhaust after-treatment system, the electronic engine control unit and its associated sensors and actuators, and the EGR system including all related filters, coolers, control valves and tubing.
- 2.2.3. "Critical emission-related maintenance" means the maintenance to be performed on critical emission-related components.
- 2.2.4. "Emission-related maintenance" means the maintenance which substantially affects emissions or which is likely to affect emissions performance deterioration of the vehicle or the engine during normal in-use operation.
- 2.2.5. "Engine-after-treatment system family" means a manufacturer's grouping of engines that comply with the definition of engine family, but which are further grouped into a family of engine families utilising a similar exhaust after-treatment system.
- 2.2.6. "Non-emission-related maintenance" means maintenance which does not substantially affect emissions and which does not have a lasting affect on the emissions performance deterioration of the machine or the engine during normal in-use operation once the maintenance is performed.
- 2.2.7. "Service accumulation schedule" means the ageing cycle and the service accumulation period for determining the deterioration factors for the engine-after-treatment system family.

2.3. Selection of engines for establishing emission durability period deterioration factors

- 2.3.1. Engines shall be selected from the engine family defined in Section 6 of Annex I to this Directive for emission testing to establish emission durability period deterioration factors.
- 2.3.2. Engines from different engine families may be further combined into families based on the type of exhaust after-treatment system utilised. In order to place engines with different cylinder configuration but having similar technical specifications and installation for the exhaust after-treatment systems into the same engine after-treatment system family, the manufacturer shall provide data to the approval authority that demonstrates that the emissions reduction performance of such engine systems is similar.
- 2.3.3. One engine representing the engine-after-treatment system family, as determined in accordance with paragraph 2.3.2, shall be selected by the engine manufacturer for testing over the service accumulation schedule defined in paragraph 2.4.2, and shall be reported to the type-approval authority before any testing commences.

- 2.3.3.1. If the type-approval authority decides that the worst case emissions of the engine-after-treatment system family can be characterised better by another engine then the test engine shall be selected jointly by the type-approval authority and the engine manufacturer.
- 2.4. **Establishing emission durability period deterioration factors**
- 2.4.1. *General*
- Deterioration factors applicable to an engine-after-treatment system family are developed from the selected engines based on a service accumulation schedule that includes periodic testing for gaseous and particulate emissions over the NRSC and NRTC tests.
- 2.4.2. *Service accumulation schedule*
- Service accumulation schedules may be carried out at the choice of the manufacturer by running a machine equipped with the selected engine over an "in-service" accumulation schedule or by running the selected engine over a "dynamometer service" accumulation schedule.
- 2.4.2.1. In-service and dynamometer service accumulation
- 2.4.2.1.1. The manufacturer shall determine the form and duration of the service accumulation and the ageing cycle for engines in a manner consistent with good engineering practice.
- 2.4.2.1.2. The manufacturer shall determine the test points where gaseous and particulate emissions will be measured over the hot NRTC and NRSC cycles. The minimum number of test points shall be three, one at the beginning, one approximately in the middle and one at the end of the service accumulation schedule.
- 2.4.2.1.3. The emission values at the start point and at the emission durability period endpoint calculated in accordance with paragraph 2.4.5.2 shall be within the limit values applicable to the engine family, but individual emission results from the test points may exceed those limit values.
- 2.4.2.1.4. At the request of the manufacturer and with the agreement of the type-approval authority, only one test cycle (either the hot NRTC or NRSC cycle) needs to be run at each test point, with the other test cycle run only at the beginning and at the end of the service accumulation schedule.
- 2.4.2.1.5. In the case of constant speed engines, engines below 19 kW, engines above 560 kW, engines intended to be used in inland waterway vessels and engines for the propulsion of railcars and locomotives, only the NRSC cycle shall be run at each test point.
- 2.4.2.1.6. Service accumulation schedules may be different for different engine-after-treatment system families.
- 2.4.2.1.7. Service accumulation schedules may be shorter than the emission durability period, but shall not be shorter than the equivalent of at least one quarter of the relevant emission durability period specified in Section 3 of this Appendix.
- 2.4.2.1.8. Accelerated ageing by adjusting the service accumulation schedule on a fuel consumption basis is permitted. The adjustment shall be based on the ratio between the typical in-use fuel consumption and the fuel consumption on the ageing cycle, but fuel consumption on the ageing cycle must not exceed typical in-use fuel consumption by more than 30 %.
- 2.4.2.1.9. At the request of the manufacturer and with the agreement of the type-approval authority, alternative methods of accelerated ageing may be permitted.
- 2.4.2.1.10. The service accumulation schedule shall be fully described in the application for type-approval and reported to the type-approval authority before the start of any testing.
- 2.4.2.2. If the type-approval authority decides that additional measurements need to be performed between the points selected by the manufacturer it shall notify the manufacturer. The revised service accumulation schedule shall be prepared by the manufacturer and agreed by the type-approval authority.
- 2.4.3. *Engine testing*
- 2.4.3.1. Engine system stabilisation

- 2.4.3.1.1. For each engine-after-treatment system family, the manufacturer shall determine the number of hours of machine or engine running after which the operation of the engine-after-treatment system has stabilised. If requested by the approval authority the manufacturer shall make available the data and analysis used to make this determination. As an alternative, the manufacturer may select to run the engine or machine between 60 and 125 hours or the equivalent time on the ageing cycle to stabilise the engine-after-treatment system.
- 2.4.3.1.2. The end of the stabilisation period determined in Section 2.4.3.1.1 shall be deemed to be the start of the service accumulation schedule.
- 2.4.3.2. Service accumulation testing
- 2.4.3.2.1. After stabilisation, the engine shall be run over the service accumulation schedule selected by the manufacturer, as described in Section 2.3.2. At the periodic intervals in the service accumulation schedule determined by the manufacturer, and, where appropriate, also stipulated by the type-approval authority in accordance with Section 2.4.2.2, the engine shall be tested for gaseous and particulate emissions over the hot NRTC and NRSC cycles.

The manufacturer may select to measure the pollutant emissions before any exhaust after-treatment system separately from the pollutant emissions after any exhaust after-treatment system.

In accordance with Section 2.4.2.1.4, if it has been agreed that only one test cycle (hot NRTC or NRSC) be run at each test point, the other test cycle (hot NRTC or NRSC) shall be run at the beginning and end of the service accumulation schedule.

In accordance with Section 2.4.2.1.5, in the case of constant speed engines, engines below 19 kW, engines above 560 kW, engines intended to be used in inland waterway vessels and engines for the propulsion of railcars and locomotives, only the NRSC cycle shall be run at each test point.

- 2.4.3.2.2. During the service accumulation schedule, maintenance shall be carried out on the engine according to Section 2.5.
- 2.4.3.2.3. During the service accumulation schedule, unscheduled maintenance on the engine or machine may be performed, for example if the manufacturer's normal diagnostic system has detected a problem that would have indicated to the machine operator that a fault had arisen.
- 2.4.4. *Reporting*
- 2.4.4.1. The results of all emission tests (hot NRTC and NRSC) conducted during the service accumulation schedule shall be made available to the type-approval authority. If any emission test is declared to be void, the manufacturer shall provide an explanation of why the test has been declared void. In such a case, another series of emission tests shall be carried out within the following 100 hours of service accumulation.
- 2.4.4.2. The manufacturer shall retain records of all information concerning all the emission tests and maintenance carried out on the engine during the service accumulation schedule. This information shall be submitted to the approval authority along with the results of the emission tests conducted over the service accumulation schedule.

2.4.5. *Determination of deterioration factors*

- 2.4.5.1. For each pollutant measured over the hot NRTC and NRSC cycles at each test point during the service accumulation schedule, a "best fit" linear regression analysis shall be made on the basis of all test results. The results of each test for each pollutant shall be expressed to the same number of decimal places as the limit value for that pollutant, as applicable to the engine family, plus one additional decimal place.

In accordance with Section 2.4.2.1.4 or Section 2.4.2.1.5, if only one test cycle (hot NRTC or NRSC) has been run at each test point, the regression analysis shall be made only on the basis of the test results from the test cycle run at each test point.

At the request of the manufacturer and with the prior approval of the type approval authority, non-linear regression is permitted.

- 2.4.5.2. The emission values for each pollutant at the start of the service accumulation schedule and at the emission durability period end point that is applicable for the engine under test shall be calculated from the regression equation. If the service accumulation schedule is shorter than the emission durability period, the emission values at the emission durability period end point shall be determined by extrapolation of the regression equation as determined in Section 2.4.5.1.

In the case that emission values are used for engine families in the same engine-after-treatment family but with different emission durability periods, then the emission values at the emission durability period end point shall be recalculated for each emission durability period by extrapolation or interpolation of the regression equation as determined in Section 2.4.5.1.

- 2.4.5.3. The deterioration factor (DF) for each pollutant is defined as the ratio of the applied emission values at the emission durability period end point and at the start of the service accumulation schedule (multiplicative deterioration factor).

At the request of the manufacturer and with the prior approval of the type-approval authority, an additive DF for each pollutant may be applied. The additive DF is defined as the difference between the calculated emission values at the emission durability period end point and at the start of the service accumulation schedule.

An example for determination of DFs by using linear regression is shown in Figure 1 for NO_x emission.

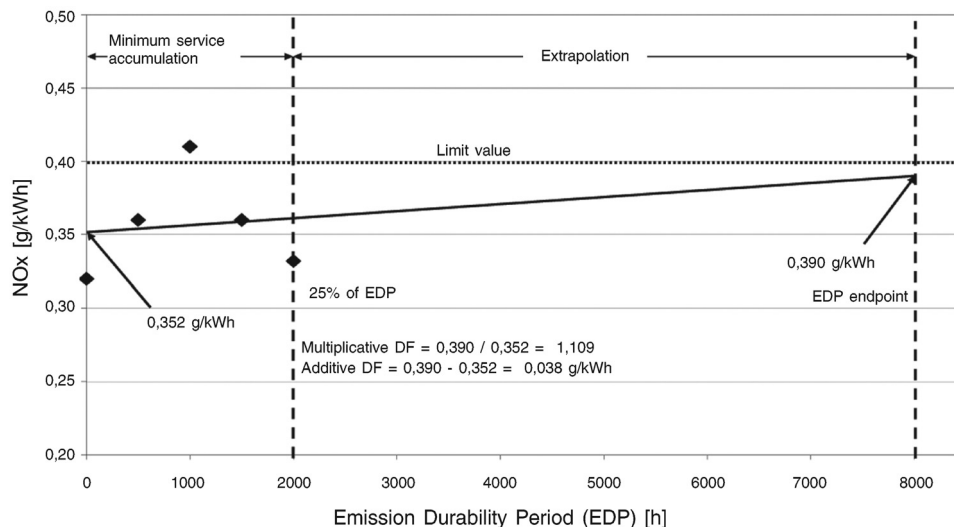
Mixing of multiplicative and additive DFs within one set of pollutants is not permitted.

If the calculation results in a value of less than 1,00 for a multiplicative DF, or less than 0,00 for an additive DF, then the deterioration factor shall be 1,0 or 0,00, respectively.

In accordance with Section 2.4.2.1.4, if it has been agreed that only one test cycle (hot NRTC or NRSC) be run at each test point and the other test cycle (hot NRTC or NRSC) run only at the beginning and end of the service accumulation schedule, the deterioration factor calculated for the test cycle that has been run at each test point shall be applicable also for the other test cycle.

Figure 1

Example of DF determination



2.4.6. Assigned deterioration factors

- 2.4.6.1. As an alternative to using a service accumulation schedule to determine DFs, engine manufacturers may select to use the following assigned multiplicative DFs:

Test cycle	CO	HC	NO _x	PM
NRTC	1,3	1,3	1,15	1,05
NRSC	1,3	1,3	1,15	1,05

Assigned additive DFs are not given. It is not permitted to transform the assigned multiplicative DFs into additive DFs.

Where assigned DFs are used, the manufacturer shall present to the type approval authority robust evidence that the emission control components can reasonably be expected to have the emission durability associated with those assigned factors. This evidence may be based upon design analysis, or tests, or a combination of both.

2.4.7. *Application of deterioration factors*

- 2.4.7.1. The engines shall meet the respective emission limits for each pollutant, as applicable to the engine family, after application of the deterioration factors to the test result as measured in accordance with Annex III (cycle-weighted specific emission for particulate and each individual gas). Depending on the type of DF, the following provisions apply:

— Multiplicative: (cycle weighted specific emission) * DF ≤ emission limit

— Additive: (cycle weighted specific emission) + DF ≤ emission limit

If the manufacturer, based on the option indicated in Section 1.2.1 of this Annex, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments, cycle weighted specific emission may include the adjustment for infrequent regeneration, where applicable.

- 2.4.7.2. For a multiplicative NO_x + HC DF, separate HC and NO_x DFs shall be determined and applied separately when calculating the deteriorated emission levels from an emissions test result before combining the resultant deteriorated NO_x and HC values to establish compliance with the emission limit.

- 2.4.7.3. The manufacturer may select to carry across the DFs determined for an engine-after-treatment system family to an engine system that does not fall into the same engine-after-treatment system family. In such cases, the manufacturer shall demonstrate to the approval authority that the engine system for which the engine-after-treatment system family was originally tested and the engine system for which the DFs are being carried across have similar technical specifications and installation requirements on the machine and that the emissions of such engine or engine system are similar.

In the case that DFs are carried across to an engine system with a different emission durability period, then the DFs shall be recalculated for the applicable emission durability period by extrapolation or interpolation of the regression equation as determined in Section 2.4.5.1.

- 2.4.7.4. The DF for each pollutant for each applicable test cycle shall be recorded in the test result document set out in Appendix 1 to Annex VII.

2.4.8. *Checking of conformity of production*

- 2.4.8.1. Conformity of production for emissions compliance is checked on the basis of Section 5 of Annex I.

- 2.4.8.2. The manufacturer may select to measure the pollutant emissions before any exhaust after-treatment system at the same time as the type-approval test is being performed. In so doing, the manufacturer may develop informal DFs separately for the engine and for the after-treatment system that may be used by the manufacturer as an aid to end of production line auditing.

- 2.4.8.3. For the purposes of type-approval, only the DFs determined in accordance with paragraph 2.4.5 or 2.4.6 shall be recorded in the test result document set out in Appendix 1 to Annex VII.

2.5. **Maintenance**

For the purpose of the service accumulation schedule, maintenance shall be performed in accordance with the manufacturer's manual for service and maintenance.

2.5.1. *Emission-related scheduled maintenance*

- 2.5.1.1. Emission-related scheduled maintenance during engine running, undertaken for the purpose of conducting a service accumulation schedule, must occur at equivalent intervals to those that will be specified in the manufacturer's maintenance instructions to the owner of the machine or engine. This maintenance schedule may be updated as necessary throughout the service accumulation schedule provided that no maintenance operation is deleted from the maintenance schedule after the operation has been performed on the test engine.

- 2.5.1.2. The engine manufacturer shall specify for the service accumulation schedules any adjustment, cleaning, maintenance (where necessary) and scheduled exchange of the following items:

— filters and coolers in the exhaust gas re-circulation system

— positive crankcase ventilation valve, if applicable

- fuel injector tips (only cleaning is permitted)
 - fuel injectors
 - turbocharger
 - electronic engine control unit and its associated sensors and actuators
 - particulate after-treatment system (including related components)
 - NO_x after-treatment system (including related components)
 - exhaust gas re-circulation system, including all related control valves and tubing
 - any other exhaust after-treatment system.
- 2.5.1.3. Critical emission-related scheduled maintenance shall only be performed if intended to be performed in-use and the requirement to perform such maintenance is to be communicated to the owner of the machine.
- 2.5.2. *Changes to scheduled maintenance*
- 2.5.2.1. The manufacturer shall submit a request to the type-approval authority for approval of any new scheduled maintenance that it wishes to perform during the service accumulation schedule and subsequently to recommend to owners of machines and engines. The request shall be accompanied by data supporting the need for the new scheduled maintenance and the maintenance interval.
- 2.5.3. *Non-emission-related scheduled maintenance*
- 2.5.3.1. Non-emission-related scheduled maintenance which is reasonable and technically necessary (for example oil change, oil filter change, fuel filter change, air filter change, cooling system maintenance, idle speed adjustment, governor, engine bolt torque, valve lash, injector lash, adjustment of the tension of any drive-belt, etc.) may be performed on engines or machines selected for the service accumulation schedule at the least frequent intervals recommended by the manufacturer to the owner (for example not at the intervals recommended for severe service).
- 2.5.4. *Repair*
- 2.5.4.1. Repairs to the components of an engine system selected for testing over a service accumulation schedule shall be performed only as a result of component failure or engine system malfunction. Repair of the engine itself, the emission control system or the fuel system is not permitted except to the extent defined in paragraph 2.5.4.2.
- 2.5.4.2. If the engine itself, the emission control system or the fuel system fail during the service accumulation schedule, the service accumulation shall be considered void, and a new service accumulation shall be started with a new engine system, unless the failed components are replaced with equivalent components that have been subject to a similar number of hours of service accumulation.
3. EMISSION DURABILITY PERIOD FOR STAGE IIIA, IIIB AND IV ENGINES
- 3.1. Manufacturers shall use the emission durability period in Table 1 of this section.

Table 1

Emission durability period for CI Stage IIIA, IIIB and IV Engines (hours)

Category (power band)	Emission durability period (hours)
≤ 37 kW (constant speed engines)	3 000
≤ 37 kW (variable speed engines)	5 000
> 37 kW	8 000
Engines for propulsion of inland waterway vessels	10 000
Railcar and Locomotive engines	10 000'

- (3) The following Appendices 6 and 7 are added:

Appendix 6

Determination of CO₂ Emissions for Stage I, II, IIIA, IIIB and IV Engines

1. Introduction

- 1.1. This Appendix sets out the provisions and test procedures for reporting CO₂ emissions for all stages I through IV. If the manufacturer, based on the option indicated in Section 1.2.1 of this Annex, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments, Appendix 7 to this Annex shall apply.

2. General requirements

- 2.1. CO₂ emissions shall be determined over the applicable test cycle specified in Section 1.1 of Annex III in accordance with Section 3 (NRSC) or Section 4 (hot start NRTC), respectively, of Annex III. For Stage IIIB CO₂ emissions shall be determined over the hot start NRTC test cycle.
- 2.2. The test results shall be reported as cycle averaged brake specific values and expressed in the unit of g/kWh.
- 2.3. If, at the choice of the manufacturer, the NRSC is operated as a ramped modal cycle, either the references to the NRTC laid down in this Appendix or the requirements of Appendix 7 to Annex III shall apply.

3. Determination of CO₂ emissions

3.1. Raw measurement

This section applies, if CO₂ is measured in the raw exhaust gas.

3.1.1. Measurement

CO₂ in the raw exhaust gas emitted by the engine submitted for testing shall be measured with a non-dispersive infrared (NDIR) analyser in accordance with Section 1.4.3.2 (NRSC) or Section 2.3.3.2 (NRTC), respectively, of Appendix 1 to Annex III.

The measurement system shall meet the linearity requirements of Section 1.5 of Appendix 2 to Annex III.

The measurement system shall meet the requirements of Section 1.4.1 (NRSC) or Section 2.3.1 (NRTC), respectively, of Appendix 1 to Annex III.

3.1.2. Data evaluation

The relevant data shall be recorded and stored in accordance with Section 3.7.4 (NRSC) or Section 4.5.7.2 (NRTC), respectively, of Annex III.

3.1.3. Calculation of cycle averaged emission

If measured on a dry basis, the dry/wet correction in accordance with Section 1.3.2 (NRSC) or Section 2.1.2.2 (NRTC), respectively, of Appendix 3 to Annex III shall be applied.

For the NRSC, the mass of CO₂ (g/h) shall be calculated for each individual mode in accordance with Section 1.3.4 of Appendix 3 to Annex III. The exhaust gas flows shall be determined in accordance with Sections 1.2.1 to 1.2.5 of Appendix 1 to Annex III.

For the NRTC, the mass of CO₂ (g/test) shall be calculated in accordance with Section 2.1.2.1 of Appendix 3 to Annex III. The exhaust gas flow shall be determined in accordance with Section 2.2.3 of Appendix 1 to Annex III.

3.2. Dilute measurement

This section applies, if CO₂ is measured in the dilute exhaust gas.

3.2.1. Measurement

CO₂ in the dilute exhaust gas emitted by the engine submitted for testing shall be measured with a non-dispersive infrared (NDIR) analyser in accordance with Section 1.4.3.2 (NRSC) or Section 2.3.3.2 (NRTC), respectively, of Appendix 1 to Annex III. Dilution of the exhaust shall be done with filtered ambient air, synthetic air or nitrogen. The flow capacity of the full flow system shall be large enough to completely eliminate water condensation in the dilution and sampling systems.

The measurement system shall meet the linearity requirements of Section 1.5 of Appendix 2 to Annex III.

The measurement system shall meet the requirements of Section 1.4.1 (NRSC) or Section 2.3.1 (NRTC), respectively, of Appendix 1 to Annex III.

3.2.2. Data evaluation

The relevant data shall be recorded and stored in accordance with Section 3.7.4 (NRSC) or Section 4.5.7.2 (NRTC), respectively, of Annex III.

3.2.3. Calculation of cycle averaged emission

If measured on a dry basis, the dry/wet correction in accordance with Section 1.3.2 (NRSC) or Section 2.1.2.2 (NRTC), respectively, of Appendix 3 to Annex III shall be applied.

For the NRSC, the mass of CO₂ (g/h) shall be calculated for each individual mode in accordance with Section 1.3.4 of Appendix 3 to Annex III. The diluted exhaust gas flows shall be determined in accordance with Section 1.2.6 of Appendix 1 to Annex III.

For the NRTC, the mass of CO₂ (g/test) shall be calculated in accordance with Section 2.2.3 of Appendix 3 to Annex III. The diluted exhaust gas flow shall be determined in accordance with Section 2.2.1 of Appendix 3 to Annex III.

Background correction shall be applied in accordance with Section 2.2.3.1.1 of Appendix 3 to Annex III.

3.3. Calculation of brake specific emissions

3.3.1. NRSC

The brake specific emissions e_{CO_2} (g/kWh) shall be calculated as follows:

$$e_{\text{CO}_2} = \frac{\sum_{i=1}^{i=n} (\text{CO}_{2\text{mass},i} \times W_{F,i})}{\sum_{i=1}^{i=n} (P_i \times W_{F,i})}$$

where:

$$P_i = P_{m,i} + P_{AE,i}$$

and

$\text{CO}_{2\text{mass},i}$ is the mass of CO₂ of the individual mode (g/h)

$P_{m,i}$ is the measured power of the individual mode (kW)

$P_{AE,i}$ is the power of the auxiliaries of the individual mode (kW)

$W_{F,i}$ is the weighting factor of the individual mode.

3.3.2. NRTC

The cycle work needed for the calculation of brake specific CO₂ emissions shall be determined in accordance with Section 4.6.2 of Annex III.

The brake specific emissions e_{CO_2} (g/kWh) shall be calculated as follows:

$$e_{\text{CO}_2} = \frac{m_{\text{CO}_2,\text{hot}}}{W_{\text{act},\text{hot}}}$$

where:

$m_{\text{CO}_2,\text{hot}}$ is the CO₂ mass emissions of the hot start NRTC (g)

$W_{\text{act},\text{hot}}$ is the actual cycle work of the hot start NRTC (kWh).

Appendix 7

Alternative determination of CO₂ emissions**1. Introduction**

If the manufacturer, based on the option indicated in Section 1.2.1 of this Annex, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments, the provisions and test procedures for reporting CO₂ emissions set out in this Appendix shall apply.

2. General requirements

- 2.1. CO₂ emissions shall be determined over the hot start NRTC test cycle in accordance with Section 7.8.3 of Annex 4B to UNECE Regulation No 96.03 series of amendments.
- 2.2. The test results shall be reported as cycle averaged brake specific values and expressed in the unit of g/kWh.

3. Determination of CO₂ emissions**3.1. Raw measurement**

This section applies, if CO₂ is measured in the raw exhaust gas.

3.1.1. Measurement

CO₂ in the raw exhaust gas emitted by the engine submitted for testing shall be measured with a non-dispersive infrared (NDIR) analyser in accordance with Section 9.4.6 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

The measurement system shall meet the linearity requirements of Section 8.1.4 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

The measurement system shall meet the requirements of Section 8.1.9 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.1.2. Data evaluation

The relevant data shall be recorded and stored in accordance with Section 7.8.3.2 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.1.3. Calculation of cycle averaged emission

If measured on a dry basis, the dry/wet correction in accordance with Section A.8.2.2 of Appendix 8 or Section A.7.3.2 of Appendix 7 to Annex 4B to UNECE Regulation No 96.03 series of amendments shall be applied to the instantaneous concentration values before any further calculation is done.

The mass of CO₂ (g/test) shall be calculated by multiplication of the time aligned instantaneous CO₂ concentrations and exhaust gas flows and integration over the test cycle in accordance with either of the following:

- (a) Section A.8.2.1.2 and Section A.8.2.5 of Appendix 8 to Annex 4B to UNECE Regulation No 96.03 series of amendments, by using the u values of CO₂ from Table A.8.1 or calculating the u values in accordance with Section A.8.2.4.2 of Appendix 8 to Annex 4B to UNECE Regulation No 96.03 series of amendments;
- (b) Section A.7.3.1 and Section A.7.3.3 of Appendix 7 to Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.2. Dilute measurement

This section applies, if CO₂ is measured in the dilute exhaust gas.

3.2.1. Measurement

CO₂ in the dilute exhaust gas emitted by the engine submitted for testing shall be measured with a non-dispersive infrared (NDIR) analyser in accordance with Section 9.4.6 of Annex 4B to UNECE Regulation No 96.03 series of amendments. Dilution of the exhaust shall be done with filtered ambient air, synthetic air or nitrogen. The flow capacity of the full flow system shall be large enough to completely eliminate water condensation in the dilution and sampling systems.

The measurement system shall meet the linearity requirements of Section 8.1.4 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

The measurement system shall meet the requirements of Section 8.1.9 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.2.2. Data evaluation

The relevant data shall be recorded and stored in accordance with Section 7.8.3.2 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.2.3. Calculation of cycle averaged emission

If measured on a dry basis, the dry/wet correction in accordance with Section A.8.3.2 of Appendix 8 or Section A.7.4.2 of Appendix 7 to Annex 4B to UNECE Regulation No 96.03 series of amendments shall be applied to the instantaneous concentration values before any further calculation is done.

The mass of CO₂ (g/test) shall be calculated by multiplication of the CO₂ concentrations and the diluted exhaust gas flows in accordance with either of the following:

- (a) Section A.8.3.1 and Section A.8.3.4 of Appendix 8 to Annex 4B to UNECE Regulation No 96.03 series of amendments, by using the u values of CO₂ from Table A.8.2 or calculating the u values in accordance with Section A.8.3.3 of Appendix 8 to Annex 4B to UNECE Regulation No 96.03 series of amendments;
- (b) Section A.7.4.1 and Section A.7.4.3 of Appendix 7 to Annex 4B to UNECE Regulation No 96.03 series of amendments.

Background correction shall be applied in accordance with Section A.8.3.2.4 of Appendix 8 or Section A.7.4.1 of Appendix 8 to Annex 4B to UNECE Regulation No 96.03 series of amendments.

3.3. Calculation of brake specific emissions

The cycle work needed for the calculation of brake specific CO₂ emissions shall be determined in accordance with Section 7.8.3.4 of Annex 4B to UNECE Regulation No 96.03 series of amendments.

The brake specific emissions e_{CO_2} (g/kWh) shall be calculated as follows:

$$e_{CO_2} = \frac{m_{CO_2, hot}}{W_{act, hot}}$$

where:

$m_{CO_2, hot}$ is the CO₂ mass emissions of the hot start NRTC (g)

$W_{act, hot}$ is the actual cycle work of the hot start NRTC (kWh)

ANNEX IV

In Annex VI to Directive 97/68/EC the following Section 1.a is added:

'1.a. This Annex applies as follows:

- (a) for stages I, II, IIIA, IIIB and IV the requirements of Section 1 of this Annex shall apply;
 - (b) if the manufacturer, based on the option indicated in Section 1.2.1 of this Annex, chooses to use the procedure of Annex 4B to UNECE Regulation No 96.03 series of amendments, Section 9 of Annex 4B to UNECE Regulation No 96.03 series of amendments shall apply.'
-

ANNEX V

In Annex VII to Directive 97/68/EC Appendix 1 is replaced by the following:

*Appendix 1***Test report for compression ignition engines test results ⁽¹⁾****Information concerning the test engine**

Engine type:

Engine identification number:

1. Information concerning the conduct of the test:

1.1. Reference fuel used for test

1.1.1. Cetane number:

1.1.2. Sulphur content:

1.1.3. Density:

1.2. Lubricant

1.2.1. Make(s):

1.2.2. Type(s):

(state percentage of oil in mixture if lubricant and fuel are mixed)

1.3. Engine driven equipment (if applicable)

1.3.1. Enumeration and identifying details:

1.3.2. Power absorbed at indicated engine speeds (as specified by the manufacturer):

Power P_{AE} (kW) absorbed at various engine speeds ⁽¹⁾ ⁽²⁾ , taking into account Appendix 3 to this Annex			
Equipment	Intermediate speed (if applicable)	Maximum power speed (if different from rated)	Rated speed ⁽³⁾
Total:			

⁽¹⁾ Delete as appropriate.

⁽²⁾ Shall not be greater than 10 per cent of the power measured during the test.

⁽³⁾ Insert values at engine speed corresponding to 100 % normalised speed if NRSC test uses this speed.

1.4. Engine performance

1.4.1. Engine speeds:

Idle: min⁻¹

Intermediate: min⁻¹

Maximum power: min⁻¹

Rated ⁽²⁾: min⁻¹

⁽¹⁾ For the case of several parent engines, the following is to be indicated for each of them.

⁽²⁾ Insert engine speed corresponding to 100 % normalised speed if NRSC test uses this speed.

1.4.2. Engine power ⁽¹⁾

Condition	Power setting (kW) at various engine speeds		
	Intermediate speed (if applicable)	Maximum power speed (if different from rated)	Rated speed ⁽¹⁾
Maximum power measured at specified test speed (P_M) (kW) (a)			
Total power absorbed by engine driven equipment as per paragraph 1.3.2 of this Appendix taking into account Appendix 3 (kW) (b)			
Net engine power as specified in Section 2.4 of Annex I (kW) (c)			
$c = a + b$			

⁽¹⁾ Replace with values at engine speed corresponding to 100 % normalised speed if NRSC test uses this speed.

2. Information concerning the conduct of the NRSC test:

2.1. Dynamometer setting (kW)

Per cent load	Dynamometer setting (kW) at various engine speeds				
	Intermediate speed (if applicable)	63 % (if applicable)	80 % (if applicable)	91 % (if applicable)	Rated speed ⁽¹⁾
10 (if applicable)					
25 (if applicable)					
50					
75 (if applicable)					
100					

⁽¹⁾ Replace with values at engine speed corresponding to 100 % normalised speed if NRSC test uses this speed.

2.2. Emission results of the engine/parent engine ⁽²⁾

Deterioration Factor (DF): calculated/fixed ⁽²⁾

Specify the DF values and the emission results in the following table ⁽²⁾:

NRSC test						
DF mult/add ³	CO	HC	NO _x	HC + NO _x	PM	
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC + NO _x (g/kWh)	PM (g/kWh)	CO ₂ (g/kWh)
Test result						
Final test result with DF						

⁽¹⁾ Uncorrected power measured in accordance with Section 2.4 of Annex I.

⁽²⁾ Delete as appropriate.

Additional control area test points (if applicable)						
Emissions at test point	Engine speed	Load (%)	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	PM (g/kWh)
Test result 1						
Test result 2						
Test result 3						

2.3. Sampling system used for the NRSC test:

2.3.1. Gaseous emissions ⁽¹⁾:

2.3.2. PM ⁽¹⁾:

2.3.2.1. Method ⁽²⁾: single/multiple filter

3. Information concerning the conduct of the NRTC test (if applicable):

3.1. Emission results of the engine/parent engine ⁽²⁾

Deterioration Factor (DF): calculated/fixed ⁽³⁾

Specify the DF values and the emission results in the following table ⁽³⁾:

Regeneration related data may be reported for Stage IV engines.

NRTC test						
DF mult/add ⁽³⁾	CO	HC	NO _x	HC + NO _x	PM	
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC + NO _x (g/kWh)	PM (g/kWh)	
Cold start						
Emissions	CO (g/kWh)	HC (g/kWh)	NO _x (g/kWh)	HC + NO _x (g/kWh)	PM (g/kWh)	CO ₂ (g/kWh)
Hot start w/o regeneration						
Hot start with regeneration ⁽³⁾						
kr,u (mult/add) ⁽³⁾ kr,d (mult/add) ⁽³⁾						
Weighted test result						
Final test result with DF						

Cycle work for hot start w/o regeneration kWh

3.2. Sampling system used for the NRTC test:

Gaseous emissions ⁽⁴⁾:

PM ⁽⁴⁾:

Method ⁽⁵⁾: single/multiple filter

⁽¹⁾ Indicate figure number of system used as defined in Annex VI Section 1 or Section 9 of Annex 4B of ECE R96 03 series of amendments, as applicable.

⁽²⁾ Delete as appropriate.

⁽³⁾ Delete as appropriate.

⁽⁴⁾ Indicate figure number of system used as defined in Annex VI Section 1 or Section 9 of Annex 4B of ECE R96 03 series of amendments, as applicable.

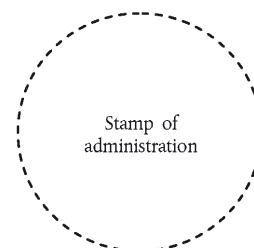
⁽⁵⁾ Delete as appropriate.

ANNEX VI

ANNEX XI

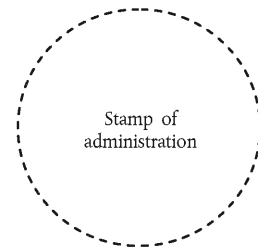
DATA SHEET OF TYPE-APPROVED ENGINES

1. SI Engines



Reported engine type approval		1	2	3	4
Type approval number					
Date of approval					
Name of manufacturer					
Engine type/family					
Engine description	General information ⁽¹⁾				
	Cooling medium ⁽¹⁾				
	Number of cylinders				
	Swept volume (cm ³)				
	Type of after-treatment ⁽²⁾				
	Rated speed (min ⁻¹)				
	Rated net power (kW)				
Emissions (g/kWh)	CO				
	HC				
	NO _x				
	PM				

⁽¹⁾ Liquid or air.⁽²⁾ Abbreviate: CAT = catalyst, PT = particulate trap, SCR = selective catalytic reduction.

2. **CI Engines** ⁽¹⁾ ⁽²⁾2.1. *General engine information*

Reported engine type approval		1	2	3	4
Type approval number					
Date of approval					
Name of manufacturer					
Engine type/family					
Engine description	General information ⁽¹⁾				
	Cooling medium ⁽²⁾				
	Number of cylinders				
	Swept volume (cm ³)				
	Type of after-treatment ⁽³⁾				
	Rated speed (min ⁻¹)				
	Maximum power speed (min ⁻¹)				
	Rated net power (kW)				
	Maximum net power (kW)				

⁽¹⁾ Abbreviate: DI = direct injection, PC = pre/swirl chamber, NA = naturally aspirated, TC = turbocharged, TCA = turbocharged including after-cooling, EGR = Exhaust gas recirculation. Examples: PC NA, DI TCA EGR.

⁽²⁾ Liquid or air.

⁽³⁾ Abbreviate: DOC = diesel oxidation catalyst, PT = particulate trap, SCR = selective catalytic reduction.

2.2. *Final emission result*

Reported engine type approval		1	2	3	4
NRSC final test result inclusive of DF (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				

⁽¹⁾ Complete all items that are applicable to the engine type/family.

⁽²⁾ In case of a family of engines insert details of parent engine.

Reported engine type approval		1	2	3	4
NRSC CO ₂ (g/kWh)					
NRTC final test result inclusive of DF (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				
NRTC hot cycle CO ₂ (g/kWh)					
NRTC hot cycle work (kWh)					

2.3. NRSC deterioration factors and emission test results

Reported engine type approval		1	2	3	4
DF mult/add ⁽¹⁾	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				
NRSC test result exclusive of DF (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				

⁽¹⁾ Delete as appropriate.

2.4. NRTC deterioration factors and emission test results

Reported engine type approval		1	2	3	4
DF mult/add ⁽¹⁾	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				
NRTC cold start test result exclusive of DF (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				

Reported engine type approval		1	2	3	4
NRTC hot start test result exclusive of DF (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				

(¹) Delete as appropriate.

2.5. NRTC hot start emission test results

Regeneration related data may be reported for Stage IV engines.

Reported engine type approval		1	2	3	4
NRTC hot start w/o regeneration (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM				
NRTC hot start with regeneration (g/kWh)	CO				
	HC				
	NO _x				
	HC + NO _x				
	PM'				

ANNEX VII

'ANNEX XII

RECOGNITION OF ALTERNATIVE TYPE-APPROVALS

1. The following type-approvals and, where applicable, the pertaining approval marks are recognised as being equivalent to an approval to this Directive for engines of categories A, B and C as defined in Article 9(2):
 - 1.1. Type approvals to Directive 2000/25/EC;
 - 1.2. Type-approvals to Directive 88/77/EEC, complying with the requirements of stages A or B regarding Article 2 and Annex I, Section 6.2.1 of Directive 88/77/EEC or UNECE Regulation No 49.02 series of amendments, corrigenda I/2;
 - 1.3. Type approvals according to UNECE Regulation No 96.
 2. For engines categories D, E, F and G (stage II) as defined in Article 9(3), the following type-approvals and, where applicable, the pertaining approval marks are recognised as being equivalent to an approval to this Directive:
 - 2.1. Directive 2000/25/EC, stage II approvals;
 - 2.2. Type-approvals to Directive 88/77/EEC as amended by Directive 99/96/EC which are in compliance with stages A, B1, B2 or C provided for in Article 2 and Section 6.2.1 of Annex I to that Directive;
 - 2.3. Type-approvals to UNECE Regulation No 49.03 series of amendments;
 - 2.4. UNECE Regulation No 96 stages D, E, F and G approvals according to paragraph 5.2.1 of the 01 series of amendments of Regulation No 96.
 3. For engines categories H, I, J and K (stage IIIA) as defined in Article 9(3a) and Article 9(3b), the following type-approvals and, where applicable, the pertaining approval marks are recognised as being equivalent to an approval to this Directive:
 - 3.1. Type-approvals to Directive 2005/55/EC, as amended by Directives 2005/78/EC and 2006/51/EC, which are in compliance with stages B1, B2 or C provided for in Article 2 and Section 6.2.1 of Annex I to that Directive;
 - 3.2. Type-approvals to UNECE Regulation No 49.05 series of amendments, which are in compliance with stages B1, B2 and C provided for in paragraph 5.2 of that Regulation;
 - 3.3. UNECE Regulation No 96 stages H, I, J and K approvals according to paragraph 5.2.1 of the 02 series of amendments of Regulation No 96.
 4. For engines categories L, M, N and P (stage IIIB) as defined in Article 9(3c), the following type-approvals and, where applicable, the pertaining approval marks are recognised as being equivalent to an approval to this Directive:
 - 4.1. Type-approvals to Directive 2005/55/EC, as amended by Directives 2005/78/EC and 2006/51/EC, which are in compliance with stages B2 or C provided for in Article 2 and Section 6.2.1 of Annex I to that Directive;
 - 4.2. Type-approvals to UNECE Regulation No 49.05 series of amendments, which are in compliance with stages B2 or C provided for in paragraph 5.2 of that regulation;
 - 4.3. UNECE Regulation No 96 stages L, M, N and P approvals according to paragraph 5.2.1 of the 03 series of amendments of Regulation No 96.
 5. For engines categories Q and R (stage IV) as defined in Article 9(3d), the following type-approvals and, where applicable, the pertaining approval marks are recognised as being equivalent to an approval to this Directive:
 - 5.1. Type-approvals to Regulation (EC) No 595/2009 and its implementing measures, if it is confirmed by a technical service that the engine meets the requirements of Annex I Section 8.5 to this Directive;
 - 5.2. Type-approvals to UNECE Regulation No 49.06 series of amendments, if it is confirmed by a technical service that the engine meets the requirements of Annex I Section 8.5 to this Directive.'
-

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