

Official Journal

of the European Union

L 233



English edition

Legislation

Volume 54

9 September 2011

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Price: EUR 8,50

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.

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

II

*(Non-legislative acts)***ACTS ADOPTED BY BODIES CREATED BY
INTERNATIONAL AGREEMENTS**

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocsts.html>

**Regulation No 16 of the Economic Commission for Europe of the United Nations (UN/ECE) —
Uniform provisions concerning the approval of:**

- I. Safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems for occupants of power-driven vehicles**
- II. Vehicles equipped with safety-belts, safety-belt reminder, restraint systems, child restraint systems and ISOFIX child restraint systems**

Incorporating all valid text up to:

Supplement 1 to the 06 series of amendments — Date of entry into force: 23 June 2011

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1. SCOPE

This Regulation applies to:

- 1.1. Vehicles of category M, N, O, L2, L4, L5, L6, L7 and T ⁽¹⁾, with regard to the installation of safety-belts and restraint systems which are intended for separate use, i.e. as individual fittings, by persons of adult build occupying forward or rearward-facing seats.
- 1.2. Safety-belts and restraint systems which are intended for separate use, i.e. as individual fittings, by persons of adult build occupying forward or rearward-facing seats, and are designed for installation in vehicles of category M, N, O, L2, L4, L5, L6, L7 and T ⁽¹⁾.
- 1.3. Vehicles of category M1 and N1 ⁽¹⁾ with regard to the installation of child restraint systems and ISOFIX child restraint systems.
- 1.4. Vehicles of categories M1 with regard to safety belt reminder ⁽²⁾.
- 1.5. At the request of the manufacturer, it also applies to the installation of child restraint systems and ISOFIX child restraint systems designated for installation in vehicles of categories M2 and M3 ⁽¹⁾.

2. DEFINITIONS

2.1. Safety-belt (seat-belt, belt)

An arrangement of straps with a securing buckle, adjusting devices and attachments which is capable of being anchored to the interior of a power-driven vehicle and is designed to diminish the risk of injury to its wearer, in the event of collision or of abrupt deceleration of the vehicle, by limiting the mobility of the wearer's body. Such an arrangement is generally referred to as a 'belt assembly', which term also embraces any device for absorbing energy or for retracting the belt.

The arrangement can be tested and approved as a safety-belt arrangement or as a restraint system.

2.1.1. Lap belt

A two-point belt which passes across the front of the wearer's pelvic region.

2.1.2. Diagonal belt

A belt which passes diagonally across the front of the chest from the hip to the opposite shoulder.

2.1.3. Three-point belt

A belt which is essentially a combination of a lap strap and a diagonal strap.

2.1.4. S-type belt

A belt arrangement other than a three-point belt or a lap belt.

2.1.5. Harness belt

A S-type belt arrangement comprising a lap belt and shoulder straps; a harness belt may be provided with an additional crotch strap assembly.

⁽¹⁾ As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document TRANS/WP.29/78/Rev.1/Amend.2, as last amended by Amendment 4.

⁽²⁾ Japan shall not be prevented, by the obligations of the Agreement to which this Regulation is annexed, from requiring vehicles of category N1, which are granted type-approvals under this regulation to meet its existing national requirements for safety-belt reminders.

- 2.2. Belt type
- Belts of different 'types' are belts differing substantially from one another; the differences may relate in particular to:
- 2.2.1. rigid parts (buckle, attachments, retractor, etc.);
 - 2.2.2. the material, weave, dimensions and colour of the straps; or
 - 2.2.3. the geometry of the belt assembly.
- 2.3. Strap
- A flexible component designed to hold the body and to transmit stresses to the belt anchorages.
- 2.4. Buckle
- A quick-release device enabling the wearer to be held by the belt. The buckle may incorporate the adjusting device, except in the case of a harness belt buckle.
- 2.5. Belt adjusting device
- A device enabling the belt to be adjusted according to the requirements of the individual wearer and to the position of the seat. The adjusting device may be part of the buckle, or a retractor, or any other part of the safety-belt.
- 2.6. Pre-loading device
- An additional or integrated device which tightens the seat-belt webbing in order to reduce the slack of the belt during a crash sequence.
- 2.7. 'Reference zone' means the space between two vertical longitudinal planes, 400 mm apart and symmetrical with respect to the H-point, and defined by rotation from vertical to horizontal of the head-form apparatus, described in Regulation No 21 Annex 1. The apparatus shall be positioned as described in that Annex to Regulation No 21 and set to the maximum length of 840 mm.
- 2.8. 'Airbag assembly' means a device installed to supplement safety-belts and restraint systems in power-driven vehicles, i.e. system which, in the event of a severe impact affecting the vehicle automatically deploys a flexible structure intended to limit, by compression of the gas contained within it, the gravity of the contacts of one or more parts of the body of an occupant of the vehicle with the interior of the passenger compartment.
- 2.9. 'Passenger airbag' means an airbag assembly intended to protect occupant(s) in seats other than the driver's in the event of a frontal collision.
- 2.10. 'Child restraint' means a safety device as defined in Regulation No 44.
- 2.11. 'Rearward-facing' means facing in the direction opposite to the normal direction of travel of the vehicle.
- 2.12. Attachments
- Parts of the belt assembly including the necessary securing components, which enable it to be attached to the belt anchorages.
- 2.13. Energy absorber
- Device designed to disperse energy independently of or jointly with the strap and forming part of a belt assembly.

- 2.14. Retractor
Device to accommodate part or the whole of the strap of a safety-belt.
- 2.14.1. Non-locking retractor (type 1)
A retractor from which the strap is extracted to its full length by a small external force and which provides no adjustment for the length of the extracted strap.
- 2.14.2. Manually unlocking retractor (type 2)
A retractor requiring the manual operation of a device by the user to unlock the retractor in order to obtain the desired strap extraction and which locks automatically when the said operation ceases.
- 2.14.3. Automatically locking retractor (type 3)
A retractor allowing extraction of the strap to the desired length and which, when the buckle is fastened, automatically adjusts the strap to the wearer. Further extraction of the strap is prevented without voluntary intervention by the wearer.
- 2.14.4. Emergency locking retractor (type 4)
A retractor which during normal driving conditions does not restrict the freedom of movement by the wearer of the safety-belt. Such a device has length adjusting components which automatically adjust the strap to the wearer and a locking mechanism actuated in an emergency by:
- 2.14.4.1. deceleration of the vehicle (single sensitivity).
- 2.14.4.2. A combination of deceleration of the vehicle, movement of the webbing or any other automatic means (multiple sensitivity).
- 2.14.5. Emergency locking retractor with higher response threshold (type 4N)
A retractor of the type defined in paragraph 2.14.4, but having special properties as regards its use in vehicles of categories M2, M3, N1, N2 and N3 ⁽¹⁾.
- 2.14.6. Belt adjustment device for height
A device enabling the position in height of the upper pillar loop of a belt to be adjusted according to the requirements of the individual wearer and the position of the seat. Such a device may be considered as a part of the belt or a part of the anchorage of the belt.
- 2.15. Belt anchorages
Parts of the vehicles structure or seat structure or any other part of the vehicle to which the safety-belt assemblies are to be secured.
- 2.16. Vehicle type as regards safety-belts and restraint systems
Category of power-driven vehicles which do not differ in such essential respects as the dimensions, lines and materials of components of the vehicle structure or seat structure or any other part of the vehicle to which the safety-belts and the restraint systems are attached.
- 2.17. Restraint system
A system for a specific vehicle type or a type defined by the vehicle manufacturer and agreed by the Technical Service consisting of a seat and a belt fixed to the vehicle by appropriate means and consisting additionally of all elements which are provided to diminish the risk of injury to the wearer, in the event of an abrupt vehicle deceleration, by limiting the mobility of the wearer's body.

⁽¹⁾ As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document TRANS/ WP.29/78/Rev.1/Amend.2, as last amended by Amendment 4.

- 2.18. Seat
- A structure which may or may not be integral with the vehicle structure complete with trim, intended to seat one adult person. The term covers both an individual seat or part of a bench seat intended to seat one person.
- 2.18.1. 'A front passenger seat' means any seat where the 'foremost H-point' of the seat in question is in or in front of the vertical transverse plane through the driver's R-point.
- 2.19. Group of seats
- Either a bench-type seat or seats which are separate but side by side (i.e. fixed so that front seat anchorages of one of these seats are in line with the front of the rear anchorages of the other or between the anchorages of the other seat) and accommodate one or more seated adult persons.
- 2.20. Bench seat
- A structure complete with trim, intended to seat more than one adult person.
- 2.21. Adjustment system of the seat
- The complete device by which the seat or its parts can be adjusted to a position suited to the morphology of the seated occupant; this device may, in particular, permit of:
- 2.21.1. longitudinal displacement;
- 2.21.2. vertical displacement;
- 2.21.3. angular displacement.
- 2.22. Seat anchorage
- The system by which the seat assembly is secured to the vehicle structure, including the affected parts of the vehicle structure.
- 2.23. Seat type
- A category of seats which do not differ in such essential respects as:
- 2.23.1. the shape, dimensions and materials of the seat structure;
- 2.23.2. the types and dimensions of the seat lock adjustment and locking systems;
- 2.23.3. the type and dimensions of the belt anchorage on the seat, of the seat anchorage and of the affected parts of the vehicle structure.
- 2.24. Displacement system of the seat
- A device enabling the seat or one of its parts to be displaced angularly or longitudinally, without a fixed intermediate position (to facilitate access by passengers).
- 2.25. Locking system of the seat
- A device ensuring that the seat and its parts are maintained in any position of use.
- 2.26. Enclosed buckle-release button
- A buckle-release button such that it must not be possible to release the buckle using a sphere having a diameter of 40 mm.

- 2.27. Non-enclosed buckle-release button
A buckle-release button such that it must be possible to release the buckle using a sphere having a diameter of 40 mm.
- 2.28. Tension-reducing device
A device which is incorporated in the retractor and reduces the tension of the strap automatically when the safety-belt is fastened. When it is released, such a device switches off automatically.
- 2.29. 'ISOFIX' is a system for the connection of child restraint systems to vehicles which has two vehicle rigid anchorages, two corresponding rigid attachments on the child restraint system, and a mean to limit the pitch rotation of the child restraint system.
- 2.30. 'ISOFIX child restraint system' means a child restraint system, fulfilling the requirements of Regulation No 44, which has to be attached to an ISOFIX anchorages system, fulfilling the requirements of Regulation No 14.
- 2.31. 'ISOFIX position' means a system which allows to install:
- (a) either a universal ISOFIX forward facing child restraint system as defined in Regulation No 44;
 - (b) or a semi-universal ISOFIX forward facing child restraint system as defined in Regulation No 44;
 - (c) or a semi-universal ISOFIX rearward facing child restraint system as defined in Regulation No 44;
 - (d) or a semi-universal ISOFIX lateral facing position child restraint system as defined in Regulation No 44;
 - (e) or a specific vehicle ISOFIX child restraint system as defined in Regulation No 44.
- 2.32. 'ISOFIX anchorages system' means a system made up of two ISOFIX low anchorages, fulfilling the requirements of Regulation No 14, and which is designed for attaching an ISOFIX child restraint system in conjunction with an anti-rotation device.
- 2.33. 'ISOFIX low anchorage' means one 6 mm diameter rigid round horizontal bar, extending from vehicle or seat structure to accept and restrain an ISOFIX child restraint system with ISOFIX attachments.
- 2.34. 'Anti-rotation device'
- (a) An anti-rotation device for an ISOFIX universal child restraint system consists of the ISOFIX top-tether.
 - (b) An anti-rotation device for an ISOFIX semi-universal child restraint system consists of a top tether, the vehicle dashboard or a support leg intended to limit the rotation of the restraint during a frontal impact.
 - (c) For ISOFIX, universal and semi-universal, child restraint systems the vehicle seat itself does not constitute an anti-rotation device.
- 2.35. 'ISOFIX top tether anchorage' means a feature, fulfilling the requirements of Regulation No 14, such as a bar, located in a defined zone, designed to accept an ISOFIX top tether strap connector and transfer its restraint force to the vehicle structure.

- 2.36. A 'guidance device' is intended to help the person installing the ISOFIX child restraint system by physically guiding the ISOFIX attachments on the ISOFIX child restraint into correct alignment with the ISOFIX low anchorages to facilitate engagement.
- 2.37. 'ISOFIX marking fixture' means something that informs someone wishing to install an ISOFIX child restraint system of the ISOFIX positions in the vehicle and the position of each corresponding ISOFIX anchorages system.
- 2.38. 'Child restraint fixture' (CRF) means a fixture according to one out of the seven ISOFIX size classes defined in paragraph 4 of Annex 17 — Appendix 2 of this Regulation, and particularly whose dimensions are given from Figure 1 to Figure 7 in the previous mentioned paragraph 4. Those child restraint fixtures (CRF) are used, in this Regulation, to check what are the ISOFIX child restraint systems size classes which can be accommodated on the vehicle ISOFIX positions. Also one of the CRF, the so-called ISO/F2 (B), which is described in Figure 2 of the previous mentioned paragraph 4, is used in Regulation No 14 to check the location and the possibility of access to any ISOFIX anchorages system.
- 2.39. 'Safety-belt reminder', means a system dedicated to alert the driver when he/she does not use the safety-belt. The system is constituted by a detection of an unfastened safety-belt and by two levels of driver's alert: a first level warning and a second level warning.
- 2.40. 'Visual warning' means a warning by visual signal (lighting, blinking or visual display of symbol or message).
- 2.41. 'Audible warning' means a warning by sound signal.
- 2.42. 'First level warning' means a visual warning activated when the ignition switch is engaged (engine running or not) and the driver's safety-belt is not fastened. An audible warning can be added as an option.
- 2.43. 'Second level warning' means a visual and audible warning activated when a driver operates a vehicle without fastening the safety-belt.
- 2.44. 'Safety-belt is not fastened' means, at the option of the manufacturer, either the driver safety-belt buckle is not engaged or the webbing length pulled out of the retractor is 100 mm or less.
- 2.45. 'Vehicle is in normal operation' means that vehicle is in forward motion at the speed greater than 10 km/h.
3. APPLICATION FOR APPROVAL
- 3.1. Vehicle type
- 3.1.1. The application for approval of a vehicle type with regard to the installation of its safety-belts and restraint systems shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 3.1.2. It shall be accompanied by the undermentioned documents in triplicate and the following particulars:
- 3.1.2.1. Drawings of the general vehicle structure on an appropriate scale, showing the positions of the safety-belts, and detailed drawings of the safety-belts and of the points to which they are attached;
- 3.1.2.2. A specification of the materials used which may affect the strength of the safety-belts;
- 3.1.2.3. A technical description of the safety-belts;
- 3.1.2.4. In the case of safety-belts affixed to the seat structure;

- 3.1.2.5. Detailed description of the vehicle type with regard to the design of the seats, of the seat anchorages and their adjustment and locking systems;
- 3.1.2.6. Drawings, on an appropriate scale and in sufficient detail, of the seats, of their anchorages to the vehicle, and of their adjustment and locking systems.
- 3.1.3. At the opinion of the manufacturer, a vehicle representative of the vehicle type to be approved or the parts of the vehicle considered essential for the safety-belt tests by the Technical Service conducting approval tests shall be submitted to the service.
- 3.2. Safety-belt type
- 3.2.1. The application for approval of a type of safety-belt shall be submitted by the holder of the trade mark or by his duly accredited representative. In the case of restraint systems, the application for approval of a type of restraint system shall be submitted by the holder of the trade mark or by his representative or by the manufacturer of the vehicle in which it is to be installed or by his representative.
- 3.2.2. It shall be accompanied by:
 - 3.2.2.1. A technical description of the belt type, specifying the straps and rigid parts used and accompanied by drawings of the parts making up the belt; the drawings must show the position intended for the approval number and the additional symbol(s) in relation to the circle of the approval mark. The description shall mention the colour of the model submitted for approval, and specify the vehicle type(s) for which this belt type is intended. In the case of retractors, installation instructions for the sensing device shall be provided; and for pre-loading devices or systems a full technical description of the construction and function including the sensing, if any, describing the method of activation and any necessary method to avoid inadvertent activation shall be provided. In the case of a restraint system the description shall include: drawings of the vehicle structure and of the seat structure, adjustment system and attachments on an appropriate scale showing the sites of the seat anchorages and belt anchorages and reinforcements in sufficient detail; together with a specification of the materials used which may affect the strength of the seat anchorages and belt anchorages, and a technical description of the seat anchorages and the belt anchorages. If the belt is designed to be fixed to the vehicle structure through a belt adjustment device for height, the technical description shall specify whether or not this device is considered as a part of the belt;
 - 3.2.2.2. Six samples of the belt type, one of which is for reference purposes;
 - 3.2.2.3. A 10-metre length of each type of strap used in the type of belt;
 - 3.2.2.4. The Technical Service conducting the type-approval tests shall be entitled to request further samples.
- 3.2.3. In the case of restraint systems, two samples which may include two of the samples of belts required under paragraphs 3.2.2.2 and 3.2.2.3 at the option of the manufacturer, either a vehicle representative of the vehicle type to be approved, or the part or parts of the vehicle considered essential by the Technical Service conducting approval tests for testing the restraint system shall be submitted to the service.
- 4. MARKINGS

The samples of a belt type or type of restraint system submitted for approval in conformity with the provisions of paragraphs 3.2.2.2, 3.2.2.3 and 3.2.2.4 above shall be clearly and indelibly marked with the manufacturer's name, initials or trade name or mark.
- 5. APPROVAL
- 5.1. A certificate conforming to the model specified in paragraph 5.1.1 or 5.1.2 shall be attached to the type approval certificate:
 - 5.1.1. Annex 1A for applications referred to in paragraph 3.1;

- 5.1.2. Annex 1B for applications referred to in paragraph 3.2.
- 5.2. Vehicle type
- 5.2.1. If the vehicle submitted for approval pursuant this Regulation meets the requirements of paragraph 8 below, and of Annexes 15 and 16 to this Regulation, approval of that vehicle type shall be granted.
- 5.2.2. An approval number shall be assigned to each type approved. Its first two digits (at present 06 corresponding to the 06 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another vehicle type as defined in paragraph 2.16 above.
- 5.2.3. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement which apply this Regulation by means of a form conforming to the model in Annex 1A to this Regulation.
- 5.2.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation an international approval mark consisting of:
- 5.2.4.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽¹⁾;
- 5.2.4.2. the number of this Regulation, followed by the letter R, a dash and the approval number to the right of the circle prescribed in paragraph 5.2.4.1.
- 5.2.5. If the vehicle conforms to a vehicle type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 5.2.4.1 need not be repeated; in such a case the additional numbers and symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 5.2.4.1.
- 5.2.6. The approval mark shall be clearly legible and be indelible.
- 5.2.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 5.3. Safety-belt type
- 5.3.1. If the samples of a type of belt which are submitted in conformity with the provisions of paragraph 3.2 above meet the requirements of paragraphs 4, 5.3 and 6 of this Regulation, approval shall be granted.

⁽¹⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Serbia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35 (vacant), 36 for Lithuania, 37 for Turkey, 38 (vacant), 39 for Azerbaijan, 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for South Africa, 48 for New Zealand, 49 for Cyprus, 50 for Malta, 51 for the Republic of Korea, 52 for Malaysia, 53 for Thailand, 54 and 55 (vacant), 56 for Montenegro, 57 (vacant) and 58 for Tunisia. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

- 5.3.2. An approval number shall be assigned to each type approved. Its first two digits (at present 06 corresponding to the 06 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of belt or restraint system.
- 5.3.3. Notice of approval or of extension or refusal of approval of a type of belt or restraint system, pursuant to this Regulation, shall be communicated to the Parties to the 1958 Agreement which apply this Regulation by means of a form conforming to the model in Annex 1B to this Regulation.
- 5.3.4. In addition to the marks prescribed in paragraph 4 above, the following particulars shall be affixed in a suitable space to every belt conforming to a type approved under this Regulation:
- 5.3.4.1. An international approval mark consisting of:
- 5.3.4.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽¹⁾;
- 5.3.4.1.2. an approval number.
- 5.3.4.2. The following additional symbol(s):
- 5.3.4.2.1. The letter 'A' for a three-point belt, the letter 'B' for a lap belt and the letter 'S' for special-type belts.
- 5.3.4.2.2. The symbols referred to in paragraph 5.3.4.2.1 above shall be supplemented by the following additional markings:
- 5.3.4.2.2.1. the letter 'e' for a belt with an energy absorption device;
- 5.3.4.2.2.2. the letter 'r' for a belt incorporating a retractor followed by the symbol (1, 2, 3, 4 or 4N) of the retractor used, in accordance with paragraph 2.14 of this Regulation, and the letter 'm' if the retractor used is an emergency locking retractor with multiple sensitivity;
- 5.3.4.2.2.3. the letter 'p' in the case of safety-belts with a pre-loading device;
- 5.3.4.2.2.4. the letter 't' in the case of a safety-belt with a retractor incorporating a tension-reducing device;
- 5.3.4.2.2.5. belts fitted with a type 4N retractor shall also bear a symbol consisting of a rectangle with a vehicle of category M1 crossed out, indicating that the use of this type of retractor is prohibited in vehicles of that category;
- 5.3.4.2.2.6. if the safety-belt is approved following the provisions of paragraph 6.4.1.3.3 of this Regulation, it shall be marked with the word 'AIRBAG' in a rectangle.
- 5.3.4.2.3. The symbol referred to in paragraph 5.3.4.2.1 above shall be preceded by the letter 'Z' when the safety-belt is part of a restraint system.
- 5.3.5. Annex 2, paragraph to this Regulation gives examples of arrangements of the approval mark.

⁽¹⁾ See the footnote to paragraph 5.2.4.1.

- 5.3.6. The particulars referred to in paragraph 5.3.4 above shall be clearly legible and be indelible, and may be permanently affixed either by means of a label or by direct marking. The label or marking shall be resistant to wear.
- 5.3.7. The labels referred to in paragraph 5.3.6 above may be issued either by the authority which has granted the approval or, subject to that authority's authorisation, by the manufacturer.
6. SPECIFICATIONS
- 6.1. General specifications
- 6.1.1. Each sample submitted in conformity with paragraphs 3.2.2.2, 3.2.2.3 and 3.2.2.4 above shall meet the specifications set forth in paragraph 6 of this Regulation.
- 6.1.2. The belt or the restraint system shall be so designed and constructed that, when correctly installed and properly used by an occupant, its satisfactory operation is assured and it reduces the risk of bodily injury in the event of an accident.
- 6.1.3. The straps of the belt shall not be liable to assume a dangerous configuration.
- 6.1.4. The use of materials with properties of polyamide 6 as regards water retention is prohibited in all mechanical parts for which such a phenomenon is likely to have an adverse effect on their operation.
- 6.2. Rigid parts
- 6.2.1. General
- 6.2.1.1. The rigid parts of the safety-belt, such as buckles, adjusting devices, attachments and the like, shall not have sharp edges liable to cause wear or breakage of the straps by chafing.
- 6.2.1.2. All parts of the belt assembly liable to be affected by corrosion shall be suitably protected against it. After undergoing the corrosion test prescribed in paragraph 7.2, neither signs of deterioration likely to impair the proper functioning of the device nor any significant corrosion shall be visible to the unaided eye of a qualified observer.
- 6.2.1.3. Rigid parts intended to absorb energy or to be subjected to or to transmit a load shall not be fragile.
- 6.2.1.4. The rigid items and parts made of plastics of a safety-belt must be so located and installed that they are not liable, during every day use of a power-driven vehicle, to become trapped under a moveable seat or in a door of that vehicle. If any of these items and parts do not comply with the above conditions, they shall be subjected to the cold impact test specified in paragraph 7.5.4 below. After the test, if any visible cracks are present in any plastic cover or retainer of rigid item, the complete plastic part shall then be removed and the remaining assembly shall then be assessed against its continued security. If the remaining assembly is still secure, or no visible cracks are present, it will then be further assessed against the test requirements specified in paragraphs 6.2.2, 6.2.3 and 6.4.
- 6.2.2. Buckle
- 6.2.2.1. The buckle shall be so designed as to preclude any possibility of incorrect use. This means, inter alia, that it must not be possible for the buckle to be left in a partially-closed condition. The procedure for opening the buckle must be evident. The parts of the buckle likely to contact the body of the wearer shall present a section of not less than 20 cm² and at least 46 mm in width, measured in a plane situated at a maximal distance of 2,5 mm from the contact surface. In the case of harness belt buckles, the latter requirement shall be regarded as satisfied if the contact area of the buckle with the wearer's body is comprised between 20 and 40 cm².

- 6.2.2.2. The buckle, even when not under tension, shall remain closed whatever the position of the vehicle. It shall not be possible to release the buckle inadvertently, accidentally or with a force of less than 1 daN. The buckle shall be easy to use and to grasp; when it is not under tension and when under the tension specified in paragraph 7.8.2 below, it shall be capable of being released by the wearer with a single simple movement of one hand in one direction; in addition, in the case of belt assemblies intended to be used for the front outboard seats, except in these harness belts, it shall also be capable of being engaged by the wearer with a simple movement of one hand in one direction. The buckle shall be released by pressing either a button or a similar device. The surface to which this pressure is applied shall have the following dimensions, with the button in the actual release position and when projected into a plane perpendicular to the button's initial direction of motion: for enclosed buttons, an area of not less than 4,5 cm² and a width of not less than 15 mm; for non-enclosed buttons, an area of not less than 2,5 cm² and a width of not less than 10 mm. The buckle release area shall be coloured red. No other part of the buckle shall be of this colour. When the seat is occupied, red warning light in any part of the buckle is permitted if it is switched off after the occupant has buckled.
- 6.2.2.3. The buckle, when tested in accordance with paragraph 7.5.3 below, shall operate normally.
- 6.2.2.4. The buckle shall be capable of withstanding repeated operation and, prior to the dynamic test specified in paragraph 7.7 shall undergo 5 000 opening and closing cycles under normal conditions of use. In the case of harness belt buckles, this test may be carried out without all the tongues being introduced.
- 6.2.2.5. The force required to open the buckle in the test as prescribed in paragraph 7.8 below shall not exceed 6 daN.
- 6.2.2.6. The buckle shall be tested for strength as prescribed in paragraphs 7.5.1 and, where appropriate, 7.5.5. It must not break, be seriously distorted or become detached under the tension set up by the prescribed load.
- 6.2.2.7. In the case of buckles which incorporate a component common to two assemblies, the strength and release tests of paragraphs 7.7 and 7.8 shall also be carried out with the part of the buckle pertaining to one assembly being engaged in the mating part pertaining to the other, if it is possible for the buckle to be so assembled in use.
- 6.2.3. Belt adjusting device
- 6.2.3.1. The belt after being put on by the wearer, shall either adjust automatically to fit him or be such that the manually adjusting device shall be readily accessible to the seated wearer and shall be convenient and easy to use. It shall also allow the belt to be tightened with one hand to suit the wearer's body size and the position of the vehicle seat.
- 6.2.3.2. Two samples of each belt adjusting device shall be tested in accordance with the requirements of paragraph 7.3. The strap slip shall not exceed 25 mm for each sample of adjusting device and the sum of shifts for all the adjusting devices shall not exceed 40 mm.
- 6.2.3.3. All the adjustment devices shall be tested for strength as prescribed in paragraph 7.5.1. They must not break or become detached under the tension set up by the prescribed load.
- 6.2.3.4. When tested in accordance with paragraph 7.5.6 the force required to operate any manually adjusting device shall not exceed 5 daN.
- 6.2.4. Attachments and belt adjustment devices for height
- The attachments shall be tested for strength as prescribed in paragraphs 7.5.1 and 7.5.2. The actual belt adjustment devices for height shall be tested for strength as prescribed in paragraph 7.5.2 of this Regulation where they have not been tested on the vehicle in application of Regulation No 14 (in its last version of amendments) relative to anchorages of safety-belts. These parts must not break or become detached under the tension set up by the prescribed load.

6.2.5. Retractors

Retractors shall be subjected to tests and shall fulfil the requirements specified below, including the tests for strength prescribed in paragraphs 7.5.1 and 7.5.2. (These requirements are such that they exclude non-locking retractors.)

6.2.5.1. Manually unlocking retractors

6.2.5.1.1. The strap of a safety-belt assembly equipped with a manually unlocking retractor shall not move more than 25 mm between locking positions of the reactor.

6.2.5.1.2. The strap of a safety-belt assembly shall extract from a manually unlocking retractor within 6 mm of its maximum length when a tension of not less than 1,4 daN and not more than 2,2 daN is applied to the strap in the normal direction of pull.

6.2.5.1.3. The strap shall be withdrawn from the retractor, and allowed to retract repeatedly by the method described in paragraph 7.6.1 until 5 000 cycles have been completed. The retractor shall then be subjected to the corrosion test given in paragraph 7.2 and to the dust test given in paragraph 7.6.3. It shall then satisfactorily complete a further 5 000 cycles of withdrawal and retraction. After the above tests, the retractor shall operate correctly and still meet the requirements of paragraphs 6.2.5.1.1 and 6.2.5.1.2 above.

6.2.5.2. Automatically locking retractors

6.2.5.2.1. The strap of a safety-belt assembly equipped with an automatically locking retractor shall not move more than 30 mm between locking positions of the retractor. After a rearward movement of the wearer, the belt must either remain at its initial position or return to that position automatically on subsequent forward movements of the wearer.

6.2.5.2.2. If the retractor is part of a lap belt, the retracting force of the strap shall be not less than 0,7 daN when measured in the free length between the dummy and the retractor in accordance with paragraph 7.6.4.

If the retractor is part of an upper torso restraint, the retracting force of the strap shall be not less than 0,1 daN and not more than 0,7 daN when similarly measured.

6.2.5.2.3. The strap shall be withdrawn from the retractor and allowed to retract repeatedly by the method described in paragraph 7.6.1 until 5 000 cycles have been completed. The retractor shall then be subjected to the corrosion test given in paragraph 7.2 and after that to the dust test given in paragraph 7.6.3. It shall then satisfactorily complete a further 5 000 cycles of withdrawal and retraction. After the above tests the retractor shall operate correctly and still meet the requirements of paragraphs 6.2.5.2.1 and 6.2.5.2.2 above.

6.2.5.3. Emergency locking retractors

6.2.5.3.1. An emergency locking retractor, when tested in accordance with paragraph 7.6.2, shall satisfy the conditions below. In the case of a single sensitivity, according to paragraph 2.14.4.1, only the specifications regarding deceleration of the vehicle are valid.

6.2.5.3.1.1. The locking must have occurred when the deceleration of the vehicle reaches 0,45 g ⁽¹⁾ in the case of type 4 or 0,85 g in the case of type 4N retractors.

6.2.5.3.1.2. It must not lock for values of acceleration of the strap measured in the direction of the extraction of the strap of less than 0,8 g in the case of type 4 or less than 1,0 g in the case of type 4N retractors.

⁽¹⁾ g = 9,81 m/s².

- 6.2.5.3.1.3. It must not lock when its sensing device is tilted 12° or less in any direction from the installation position specified by its manufacturer.
- 6.2.5.3.1.4. It shall lock when its sensing device is tilted by more than 27° in the case of type 4 or 40° in the case of type 4N retractors in any direction from the installation position specified by its manufacturer.
- 6.2.5.3.1.5. In cases where the operation of a retractor depends on an external signal or power source, the design shall ensure that the retractor locks automatically upon failure or interruption of that signal or power source. However, this requirement need not be met in the case of a retractor with multiple sensitivities, provided only one sensitivity is dependent on an external signal or power source and the failure of the signal or power source is indicated to the driver by optical and/or acoustical means.
- 6.2.5.3.2. When tested in accordance with paragraph 7.6.2, an emergency locking retractor with multiple sensitivity, including strap sensitivity, shall comply with the specified requirements and also lock up when strap acceleration measured in the direction of unreeling is not less than 2,0 g.
- 6.2.5.3.3. In the case of the tests mentioned in paragraphs 6.2.5.3.1 and 6.2.5.3.2 above the amount of strap movement which may occur before the retractor locks shall not exceed 50 mm starting at the length given in paragraph 7.6.2.1. In the case of the test mentioned in paragraph 6.2.5.3.1.2 above locking must not occur during the 50 mm of strap movement starting at the length given in paragraph 7.6.2.1.
- 6.2.5.3.4. If the retractor is part of a lap belt, the retracting force of the strap shall be not less than 0,7 daN when measured in the free length between the dummy and the retractor in accordance with paragraph 7.6.4.

If the retractor is part of an upper torso restraint, the retracting force of the strap shall be not less than 0,1 daN and not more than 0,7 daN when similarly measured, except for a belt equipped with a tension-reducing device, in which case the minimum retracting force may be reduced to 0,05 daN only when such a device is in operation mode. If the strap passes through a guide or pulley, the retracting force shall be measured in the free length between the dummy and the guide or pulley.

If the assembly incorporates a device that upon manual or automatic operation prevents the strap from being completely retracted, such a device shall not be operated when these requirements are assessed.

If the assembly incorporates a tension-reducing device, the retracting force of the strap described in the above shall be measured with the device in operation mode and non-operation mode when these requirements are assessed before and after durability tests according to paragraph 6.2.5.3.5.

- 6.2.5.3.5. The strap shall be withdrawn from the retractor and allowed to retract repeatedly by the method described in paragraph 7.6.1 until 40 000 cycles have been completed. The retractor shall then be subjected to the corrosion test given in paragraph 7.2 and after that to the dust test prescribed in paragraph 7.6.3. It shall then satisfactorily complete a further 5 000 cycles (making 45 000 in all).

If the assembly incorporates a tension-reducing device, the above tests shall be conducted on condition that the tension-reducing device is in operation mode and in non-operation mode.

After the above tests, the retractor shall operate correctly and still meet the requirements of paragraphs 6.2.5.3.1, 6.2.5.3.3 and 6.2.5.3.4 above.

- 6.2.5.4. Retractors must fulfil, after durability test according to paragraph 6.2.5.3.5, and immediately after the retracting force measurement according to paragraph 6.2.5.3.4, all next two specifications:
- 6.2.5.4.1. When retractors except automatically locking retractors are tested according to paragraph 7.6.4.2, the retractors must be able to avoid any slack between torso and belt, and,
- 6.2.5.4.2. When the buckle is unlatched to release the tongue, the retractor alone must be able to retract strap fully.
- 6.2.6. Pre-loading device
- 6.2.6.1. After being submitted to corrosion testing in accordance with paragraph 7.2, the pre-loading device (including the impact sensor connected to the device by the original plugs but without any current passing through them) shall operate normally.
- 6.2.6.2. It shall be verified that inadvertent operation of the device does not involve any risk of bodily injury for wearer.
- 6.2.6.3. In the case of pyrotechnic pre-loading devices:
- 6.2.6.3.1. After being submitted to conditioning in accordance with paragraph 7.9.1, operation of the pre-loading device must not have been activated by temperature and the device shall operate normally.
- 6.2.6.3.2. Precautions shall be taken to prevent the hot gases expelled from igniting adjacent flammable materials.
- 6.3. Straps
- 6.3.1. General
- 6.3.1.1. The characteristics of the straps shall be such as to ensure that their pressure on the wearer's body is distributed as evenly as possible over their width and that they do not twist even under tension. They shall have energy-absorbing and energy-dispersing capacities. The straps shall have finished selvages which shall not become unravelled in use.
- 6.3.1.2. The width of the strap under load of $980 \text{ daN} + 100 - 0 \text{ daN}$ shall be not less than 46 mm. This dimension shall be measured according to the test prescribed in paragraph 7.4.3, stopping the machine at the above mentioned load ⁽¹⁾.
- 6.3.2. Strength after room-conditioning
- In the case of the two straps samples conditioned in conformity with paragraph 7.4.1.1 the breaking load of the strap, determined as prescribed in paragraph 7.4.2 below, shall be not less than 1 470 daN. The difference between the breaking loads of the two samples shall not exceed 10 per cent of the greater of the breaking loads measured.
- 6.3.3. Strength after special conditioning
- In the case of the two strap samples conditioned in conformity with one of the provisions of paragraph 7.4.1 (except 7.4.1.1) below, the breaking load of the strap shall be not less than 75 per cent of average of the loads determined in the test referred to in paragraph 6.3.2 and not less than 1 470 daN. The Technical Service conducting the tests may dispense with one or more of these tests if the composition of the material used or information already available renders the test or tests superfluous.

⁽¹⁾ The test has not been performed for woven straps in twill construction with high-tenacity polyester yarns as those webbings get wider under load. In that case the width without load shall be $\geq 46 \text{ mm}$.

- 6.4. Belt assembly or restraint system
 - 6.4.1. Dynamic test
 - 6.4.1.1. The belt assembly or restraint system shall be subjected to a dynamic test in conformity with paragraph 7.7 below.
 - 6.4.1.2. The dynamic test shall be performed on two belt assemblies which have not previously been under load, except in the case of belt assemblies forming part of restraint systems when the dynamic test shall be performed on the restraint systems intended for one group of seats which have not previously been under load. The buckles of the belt assemblies to be tested shall have met the requirements of paragraph 6.2.2.4 above. In the case of safety-belts with retractors, the retractor shall have been subjected to the dust resistance test laid down in paragraph 7.6.3; in addition, in the case of safety-belts or restraint systems equipped with a pre-loading device comprising pyrotechnic means, the device shall have been subjected to the conditioning specified in paragraph 7.9.1.
 - 6.4.1.2.1. The belts shall have undergone the corrosion test described in paragraph 7.2, after which the buckles shall be subjected to 500 additional opening and closing cycles under normal conditions of use.
 - 6.4.1.2.2. Safety-belts with retractors shall have been subjected either to the tests described in paragraph 6.2.5.2 or to those described in paragraph 6.2.5.3. If, however, a retractor has already been subjected to the corrosion test in accordance with the provisions of paragraph 6.4.1.2.1, above, this test need not be repeated.
 - 6.4.1.2.3. In the case of a belt intended for use with a belt adjustment device for height, as defined in paragraph 2.9.6 above, the test shall be carried out with the device adjusted in the most unfavourable position(s) chosen by the Technical Service responsible for testing. However, if the belt adjustment device for height is constituted by the belt anchorage, as approved in accordance with the provisions of Regulation No 14, the Technical Service responsible for testing may, at its discretion, apply the provisions of paragraph 7.7.1 below.
 - 6.4.1.2.4. In the case of safety-belt with a preloading device the minimum displacement specified in paragraph 6.4.1.3.2 below may be reduced by half. For the purpose of this test, the preloading device shall be in operation.
 - 6.4.1.2.5. In the case of a safety-belt with tension-reducing device, it shall be subjected to a durability test with such a device in operation mode according to paragraph 6.2.5.3.5 before a dynamic test. The dynamic test shall then be conducted with the tension-reducing device in operation mode.
 - 6.4.1.3. During this test, the following requirements shall be met:
 - 6.4.1.3.1. no part of the belt assembly or a restraint system affecting the restraint of the occupant shall break and no buckles or locking system or displacement system shall release or unlock; and
 - 6.4.1.3.2. the forward displacement of the manikin shall be between 80 and 200 mm at pelvic level in the case of lap belts. In the case of other types of belts, the forward displacement shall be between 80 and 200 mm at pelvic level and between 100 and 300 mm at chest level. In the case of a harness belt, the minimum displacements specified above may be reduced by half. These displacements are the displacements in relation to the measurement points shown in Annex 7, Figure 6 to this Regulation.
 - 6.4.1.3.3. In the case of a safety-belt intended to be used in an outboard front seating position protected by an airbag in front of it, the displacement of the chest reference point may exceed that specified in paragraph 6.4.1.3.2 above if its speed at this value does not exceed 24 km/h.

6.4.1.4. In the case of a restraint system:

6.4.1.4.1. The movement of the chest reference point may exceed that specified in paragraph 6.4.1.3.2 above if it can be shown either by calculation or a further test that no part of the torso or the head of the manikin used in the dynamic test would have come into contact with any forward rigid part of the vehicle other than the chest with the steering assembly, if the latter meets the requirements of Regulation No 12 and provided contact does not occur at a speed higher than 24 km/h. For this assessment the seat shall be considered to be in the position specified in paragraph 7.7.1.5 below.

6.4.1.4.2. In vehicles where such devices are used, the displacement and locking systems enabling the occupants of all seats to leave the vehicle shall still be operable by hand after the dynamic test.

6.4.1.5. By way of derogation, in case of a restraint system, the displacements may be greater than those specified in paragraph 6.4.1.3.2 in the case where the upper anchorage fitted to the seat profits from the derogation provided in Regulation No 14, paragraph 7.4.

6.4.2. Strength after abrasion conditioning

6.4.2.1. For both samples conditioned in compliance with paragraph 7.4.1.6 below, the breaking strength shall be assessed as prescribed in paragraphs 7.4.2 and 7.5 below. It must be at least equal to 75 per cent of the breaking strength average determined during tests on unabraded straps and not less than the minimum load specified for the item being tested. Difference between breaking strength of the two samples must not exceed 20 per cent of the highest measured breaking strength. For type 1 and type 2 procedures, the breaking strength test shall be carried out on strap samples only (paragraph 7.4.2). For type 3 procedure, the breaking strength test shall be carried out on the strap in combination with the metal component involved (paragraph 7.5).

6.4.2.2. The parts of the belt assembly to be subjected to an abrasion procedure are given in the following table and the procedure types which may be appropriate for them are indicated by 'x'. A new sample shall be used for each procedure.

	Procedure 1	Procedure 2	Procedure 3
Attachment	—	—	x
Guide or Pulley	—	x	—
Buckle-loop	—	x	x
Adjusting device	x	—	x
Parts sewn to the strap	—	—	x

7. TESTS

7.1. Use of samples submitted for approval of a type of belt or restraint system (see Annex 13 to this Regulation)

7.1.1. Two belts or restraint systems are required for the buckle inspection, the low-temperature buckle test, the low-temperature test described in paragraph 7.5.4 below where necessary, the buckle durability test, the belt corrosion test, the retractor operating tests, the dynamic test and the buckle-opening test after the dynamic test. One of these two samples shall be used for the inspection of the belt or restraint system.

7.1.2. One belt or restraint system is required for the inspection of the buckle and the strength test on the buckle, the attachment mountings, the belt adjusting devices and, where necessary, the retractors.

- 7.1.3. Two belts or restraint systems are required for the inspection of the buckle, the micro-slip test and the abrasion test. The belt adjusting device operating test shall be conducted on one of these two samples.
- 7.1.4. The sample of strap shall be used for testing the breaking strength of the strap. Part of this sample shall be preserved so long as the approval remains valid.
- 7.2. Corrosion test
- 7.2.1. A complete safety-belt assembly shall be positioned in a test chamber as prescribed in Annex 12 to this Regulation. In the case of an assembly incorporating a retractor, the strap shall be unwound to full length less 300 ± 3 mm. Except for short interruptions that may be necessary, for example, to check and replenish the salt solution, the exposure test shall proceed continuously for a period of 50 hours.
- 7.2.2. On completion of the exposure test the assembly shall be gently washed, or dipped in clean running water with a temperature not higher than $38\text{ }^{\circ}\text{C}$ to remove any salt deposit that may have formed and then allowed to dry at room temperature for 24 hours before inspection in accordance with paragraph 6.2.1.2 above.
- 7.3. Micro-slip test (see Annex 11, Figure 3 to this Regulation)
- 7.3.1. The samples to be submitted to the micro-slip test shall be kept for a minimum of 24 hours in an atmosphere having a temperature of $20 \pm 5\text{ }^{\circ}\text{C}$ and a relative humidity of 65 ± 5 per cent. The test shall be carried out at a temperature between 15 and $30\text{ }^{\circ}\text{C}$.
- 7.3.2. It shall be ensured that the free section of the adjusting device points either up or down on the test bench, as in the vehicle.
- 7.3.3. A 5 daN load shall be attached to the lower end of the section of strap. The other end shall be subjected to a back and forth motion, the total amplitude being 300 ± 20 mm (see figure).
- 7.3.4. If there is a free end serving as reserve strap, it must in no way be fastened or clipped to the section under load.
- 7.3.5. It shall be ensured that on the test bench the strap, in the slack position, descends in a concave curve from the adjusting device, as in the vehicle. The 5 daN load applied on the test bench shall be guided vertically in such a way as to prevent the load swaying and the belt twisting. The attachment shall be fixed to the 5 daN load as in the vehicle.
- 7.3.6. Before the actual start of the test, a series of 20 cycles shall be completed so that the self-tightening system settles properly.
- 7.3.7. 1 000 cycles shall be completed at a frequency of 0,5 cycles per second, the total amplitude being 300 ± 20 mm. The 5 daN load shall be applied only during the time corresponding to a shift of 100 ± 20 mm for each half period.
- 7.4. Conditioning of straps and breaking-strength test (static)
- 7.4.1. Conditioning of straps for the breaking-strength test
- Samples cut from the strap referred to in paragraph 3.2.2.3 above shall be conditioned as follows:
- 7.4.1.1. Temperature-conditioning and Hygrometrics
- The strap shall be conditioned in accordance with ISO 139 (2005), using the standard atmosphere or the standard alternative atmosphere. If the test is not carried out immediately after conditioning, the specimen shall be placed in a hermetically-closed receptacle until the test begins. The breaking load shall be determined within 5 minutes after removal of the strap from the conditioning atmosphere or from the receptacle.

7.4.1.2. Light-conditioning

7.4.1.2.1. The provisions of Recommendation ISO 105-B02 (1994/Amd2:2000) shall apply. The strap shall be exposed to light for the time necessary to produce a contrast equal to Grade 4 on the grey scale on Standard Blue Dye No 7.

7.4.1.2.2. After exposure the strap shall be conditioned as described under paragraph 7.4.1.1. If the test is not carried out immediately after conditioning the specimen shall be placed in a hermetically-closed receptacle until the test begins. The breaking load shall be determined within 5 minutes after removal of the strap from the conditioning installation.

7.4.1.3. Cold-conditioning

7.4.1.3.1. The strap shall be conditioned as described under paragraph 7.4.1.1.

7.4.1.3.2. The strap shall then be kept for one and a half hours on a plane surface in a low-temperature chamber in which the air temperature is -30 ± 5 °C. It shall then be folded and the fold shall be loaded with a mass of 2 kg previously cooled to -30 ± 5 °C. When the strap has been kept under load for 30 minutes in the same low-temperature chamber, the mass shall be removed and the breaking load shall be measured within 5 minutes after removal of the strap from the low-temperature chamber.

7.4.1.4. Heat-conditioning

7.4.1.4.1. The strap shall be kept for 3 hours in a heating cabinet in an atmosphere having a temperature of 60 ± 5 °C and a relative humidity of 65 ± 5 per cent.

7.4.1.4.2. The breaking load shall be determined within 5 minutes after removal of the strap from the heating cabinet.

7.4.1.5. Exposure to water

7.4.1.5.1. The strap shall be kept fully immersed for 3 hours in distilled water, at a temperature of 20 ± 5 °C, to which a trace of a wetting agent has been added. Any wetting agent suitable for the fibre under test may be used.

7.4.1.5.2. The breaking load shall be determined within 10 minutes after removal of the strap from the water.

7.4.1.6. Abrasion conditioning

7.4.1.6.1. The abrasion conditioning will be performed on every device in which the strap is in contact with a rigid part of the belt, with the exception of all adjusting devices where the micro-slip test (7.3) shows that the strap slips by less than half the prescribed value, in which case, the procedure 1 abrasion conditioning (7.4.1.6.4.1) will not be necessary. The setting on the conditioning device will approximately maintain the relative position of strap and contact area.

7.4.1.6.2. The samples shall be conditioned as described under paragraph 7.4.1.1. The ambient temperature during the abrasion procedure shall be between 15 and 30 °C.

7.4.1.6.3. In the table below are listed the general conditions for each abrasion procedure.

	Load daN	Frequency Hz	Cycles Numbers	Shift Mm
Procedure 1	2,5	0,5	5 000	300 ± 20
Procedure 2	0,5	0,5	45 000	300 ± 20
Procedure 3 (*)	0 to 5	0,5	45 000	—

(*) See paragraph 7.4.1.6.4.3.

The shift given in the fifth column of this table represents the amplitude of a back and forth motion applied to the strap.

7.4.1.6.4. Particular conditioning procedures

7.4.1.6.4.1. Procedure 1: for cases where the strap slides through an adjusting device.

A vertical steady load of 2,5 daN shall be maintained on one end of the strap — the other end of the strap shall be attached to a device giving the strap a horizontal back and forth motion.

The adjusting device shall be placed on the horizontal strap so that the strap remains under tension (see Annex 11, Figure 1 to this Regulation).

7.4.1.6.4.2. Procedure 2: for cases where the strap changes direction in passing through a rigid part.

During this test, the angles of the straps shall be maintained as shown in Annex 11, Figure 2, to this Regulation.

The steady load of 0,5 daN shall be maintained during the test.

For cases where the strap changes direction more than once in passing through a rigid part, the load of 0,5 daN may be increased so as to achieve the prescribed strap movement of 300 mm through that rigid part.

7.4.1.6.4.3. Procedure 3: for cases where the strap is fixed to a rigid part by sewing or similar means.

The total back and forth motion shall be 300 ± 20 mm but the 5 daN load shall only be applied during a shift of 100 ± 20 mm for each half period (see Annex 11, Figure 3, to this Regulation).

7.4.2. Test of breaking strength of strap (static test)

7.4.2.1. The test shall be carried out each time on two new samples of strap, of sufficient length, conditioned in conformity with the provisions of paragraph 7.4.1.

7.4.2.2. Each strap shall be gripped between the clamps of a tensile-testing machine. The clamps shall be so designed as to avoid breakage of the strap at or near them. The speed of traverse shall be about 100 mm/min. The free length of the specimen between the clamps of the machine at the start of the test shall be $200 \text{ mm} \pm 40 \text{ mm}$.

7.4.2.3. The tension shall be increased until the strap breaks, and the breaking load shall be noted.

7.4.2.4. If the strap slips or breaks at or within 10 mm of either of the clamps the test shall be invalid and a new test shall be carried out on another specimen.

7.4.3. Width under load

7.4.3.1. The test shall be carried out each time on two new samples of strap, of sufficient length conditioned in conformity with the provisions of paragraph 7.4.1.

7.4.3.2. Each strap shall be gripped between the clamps of a tensile-testing machine. The clamps shall be so designed as to avoid breaking of the strap at or near them. The speed of traverse shall be about 100 mm/min. The free length of the specimen between the clamps of the machine at the start of the test shall be $200 \text{ mm} \pm 40 \text{ mm}$.

7.4.3.3. When the load reaches $980 \text{ daN} + 100 - 0 \text{ daN}$, the machine shall be stopped and the measurement shall be completed within 5 seconds. The test has to be performed separately from the tensile test.

- 7.5. Test of belt assembly components incorporating rigid parts
- 7.5.1. The buckle and the adjusting device shall be connected to the tensile-testing apparatus by the parts of the belt assembly to which they are normally attached, and the load shall then build up to 980 daN.

In the case of harness belts, the buckle shall be connected to the testing apparatus by the straps which are attached to the buckle and the tongue or two tongues located in an approximately symmetrical way to the geometric centre of the buckle. If the buckle, or the adjusting device, is part of the attachment or of the common part of a three-point belt, the buckle or adjusting device shall be tested with the attachment, in conformity with paragraph 7.5.2 below, except in the case of retractors having a pulley or strap guide at the upper belt anchorage, when the load will be 980 daN and the length of strap remaining wound on the reel shall be the length resulting from locking as close as possible to 450 mm from the end of the strap.

- 7.5.2. The attachments and any belt adjustment devices for height shall be tested in the manner indicated in paragraph 7.5.1, but the load shall be 1 470 daN and shall, subject to the provisions of the second sentence of paragraph 7.7.1 below, be applied in the least favourable conditions likely to occur in a vehicle in which the belt is correctly installed. In the case of retractors the test is performed with the strap completely unwound from the reel.
- 7.5.3. Two samples of the complete belt assembly shall be placed in a refrigerated cabinet at $-10^{\circ} \pm 1^{\circ} \text{C}$ for 2 hours. The mating parts of the buckle shall be coupled together manually immediately after being removed from the refrigerated cabinet.
- 7.5.4. Two samples of complete belt assembly shall be placed in a refrigerated cabinet at $-10^{\circ} \pm 1^{\circ} \text{C}$ for 2 hours. The rigid items and parts made of plastics under test shall then be laid in turn upon a flat rigid steel surface (which has been kept with the samples in the refrigerated cabinet) placed on the horizontal surface of a compact rigid block with a mass of at least 100 kg and within 30 seconds of being removed from the refrigerated cabinet, an 18 kg steel mass shall be allowed to fall under gravity through 300 mm on to the test sample. The impact face of the 18 kg mass shall take the form of a convex surface with a hardness of at least 45 HRC having a transverse radius of 10 mm and a longitudinal radius of 150 mm placed along the centre line of the mass. One test sample shall be tested with the axis of the curved bar in line with the strap and the other sample shall be tested at 90° to the strap.
- 7.5.5. Buckles having parts common to two safety-belts shall be loaded in such a way as to simulate the conditions of use in the vehicle with seats in the mid position of their adjustment. A load of 1 470 daN shall be applied simultaneously to each strap. The direction of the application of load shall be established according to paragraph 7.7.1 below. A suitable device for the test is shown in Annex 10 to this Regulation.
- 7.5.6. When testing a manually adjusting device, the strap shall be drawn steadily through the adjusting device, having regard for the normal conditions of use, at a rate of approximately 100 mm/s and the maximum force measured to the nearest 0,1 daN after the first 25 mm of strap movement. The test shall be carried out in both directions of strap travel through the device, the strap being cycled 10 times prior to the measurement.
- 7.6. Additional tests for safety-belts with retractors
- 7.6.1. Durability of retractor mechanism
- 7.6.1.1. The strap shall be withdrawn and allowed to retract for the required number of cycles at a rate of not more than 30 cycles per minute. In the case of emergency locking retractors, a snatch to lock the retractor shall be introduced at each fifth cycle.

The snatches shall occur in equal numbers at each of five different extractions, namely, 90, 80, 75, 70 and 65 per cent of the total length of the strap remaining wound on the retractor. However, where more than 900 mm is provided the above percentages shall be related to the final 900 mm of strap which can be withdrawn from the retractor.

- 7.6.1.2. A suitable apparatus for the tests specified in paragraph 7.6.1.1 above is shown in Annex 3 to this Regulation.
- 7.6.2. Locking of emergency locking retractors
- 7.6.2.1. The retractor shall be tested once for locking when the strap has been unwound to full length less 300 ± 3 mm.
- 7.6.2.1.1. In the case of a retractor actuated by strap movement, the extraction shall be in the direction in which it normally occurs when the retractor is installed in a vehicle.
- 7.6.2.1.2. When retractors are being tested for sensitivity to vehicle deceleration they shall be tested at the above extraction along two perpendicular axes, which are horizontal if the retractor is installed in a vehicle as specified by the safety-belt manufacturer. When this position is not specified, the testing authority shall consult the safety-belt manufacturer. One of these axes shall be in the direction chosen by the Technical Service conducting the approval test to give the most adverse conditions with respect to actuation of the locking mechanism.
- 7.6.2.2. A suitable apparatus for the tests specified in paragraph 7.6.2.1 above is described in Annex 4 to this Regulation. The design of any such test apparatus shall ensure that the required acceleration is given before the webbing is withdrawn out of the retractor by more than 5 mm and that the withdrawal takes place at an average rate of increase of acceleration of at least 55 g/s and not more than 150 g/s in testing sensitivity for strap movement and of at least 25 g/s and not more than 150 g/s in testing sensitivity for vehicle deceleration.
- 7.6.2.3. To check conformity with the requirements of paragraphs 6.2.5.3.1.3 and 6.2.5.3.1.4, the retractor shall be mounted on a horizontal table and the table tilted with a speed not exceeding 2° per second until locking has occurred. The test shall be repeated with tilting in other directions to ensure that the requirements are fulfilled.
- 7.6.3. Dust resistance
- 7.6.3.1. The retractor shall be positioned in a test chamber as described in Annex 5 to this Regulation. It shall be mounted in an orientation similar to that in which it is mounted in the vehicle. The test chamber shall contain dust as specified in paragraph 7.6.3.2 below. A length of 500 mm of the strap shall be extracted from the retractor and kept extracted, except that it shall be subjected to 10 complete cycles of retraction and withdrawal within 1 or 2 minutes after each agitation of the dust. For a period of 5 hours, the dust shall be agitated every 20 minutes for 5 seconds by compressed air free of oil and moisture at a gauge pressure of $5,5 \times 10^5 \pm 0,5 \times 10^5$ Pa entering through an orifice, $1,5 \pm 0,1$ mm in diameter.
- 7.6.3.2. The dust used in the test described in paragraph 7.6.3.1 above shall consist of about 1 kg of dry quartz. The particle size distribution is as follows:
- (a) passing 150 μ m aperture, 104 μ m wire diameter: 99 to 100 per cent;
 - (b) passing 105 μ m aperture, 64 μ m wire diameter: 76 to 86 per cent;
 - (c) passing 75 μ m aperture, 52 μ m wire diameter: 60 to 70 per cent.
- 7.6.4. Retracting forces
- 7.6.4.1. The retracting force shall be measured with the safety-belt assembly fitted to a dummy as for the dynamic test prescribed in paragraph 7.7. The strap tension shall be measured at the point of contact with (but just clear of) the dummy while the strap is being retracted at the approximate rate of 0,6 m/min. In the case of a safety-belt with tension-reducing device, the retracting force and strap tension shall be measured with the tension-reducing device in both operation mode and non-operation mode.

- 7.6.4.2. Before the dynamic test described in paragraph 7.7 the seated dummy, which is clothed with a cotton shirt, shall be tilted forward until 350 mm of the strap is withdrawn from retractor, and then released to the initial position.

7.7. Dynamic test of belt assembly or of the restraint system

- 7.7.1. The belt assembly shall be mounted on a trolley equipped with the seat and the anchorage defined in Annex 6 to this Regulation. However, if the belt assembly is intended for a specific vehicle or for specific types of vehicle, the distances between the manikin and the anchorages shall be determined by the service conducting the tests, either in conformity with the instructions for fitting supplied with the belt or in conformity with the data supplied by the manufacturer of the vehicle. If the belt is equipped with a belt adjustment device for height such as defined in paragraph 2.9.6 above, the position of the device and the means of securing it shall be the same as those of the vehicle design.

In that case, when the dynamic test has been carried out for a type of vehicle it need not be repeated for other types of vehicle where each anchorage point is less than 50 mm distant from the corresponding anchorage point of the tested belt. Alternatively, manufacturers may determine hypothetical anchorage positions for testing in order to enclose the maximum number of real anchorage points.

- 7.7.1.1. In the case of a safety-belt or restraint system forming part of an assembly for which type approval is requested as a restraint system, the safety-belt shall be mounted either as defined in paragraph 7.7.1 or on the part of the vehicle structure to which the restraint system is normally fitted and this part shall be rigidly attached to the test trolley in the way prescribed in paragraphs 7.7.1.2 to 7.7.1.6.

In the case of a safety-belt or restraint system with pre-loading devices relying on component parts other than those incorporated in the belt assembly itself, the belt assembly shall be mounted in conjunction with the necessary additional vehicle parts on the test trolley in the manner prescribed in paragraphs 7.7.1.2 to 7.7.1.6.

Alternatively, in the case where those devices cannot be tested on the test trolley, the manufacturer may demonstrate by a conventional frontal impact test at 50 km/h in conformity with the procedure ISO 3560 (1975) that the device complies with the requirements of the Regulation.

- 7.7.1.2. The method used to secure the vehicle during the test shall not be such as to strengthen the anchorages of the seats or safety-belts or to lessen the normal deformation of the structure. No forward part of the vehicle shall be present which by limiting the forward movement of the manikin excepting the foot, would reduce the load imposed on the restraint system during the test. The parts of the structure eliminated can be replaced by parts of equivalent strength provided they do not hinder the forward movement of the manikin.

- 7.7.1.3. A securing device shall be regarded as satisfactory if it produces no effect on an area extending over the whole width of the structure and if the vehicle or the structure is blocked or fixed in front at a distance of not less than 500 mm from the anchorage of the restraint system. At the rear the structure shall be secured at a sufficient distance rearwards of the anchorages to ensure that the requirements of paragraph 7.7.1.2 above are fulfilled.

- 7.7.1.4. The seats of the vehicle shall be fitted and shall be placed in the position for driving use chosen by the Technical Service conducting approval tests to give the most adverse conditions with respect to strength, compatible with installing the manikin in the vehicle. The positions of the seats shall be stated in the report. The seat back, if adjustable for inclination, shall be locked as specified by the manufacturer or, in the absence of any specification, to an actual seat back angle as near as possible to 25° in the case of vehicles of categories M1 and N1 as near as possible to 15° in the case of vehicles of all other categories.

7.7.1.5. For the assessment of the requirements in paragraph 6.4.1.4.1 the seat shall be regarded in its most forward driving or travelling position appropriate to the dimensions of the manikin.

7.7.1.6. All the seats of any group of seats shall be tested simultaneously.

7.7.1.7. The dynamic tests of the harness belt system shall be carried out without the crotch strap (assembly), if there is any.

7.7.2. The belt assembly shall be attached to the manikin in Annex 7 to this Regulation as follows: a board 25 mm thick shall be placed between the back of the manikin and the seat back. The belt shall be firmly adjusted to the manikin. The board shall then be removed so that the entire length of its back is in contact with the seat back. A check shall be made to ensure that the mode of engagement of the two parts of the buckle entails no risk of reducing the reliability of locking.

7.7.3. The free ends of the straps shall extend sufficiently far beyond the adjusting devices to allow for slip.

7.7.4. Deceleration or acceleration devices

The applicant shall choose to use one of the two following devices:

7.7.4.1. Deceleration test device

The trolley shall be so propelled that at the moment of impact its free running speed is 50 km/h $\pm$ 1 km/h and the manikin remains stable. The stopping distance of the trolley shall be 40 cm $\pm$ 5 cm. The trolley shall remain horizontal throughout deceleration. The deceleration of the trolley shall be achieved by using the apparatus described in Annex 6 to this Regulation or any other device giving equivalent results. This apparatus shall comply with the performance hereafter specified:

The deceleration curve of the trolley, weighted with inert mass to produce a total mass of 455 kg $\pm$ 20 kg for safety-belts tests and 910 kg $\pm$ 40 kg for restraining systems tests where the nominal mass of the trolley and vehicle structure is 800 kg, must remain within the hatched area of the graph in Annex 8. If necessary, the nominal mass of the trolley and attached vehicle structure can be increased by increments of 200 kg, in which case, an additional inert mass of 28 kg per increment shall be added. In no case shall the total mass of the trolley and vehicle structure and inert masses differ from the nominal value for calibration tests by more than $\pm$ 40 kg. During calibration of the stopping device, the speed of the trolley shall be 50 km/h $\pm$ 1 km/h and the stopping distance shall be of 40 cm $\pm$ 2 cm.

7.7.4.2. Acceleration test device

The trolley shall be so propelled that its total velocity change ΔV is 51 km/h $\pm_0^{+2}$ km/h. The trolley shall remain horizontal during the acceleration. The acceleration of the trolley shall be achieved by using the apparatus complying with the performance hereafter specified:

The acceleration curve of the trolley, weighted with inert mass, must remain within the hatched area of the graph in Annex 8, and stay above the segment defined by the coordinates 10 g, 5 ms and 20 g, 10 ms. The start of the impact (T0) is defined, according to ISO 17373 (2005) for a level of acceleration of 0,5 g. In no case shall the total mass of the trolley and vehicle structure and inert masses differ from the nominal value for calibration tests by more than $\pm$ 40 kg. During calibration of the acceleration test device, trolley's total velocity change ΔV shall be 51 km/h $\pm_0^{+2}$ km/h.

Despite the fulfilment of the above requirements, the Technical Service shall use a mass of trolley (equipped with its seat), as specified in paragraph 1 of Annex 6, greater than 380 kg.

- 7.7.5. The trolley speed immediately before impact (only for deceleration trolleys, needed for stopping distance calculation), the trolley acceleration or deceleration, the forward displacement of the manikin and the speed of the chest at a 300 mm displacement of the chest shall be measured.

The velocity change will be calculated by integration of the recorded trolley acceleration or deceleration.

The distance to achieve the first $50 \text{ km/h}_{-0}^{+1} \text{ km/h}$ of the velocity change of the trolley may be calculated by double integration of the recorded trolley deceleration.

- 7.7.6. After impact, the belt assembly or restraint system and its rigid parts shall be inspected visually, without opening the buckle, to determine whether there has been any failure or breakage. In the case of restraint systems it shall also be ascertained, after the test, whether the parts of the vehicle structure which are attached to the trolley have undergone any visible permanent deformation. If there is any such deformation this shall be taken into account in any calculation made in accordance with paragraph 6.4.1.4.1.

- 7.7.7. However, if the tests were performed at a higher speed and/or the acceleration curve has exceeded the upper level of the hatched area and the safety belt meets the requirements, the test shall be considered satisfactory.

- 7.8. Buckle-opening test

- 7.8.1. For this test, belt assemblies or restraint devices which have already undergone the dynamic test in conformity with paragraph 7.7 above shall be used.

- 7.8.2. The belt assembly shall be removed from the test trolley without the buckle being opened. A load shall be applied to the buckle by direct traction via the straps tied to it so that all the straps are subjected to the force of $\frac{60}{n} \text{ daN}$. (It is understood that n is the number of straps linked to the buckle when it is in a locked position.) In the case where the buckle is connected to a rigid part, the load shall be applied at the same angle as the one formed by the buckle and the rigid end during the dynamic test. A load shall be applied at a speed of $400 \pm 20 \text{ mm/min}$ to the geometric centre of the buckle-release button along a fixed axis running parallel to the initial direction of motion of the button. During the application of the force needed to open the buckle, the buckle shall be held by a rigid support. The load quoted above shall not exceed the limit indicated in paragraph 6.2.2.5 above. The point of contact of the test equipment shall be spherical in form with a radius of $2,5 \text{ mm} \pm 0,1 \text{ mm}$. It shall have a polished metal surface.

- 7.8.3. The buckle-opening force shall be measured and any failure of the buckle noted.

- 7.8.4. After the buckle-opening test, the components of the belt assembly or of the restraint device which have undergone the tests prescribed in paragraph 7.7 above shall be inspected and the extent of the damage sustained by the belt assembly or restraint device during the dynamic test shall be recorded in the test report.

- 7.9. Additional tests on safety-belts with pre-loading devices

- 7.9.1. Conditioning

The pre-loading device may be separated from the safety-belt to be tested and kept for 24 hours at a temperature of $60^\circ \pm 5^\circ \text{C}$. The temperature shall then be raised to $100^\circ \pm 5^\circ \text{C}$ for 2 hours. Subsequently it shall be kept for 24 hours at a temperature of $-30^\circ \pm 5^\circ \text{C}$. After being removed from conditioning, the device shall warm up to ambient temperature. If it has been separated it shall be fitted again to the safety-belt.

7.10. Test report

7.10.1. The test report shall record:

- (a) the results of all the tests in paragraph 7 above and in particular;
- (b) the type of device used for the test (acceleration or deceleration device);
- (c) the total velocity change;
- (d) the trolley speed immediately before impact only for deceleration trolleys;
- (e) the acceleration or deceleration curve during all the velocity change of the trolley;
- (f) the maximum forward displacement of the manikin;
- (g) the place — if it can be varied — occupied by the buckle during the test;
- (h) the buckle-opening force;
- (i) any failure or breakage.

If by virtue of paragraph 7.7.1 the anchorages prescribed in Annex 6 to this Regulation have not been respected, the test report shall describe how the belt assembly or the restraint system was installed and shall specify important angles and dimensions.

8. REQUIREMENTS CONCERNING THE INSTALLATION IN THE VEHICLE

8.1. Safety-belt and restraint systems equipment

8.1.1. With the exception of seating intended solely for use when the vehicle is stationary, the seats of vehicles of categories M1, M2 (of Class III or B), M3 (of Class III or B) and N shall be equipped with safety-belts or restraint systems which satisfy the requirements of this Regulation.

Contracting Parties applying this Regulation may demand the installation of safety belts on M2 and M3 vehicles belonging to Class II.

When fitted, the safety belts and/or restraint systems in Class I, II or A vehicles belonging to category M2 or M3 have to be in compliance with the requirements of this Regulation.

Contracting Parties may, under national law, allow the installation of safety belts or restraint systems other than those covered by this Regulation provided that they are intended for disabled people.

Restraint systems complying with the provisions of Annex 8 of the 02 series of amendments to Regulation No 107 are exempted from the provisions of this Regulation.

Class I, or A vehicles belonging to category M2 or M3 may be fitted with safety belts and/or restraint systems conforming to the requirements of this Regulation.

8.1.2. The types of safety-belts or restraint systems for each seating position where installation is required shall be those specified in Annex 16 (with which neither non-locking retractors (paragraph 2.14.1) nor manually unlocking retractor (paragraph 2.14.2) can be used). For all seating positions where lap belts type B are specified in Annex 16 lap belts type Br3 are permitted except in the case that, in use, they retract to such an extent as to reduce comfort in a notable way after normal buckling up.

- 8.1.2.1. However, for outboard seating positions, other than front, of vehicles of the category N1 shown in Annex 16 and marked with the symbol, the installation of a lap belt of type Br4m or Br4Nm is allowed, where there exists a passage between a seat and the nearest side wall of the vehicle intended to permit access of passengers to other parts of the vehicle. A space between a seat and the side wall is considered as a passage, if the distance between that side wall, with all doors closed, and a vertical longitudinal plane passing through the centre line of the seat concerned — measured at the R-point position and perpendicularly to the median longitudinal plane of the vehicle — is more than 500 mm.
- 8.1.3. Where no safety-belts are required any type of safety-belt or restraint system conforming to this Regulation may be provided at the choice of the manufacturer. A-type belts of the types permitted in Annex 16 may be provided as an alternative to lap belts for those seating positions where lap belts are specified in Annex 16.
- 8.1.4. On three point belts fitted with retractors, one retractor must operate at least on the diagonal strap.
- 8.1.5. Except for vehicles of category M1 an emergency locking retractor of type 4N (paragraph 2.14.5) may be permitted instead of a retractor of type 4 (paragraph 2.14.4) where it has been shown to the satisfaction of the services responsible for the tests that the fitting of a type 4 retractor would not be practical.
- 8.1.6. For the front outboard and the front centre seating positions shown in Annex 16 and marked with the symbol *, lap belts of the type specified on that Annex shall be considered adequate where the windscreen is located outside the reference zone defined in Annex 1 to Regulation No 21.
- As regards safety-belts, the windscreen is considered as part of the reference zone when it is capable of entering into static contact with the test apparatus according to the method described in Annex 1 of Regulation No 21.
- 8.1.7. Every seating position in Annex 16 marked with the symbol •, three-point belts of a type specified in Annex 16 shall be provided unless one of the following conditions is fulfilled, in which case two-point belts of a type specified in Annex 16 may be provided.
- 8.1.7.1. There is a seat or other vehicle parts conforming to paragraph 3.5 of Appendix 1 to Regulation No 80 directly in front, or
- 8.1.7.2. No part of the vehicle is in or, when the vehicle is in motion, capable of being in the reference zone, or
- 8.1.7.3. Parts of the vehicle within the said reference zone comply with the energy absorbing requirements set out in Appendix 6 of Regulation No 80.
- 8.1.8. With the exception of the case covered by paragraph 8.1.9, every passenger seating position which is fitted with an airbag shall be provided with a warning against the use of a rearward-facing child restraint in that seating position. The warning label, in the form of a pictogram which may include explanatory text, shall be durably affixed and located such that it is easily visible in front of a person about to install a rearward-facing child restraint on the seat in question. An example of a possible design of a pictogram is shown in Figure 1. A permanent reference should be visible at all times, in case the warning is not visible when the door is closed.

Figure 1



Colours:

- (a) the pictogram is red;
- (b) seat, child seat and contour line of the airbag are black;
- (c) the word airbag as well as the airbag are white.

- 8.1.9. The requirements of paragraph 8.1.8 shall not apply if the vehicle is fitted with a mechanism which senses automatically the presence of any rearward-facing child restraint, and ensures that the airbag will not be deployed when such a child restraint system is fitted.
- 8.1.10. In the case of seats capable of being turned to or placed in other orientations, designed for use when the vehicle is stationary, the requirements of paragraph 8.1.1 shall only apply to those orientations designated for normal use when the vehicle is travelling on a road, in accordance with this Regulation.
- 8.2. General requirements
- 8.2.1. Safety-belts, restraint systems, and ISOFIX child restraint systems according to Table 2 of Annex 17 — Appendix 3, shall be fixed to anchorages conforming to the specifications of Regulation No 14, such as the design and dimensional characteristics, the number of anchorages, and the strength requirements.
- 8.2.2. The safety-belts, restraint systems, child restraint systems and ISOFIX child restraint systems recommended by the manufacturer according to Tables 1 and 2 of Annex 17 — Appendix 3, shall be so installed that they will work satisfactorily and reduce the risk of bodily injury in the event of an accident. In particular they shall be so installed that:
- 8.2.2.1. The straps are not liable to assume a dangerous configuration;
- 8.2.2.2. That the danger of a correctly positioned belt slipping from the shoulder of a wearer as a result of his/her forward movement is reduced to a minimum.
- 8.2.2.3. The risk of the strap deteriorating through contact with sharp parts of the vehicle or seat structure, child restraint systems or ISOFIX child restraint systems recommended by the manufacturer according to Tables 1 and 2 of Annex 17 — Appendix 3, is reduced to a minimum.
- 8.2.2.4. The design and installation of every safety-belt provided for each seating position shall be such as to be readily available for use. Furthermore, where the complete seat or the seat cushion and/or the seat back can be folded to permit access to rear of the vehicle or to goods or luggage compartment, after folding and restoring those seats to the seating position, the safety-belts provided for those seats shall be accessible for use or can be easily recovered from under or behind the seat, by one person, according to instructions in the vehicle users handbook, without the need for that person to have training or practice.

- 8.2.2.5. The Technical Service shall verify that, with the buckle tongue engaged in the buckle:
- 8.2.2.5.1. The possible slack in the belt does not prevent the correct installation of child restraint systems recommended by the manufacturer, and
- 8.2.2.5.2. in the case of three-point belts, a tension of at least 50 N can be established in the lap section of the belt by external application of tension in the diagonal section of the belt, when positioned:
- (a) on a 10-year manikin as specified in Annex 8, Appendix 1 to Regulation No 44 and set in accordance with Annex 17, Appendix 4 to the present Regulation;
- (b) or on the fixture specified in Annex 17, Appendix 1, Figure 1 to the present Regulation for the seats that enable the installation of a child restraint device of universal category.
- 8.3. Special requirements for rigid parts incorporated in safety-belts or restraint systems
- 8.3.1. Rigid parts, such as the buckles, adjusting devices and attachments, shall not increase the risk of bodily injury to the wearer or to other occupants of the vehicle in the event of an accident.
- 8.3.2. The device for releasing the buckle shall be clearly visible to the wearer and within his easy reach and shall be so designed that it cannot be opened inadvertently or accidentally. The buckle shall also be located in such a position that it is readily accessible to a rescuer needing to release the wearer in an emergency.
- The buckle shall be so installed that, both when not under load and when sustaining the wearer's mass, it is capable of being released by the wearer with a single simple movement of either hand in one direction.
- In the case of a safety-belts or restraint systems for front outboard seating positions, except if these are harness belts, the buckle shall also be capable of being locked in the same manner.
- A check shall be made to ensure that, if the buckle is in contact with the wearer, the width of the contact surface is not less than 46 mm.
- A check shall be made to ensure that, if the buckle is in contact with the wearer, the contact surface satisfies the requirements of paragraph 6.2.2.1 of this Regulation.
- 8.3.3. When the belt is being worn, it shall either adjust automatically to fit the wearer or be so designed that the manual adjusting device is readily accessible to the wearer when seated and is convenient and easy to use. It shall also be possible for it to be tightened with one hand to suit the build of the wearer and the position of the vehicle seat.
- 8.3.4. Safety-belts or restraint systems incorporating retractors shall be so installed that the retractors are able to operate correctly and stow the strap efficiently.
- 8.3.5. In order to inform the vehicle user(s) of the provisions made for the transport of children, vehicles of categories M1, M2, M3 and N1 shall meet the information requirements of Annex 17. Any vehicle of category M1 shall be equipped with ISOFIX positions, in accordance with the relevant prescriptions of Regulation No 14.

The first ISOFIX position shall allow at least the installation of one out of the three forward-facing fixtures as defined in Appendix 2 of Annex 17; the second ISOFIX position shall allow at least the installation of one out of the three rear-facing fixtures as defined in Appendix 2 of Annex 17. For this second ISOFIX position, in case where the installation of the rear-facing fixture is not possible on the second row of seats of the vehicle due to its design, the installation of one out of the six fixtures is allowed in any position of the vehicle.

8.4. Safety-belt reminder equipment.

8.4.1. The driver seating position of the M1 category of vehicles, shall be equipped with a safety-belt reminder satisfying the requirements of this Regulation. Where the vehicle manufacturer provides a safety-belt reminder system on the driver seat in another category of vehicle, the safety-belt reminder system may be approved according to this Regulation ⁽¹⁾.

8.4.1.1. Contracting Parties may allow deactivation of the safety-belt reminder provided that such deactivation satisfies to the requirements of paragraph 8.4.2.6.

8.4.2. Safety-belt Reminder.

8.4.2.1. General requirements.

8.4.2.1.1. Visual warning shall be so located as to be readily visible and recognisable in the daylight by the driver and distinguishable from other alerts. Where the visual signal warning employs the colour red, it shall use a symbol in accordance with item 21 in Table 1 of ECE Regulation No 121.



(item K.01 — ISO 2575:2000) or,



8.4.2.1.2. Visual warning shall be by continuous or intermittent signal.

8.4.2.1.3. Audible warning shall be by continuous or intermittent sound signal or by vocal information. Where vocal information is employed, the manufacturer shall ensure that the alert uses the language(s) of the market into which the vehicle is sold. This audible warning may be constituted by more than one step.

8.4.2.1.4. Audible warning shall be easily recognised by the driver.

8.4.2.2. First level warning shall be at least a visual warning activated for 4 seconds or longer when the driver safety-belt is not fastened and the ignition switch is engaged.

8.4.2.3. The activation of the first level warning shall be tested according to the test procedure defined in Annex 18, paragraph 1.

8.4.2.4. Second level warning shall be a visual and audible signal activated for 30 seconds or longer except for cases in which the warning stops for over 3 seconds when the safety-belt is not fastened, when the vehicle is in normal operation and when at least one of the following conditions (or any combination of these conditions), is fulfilled:

8.4.2.4.1. Distance driven greater than the distance threshold. The threshold shall not exceed 500 m. The distance the vehicle is not in normal operation shall be excluded.

8.4.2.4.2. Speed greater than the speed threshold. The threshold shall not exceed 25 km/h.

8.4.2.4.3. Duration time (engine running) greater than the duration time threshold. The threshold shall not exceed 60 seconds. The first level warning duration time and the duration time the vehicle is not in normal operation shall be excluded.

8.4.2.5. The activation of the second level warning shall be tested according to the test procedure defined in Annex 18, paragraph 2.

⁽¹⁾ While the current requirements for a safety-belt reminder is limited to the driver's seat of vehicles category MB1B, it is understood that the scope of this Regulation will be extended to vehicles of other categories and to other seating positions. In recognition of the importance of human factors, the delivery of driver stimuli, future safety-belt reminder requirements demanded by this Regulation will seek a harmonised convergence of the alert systems.

8.4.2.6. The safety-belt reminder may be designed to allow deactivation.

8.4.2.6.1. In the case a short term deactivation is provided, it shall be more difficult to deactivate the safety-belt reminder than buckling the safety-belt on and off. When the ignition is switched off for more than 30 minutes and switched on again, a short-term deactivated safety-belt reminder must reactivate.

8.4.2.6.2. In the case that a facility for a long term deactivation is provided, it shall require a sequence of operations to deactivate, that are detailed only in the manufacturer's technical manual and/or which requires the use of tools (mechanical, electrical, digital, etc.) that are not provided with the vehicle.

9. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

9.1. Every vehicle type or safety-belt or restraint system approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 6, 7 and 8 above.

9.2. The minimum requirements for conformity of production control procedures set forth in Annex 14 to this Regulation shall be complied with.

9.3. The authority which has granted type-approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be twice a year.

10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

10.1. The approval granted in respect of a vehicle or a type of belt or restraint system may be withdrawn if the requirement laid down in paragraph 9.1 above is not complied with, or if the safety-belt(s) or restraint system(s) selected have failed to pass the checks prescribed in paragraph 9.2 above.

10.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in Annex 1A or Annex 1B to this Regulation (as appropriate).

11. MODIFICATIONS AND EXTENSION OF APPROVAL OF THE VEHICLE TYPE OR SAFETY-BELT OR RESTRAINT SYSTEM TYPE

11.1. Every modification of the vehicle type or the belt or restraint system or both shall be notified to the Administrative Department which approved the vehicle type or safety-belt or restraint system type. The department may then either:

11.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle or safety-belt or restraint system still complies with the requirements; or

11.1.2. Require a further test report from the Technical Service responsible for conducting the tests.

11.2. Without prejudice to the provisions of paragraph 11.1 above, a variant of the vehicle whose mass in the running order is less than that of the vehicle subjected to the approval test shall not be regarded as a modification of the vehicle type.

11.3. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.2.3 or 5.3.3 above to the Parties to the Agreement applying this Regulation.

- 11.4. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1A or 1B to this Regulation.
12. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a device approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1A or 1B to this Regulation.
13. INSTRUCTIONS
- In the case of safety-belt type supplied separately from vehicle, the packaging and installation instructions must clearly state the vehicle type(s) for which it is intended.
14. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal or extension or withdrawal of approval, issued in other countries, are to be sent.
15. TRANSITIONAL PROVISIONS
- 15.1. Approvals of vehicle type
- 15.1.1. As from the official date of entry into force of Supplement 15 to the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as modified by Supplement 15 to the 04 series of amendments.
- 15.1.2. As from 2 years after the entry into force of Supplement 15 to the 04 series of amendments to this Regulation, Contracting Parties applying this Regulation shall grant ECE approvals only if the requirements of this Regulation, as amended by Supplement 15 to the 04 series of amendments are satisfied.
- 15.1.3. As from 7 years after the entry into force of Supplement 15 to the 04 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse to recognise approvals which were not granted in accordance with Supplement 15 to the 04 series of amendments to this Regulation. However, existing approvals of the vehicle categories other than M1 and which are not affected by Supplement 15 to the 04 series of amendments to this Regulation shall remain valid and Contracting Parties applying this Regulation shall continue to accept them.
- 15.1.3.1. However, as from 1 October 2000, for vehicles of categories M1 and N1, Contracting Parties applying this Regulation may refuse to recognise ECE approvals which were not granted in accordance with Supplement 8 to the 04 series of amendments to this Regulation, if the information requirements of paragraph 8.3.5 and Annex 17 are not met.
- 15.2. Installation of safety-belts and safety-belt reminder
- These transitional provisions only apply to the installation of safety-belts and safety-belt reminders on vehicles and do not change the mark of the safety-belt.
- 15.2.1. As from the official date of entry into force of Supplement 12 to the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as modified by Supplement 12 to the 04 series of amendments.

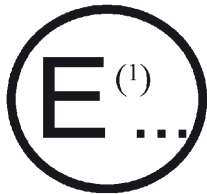
- 15.2.2. Upon expiration of a period of 36 months following the official date of entry into force referred to in paragraph 15.2.1 above, the Contracting Parties applying this Regulation shall grant approval only if the vehicle type satisfies the requirements of this Regulation as amended by the Supplement 12 to the 04 series of amendments.
- 15.2.3. Upon the expiration of a period of 60 months following the official date of entry into force referred to in paragraph 15.2.1 above, the Contracting Parties applying this Regulation may refuse to recognise approvals not granted in accordance with Supplement 12 to the 04 series of amendments to this Regulation.
- 15.2.4. As from the official date of entry into force of Supplement 14 to the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant UNECE approvals under this Regulation as modified by Supplement 14 to the 04 series of amendments.
- 15.2.5. As from the official date of entry into force of Supplement 16 to the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as modified by Supplement 16 to the 04 series of amendments.
- 15.2.6. Upon expiration of a period of 36 months following the official date of entry into force referred to in paragraph 15.2.4 above, the Contracting Parties applying this Regulation shall grant approval only if the vehicle type satisfies the requirements of this Regulation as amended by the Supplement 14 to the 04 series of amendments.
- 15.2.7. Upon the expiration of a period of 60 months following the official date of entry into force referred to in paragraph 15.2.4 above, the Contracting Parties applying this Regulation may refuse to recognise approvals not granted in accordance with Supplement 14 to the 04 series of amendments to this Regulation.
- 15.2.8. After 16 July 2006, the Contracting Parties applying this Regulation shall grant approval only if the vehicle type satisfies the requirements of this Regulation as amended by the Supplement 16 to the 04 series of amendments.
- 15.2.9. After 16 July 2008, the Contracting Parties applying this Regulation may refuse to recognise approvals to vehicles of category N1 not granted in accordance with Supplement 16 to the 04 series of amendments to this Regulation.
- 15.2.10. As from the official date of entry into force of the 05 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as amended by the 05 series of amendments.
- 15.2.11. As from 18 months after the date of entry into force, Contracting Party applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 05 series of amendments.
- 15.2.12. As from 72 months after the date of entry into force of the 05 series of amendments to this Regulation, approvals to this Regulation shall cease to be valid, except in the case of vehicle types which comply with the requirements of this Regulation as amended by the 05 series of amendments.
- 15.2.13. Notwithstanding paragraph 15.2.12, approvals of the vehicle categories other than M1 to the preceding series of amendments to the Regulation which are not affected by the 05 series of amendments related to the requirements concerning the fitting of safety-belt reminders shall remain valid and Contracting Parties applying the Regulation shall continue to accept them.
- 15.2.14. Notwithstanding paragraph 15.2.12, approvals of the vehicle categories other than N2 and N3 to the preceding series of amendments to the Regulation which are not affected by the 05 series of amendments related to minimum requirements for safety-belts and retractors in Annex 16 shall remain valid and Contracting Parties applying the Regulation shall continue to accept them.

- 15.2.15. Even after the date of entry into force of the 05 series of amendments, approvals of the components and separate technical units to the preceding series of amendments to the regulation shall remain valid and Contracting Parties applying the regulation shall continue to accept them and shall not refuse to grant extensions of approval to the 04 series of amendments to this Regulation.
- 15.2.16. Notwithstanding the transitional provisions above, Contracting Parties whose application of this Regulation comes into force after the date of entry into force of the 05 series of amendments are not obliged to accept approvals which were granted in accordance with any of the preceding series of amendments to this Regulation.
- 15.2.17. As from the official date of entry into force of the 06 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as amended by the 06 series of amendments.
- 15.2.18. As from 24 months after the date of entry into force of the 06 series of amendments, Contracting Parties applying this Regulation shall grant ECE approvals only if the requirements of this Regulation, as amended by the 06 series of amendments, are satisfied.
- 15.2.19. As from 36 months after the date of entry into force of the 06 series of amendments, Contracting Parties applying this Regulation may refuse to recognise approvals which were not granted in accordance with the 06 series of amendments to this Regulation.
- 15.2.20. Even after the date of entry into force of the 06 series of amendments, approvals of the components and separate technical units to the preceding series of amendments to the Regulation shall remain valid and Contracting Parties applying the Regulation shall continue to accept them, and Contracting Parties may continue to grant extensions of approvals to the 05 series of amendments.
- 15.2.21. Notwithstanding paragraphs 15.2.18 and 15.2.19, approvals of the vehicle categories to the preceding series of amendments to the Regulation which are not affected by the 06 series of amendments shall remain valid and Contracting Parties applying the Regulation shall continue to accept them.
- 15.2.22. As long as there are no requirements concerning the compulsory fitting of safety belts for folding seats in their national requirements at the time of acceding to this Regulation, Contracting Parties may continue to allow this non-fitment for the purpose of national approval and in this case these bus categories cannot be type approved under this Regulation.
- 15.2.23. No Contracting Parties applying this Regulation shall refuse to grant ECE approvals of a component under a preceding series of amendments to the Regulation if the safety-belts are intended to be installed in vehicles which are approved before the respective series of amendment.
-

ANNEX 1A

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type with regard to safety-belt pursuant to Regulation No 16

Approval No:

Extension No:

1. General

1.1. Make (trade name of manufacturer):

1.2. Type and general commercial description(s):

1.3. Means of identification of type, if marked on the vehicle:

1.3.1. Location of that marking:

1.4. Category of vehicle:

1.5. Name and address of manufacturer:

1.6. Address(es) of assembly plant(s):

1.7. Technical Service responsible for carrying out the test:

1.8. Date of test report:

1.9. Number of test report:

2. General construction characteristics of the vehicle

2.1. Photographs and/or drawings of a representative vehicle:

3. Bodywork

3.1. Seats

3.1.1. Number:

3.1.2. Position and arrangement:

3.1.2.1. Seating position(s) designated for use only when the vehicle is stationary:

3.1.3. Characteristics: description and drawings of

3.1.3.1. the seats and their anchorages:

3.1.3.2. the adjustment system:

3.1.3.3. the displacement and locking systems:

3.1.3.4. the seat belt anchorages if incorporated in the seat structure:

3.2. Safety-belts and/or other restraint systems

3.2.1. Number and position of safety-belts and restraint systems and seats on which they can be used:

		Complete ECE type-approval mark	Variant (if applicable)	Belt adjustment device for height (indicate yes/no/optional)
First row of seat	R			
	C			
	L			
Second row of seat	R			
	C			
	L			

(R = right-hand seat, C = centre seat, L = left hand seat)

3.2.2. Nature and position of supplementary restraint systems (indicate yes/no/optional).

		Front airbag	Side airbag	Belt preloading device
First row of seat	R			
	C			
	L			
Second row of seat	R			
	C			
	L			

(R = right-hand seat, C = centre seat, L = left hand seat)

3.2.3. Number and position of safety-belt anchorages and proof of compliance with Regulation No 14 (i.e. ECE type-approval number or test report).

3.3. Driver's safety-belt reminder (indicate yes/no ⁽²⁾)

4. Place

5. Date

6. Signature

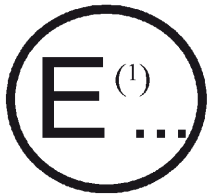
(¹) Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

(²) Strike out what does not apply.

ANNEX 1B

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of safety-belt or restraint system for adult occupants of power-driven vehicles pursuant to Regulation No 16

Approval No Extension No

1. Restraint system (with)/three-point belt/lap belt/special type belt/fitted (with) energy absorber/retractor/device for height adjustment of the upper pillar loop ⁽³⁾
2. Trade name or mark
3. Manufacturer's designation of the type of belt or restraining system

4. Manufacturer's name
5. If applicable, name of his representative
6. Address
7. Submitted for approval on
8. Technical Service responsible for conducting approval tests
9. Date of test report issued by that service
10. Number of test report issued by that service
11. Type of device: deceleration/acceleration ⁽²⁾
12. Approval granted/refused/extended/withdrawn ⁽²⁾ for general use/for use in a particular vehicle or in particular types of vehicles ⁽²⁾ ⁽⁴⁾
13. Position and nature of the marking
14. Place
15. Date
16. Signature
17. Annexed to this communication is a list of documents in the approval file deposited at the administration services having delivered the approval and which can be obtained upon request.

⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

⁽³⁾ Indicate which type.

⁽⁴⁾ If a safety-belt is approved following the provisions of paragraph 6.4.1.3.3 of this Regulation, this safety-belt shall only be installed in an outboard front seating position protected by an airbag in front of it, under the condition that the vehicle concerned is approved to Regulation No 94, 01 series of amendments or its later version in force, or to the Directive 96/79/EC of the European Parliament and of the Council.

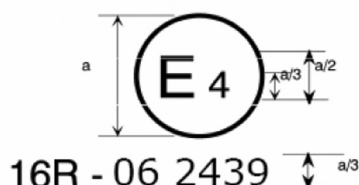
ANNEX 2

ARRANGEMENTS OF THE APPROVAL MARKS

1. Arrangements of the vehicle approval marks concerning the installation of safety-belts

Model A

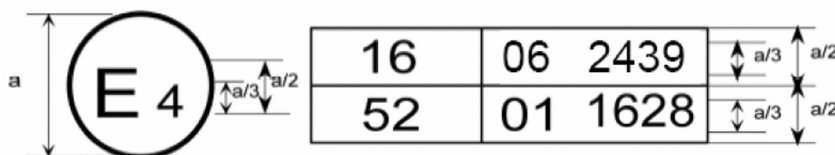
(See paragraph 5.2.4 of this Regulation)

 $a = 8 \text{ mm min.}$

The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to safety-belts, been approved in the Netherlands (E4) pursuant to Regulation No 16. The approval number indicates that the approval was granted according to the requirements of Regulation No 16 as amended by the 06 series of amendments.

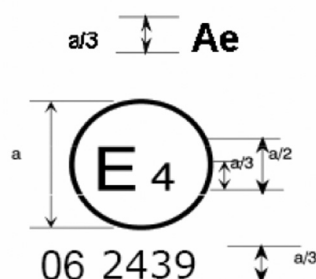
Model B

(See paragraph 5.2.5 of this Regulation)

 $a = 8 \text{ mm min.}$

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E4) pursuant to Regulations Nos 16 and 52⁽¹⁾. The approval numbers indicate that, at the dates when the respective approvals were given, Regulation No 16 included the 06 series of amendments and Regulation No 52 the 01 series of amendments.

2. Arrangements of the safety-belt approval marks (See paragraph 5.3.5 of this Regulation)

 $a = 8 \text{ mm min.}$

⁽¹⁾ The second number is given merely as an example.

The belt bearing the above approval mark is a three-point belt ('A'), fitted with an energy absorber ('e') and approved in the Netherlands (E4) under the number 062439, the Regulation already incorporating the 06 series of amendments at the time of approval.



The belt bearing the above approval mark is a lap belt ('B'), fitted with a retractor, type 4, with multiple sensitivity (m) and approved in the Netherlands (E4) under the number 062489, the Regulation already incorporating the 06 series of amendments at the time of approval.

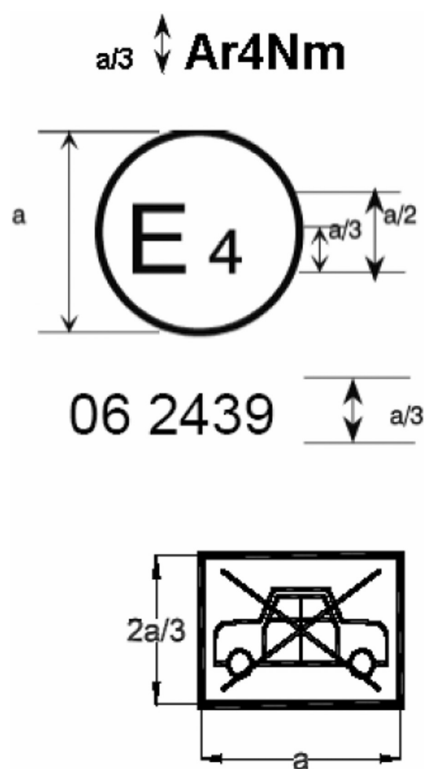
Note: The approval number and additional symbol(s) must be placed close to the circle and either above or below the 'E' or to left or right of that letter. The digits of the approval number must be on the same side of the 'E' and orientated in the same direction. The additional symbol(s) must be diametrically opposite the approval number. The use of roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.



The belt bearing the above approval mark is a special type belt ('S'), fitted with an energy absorber ('e') and approved in the Netherlands (E4) under the number 0622439, the Regulation already incorporating the 06 series of amendments at the time of approval.

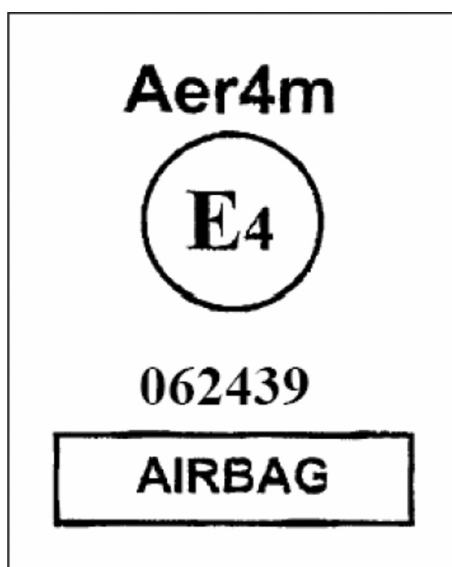


The belt bearing the above approval mark is part of a restraint system ('Z'), it is a special type belt ('S') fitted with an energy absorber ('e'). It has been approved in the Netherlands (E4) under the number 0624391, the Regulation already incorporating the 06 series of amendments at the time of approval.



$a = 8 \text{ mm min}$

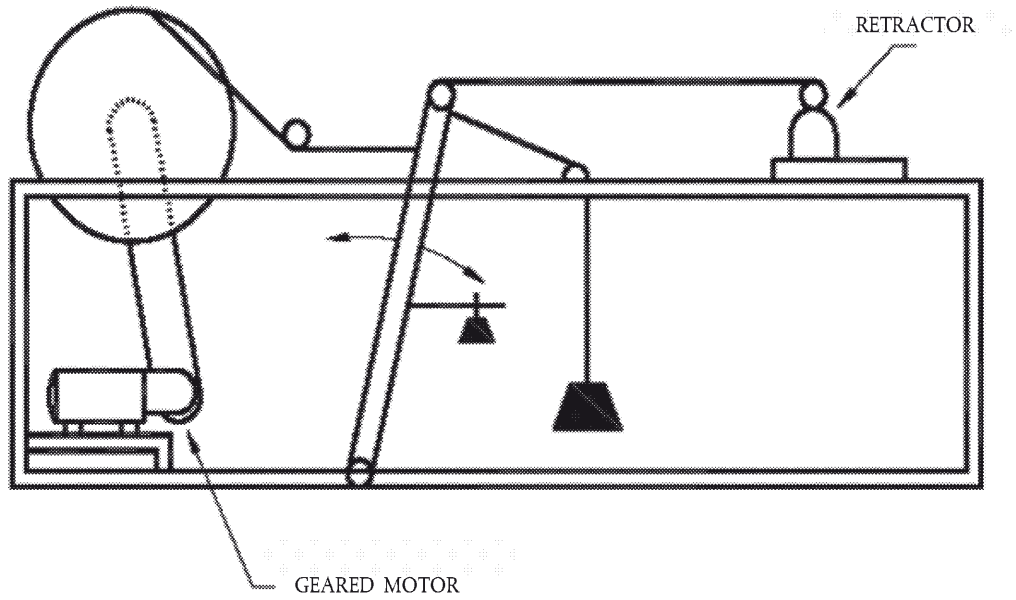
The belt bearing this type-approval mark is a three-point belt ('A') with a multiple-sensitivity ('m') type 4N ('r4N') retractor, in respect of which type-approval was granted in the Netherlands ('E4') under number 062439, the Regulation already incorporating the 06 series of amendments at the time of approval. This belt shall not be fitted to vehicles of category M1.



The safety-belt bearing this type-approval mark is a three-point belt ('A') fitted with an energy absorber ('e'), approved as meeting the specific requirements of paragraph 6.4.1.3.3 of this Regulation, and with a multiple-sensitivity ('m') type 4 ('r4') retractor, in respect of which type approval was granted in the Netherlands ('E4') under the approval number 062439. The first two digits indicate that the Regulation already incorporated the 06 series of amendments at the time of the approval. This safety-belt has to be fitted to a vehicle equipped with an airbag in the given seating position.

ANNEX 3

DIAGRAM OF AN APPARATUS TO TEST DURABILITY OF RETRACTOR MECHANISM



ANNEX 4

DIAGRAM OF AN APPARATUS TO TEST LOCKING OF EMERGENCY LOCKING RETRACTORS

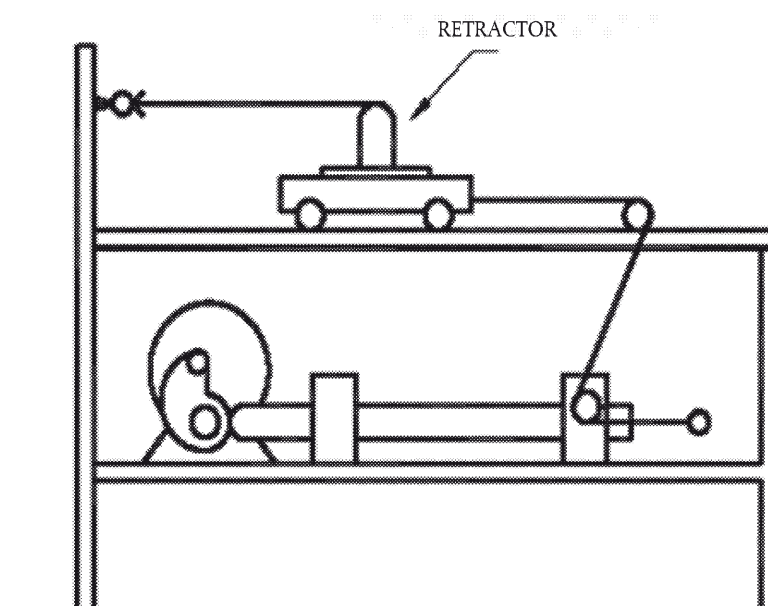
A suitable apparatus is illustrated in the figure and consists of a motor-driven cam, the follower of which is attached by wires to a small trolley mounted on a track. The cam design and motor speed combination is such as to give the required acceleration at a rate of increase of acceleration as specified in paragraph 7.6.2.2 of this Regulation and the stroke is arranged to be in excess of the maximum permitted webbing movement before locking.

On the trolley a carrier is mounted which can be swivelled to enable the retractor to be mounted in varying positions relative to the direction of movement of the trolley.

When testing retractors for sensitivity to strap movement the retractor is mounted on a suitable fixed bracket and the strap is attached to the trolley.

When carrying out the above tests any brackets, etc. supplied by the manufacturer or his accredited representative shall be incorporated in the test installation to simulate as closely as possible the intended installation in a vehicle.

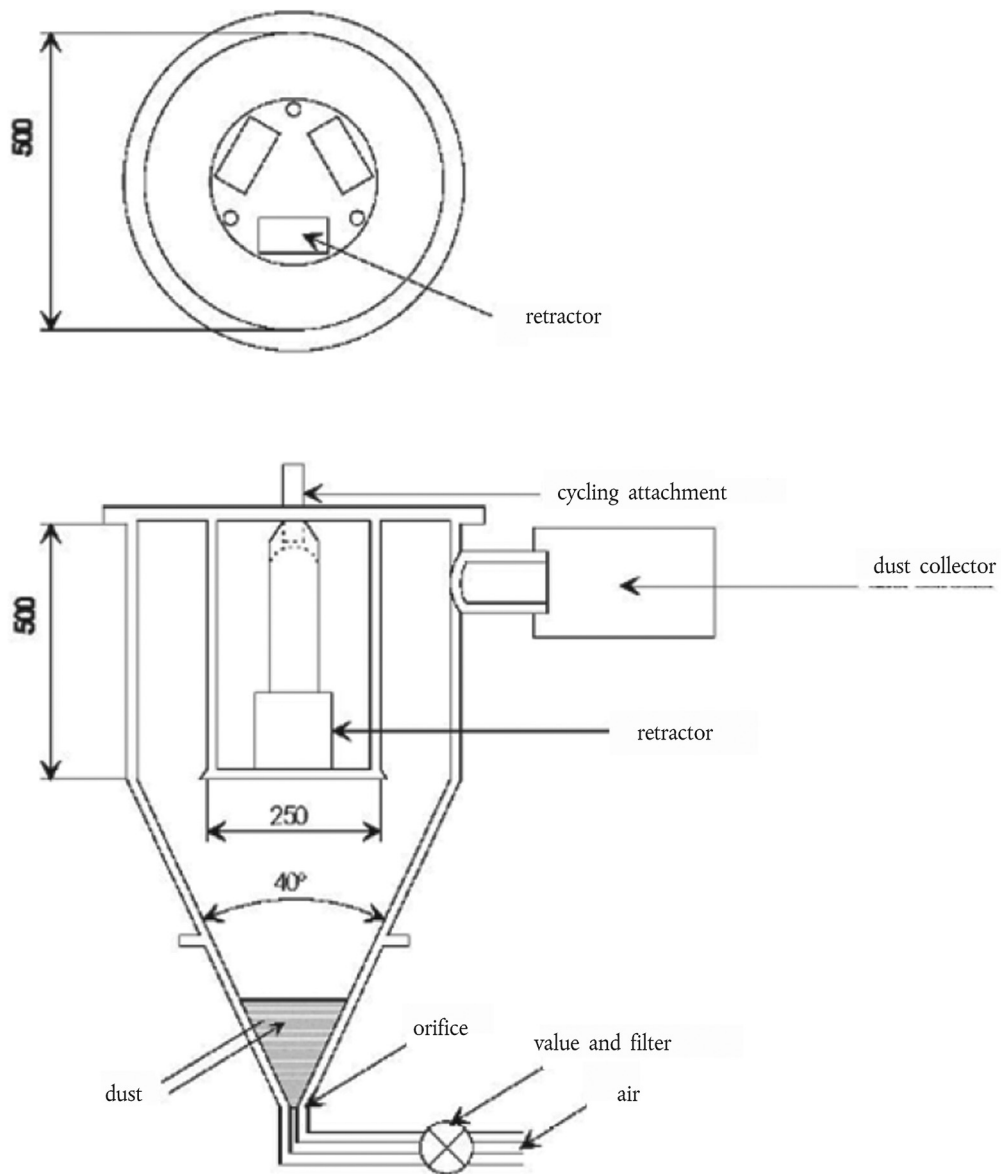
Any additional brackets, etc. that may be required to simulate the installation as intended in the vehicle shall be provided by the manufacturer or his accredited representative.



ANNEX 5

DIAGRAM OF AN APPARATUS FOR DUST-RESISTANCE TEST

(dimensions in millimetres)



ANNEX 6

DESCRIPTION OF TROLLEY, SEAT, ANCHORAGES AND STOPPING DEVICE**1. TROLLEY**

For tests on safety-belts the trolley, carrying the seat only, shall have a mass of 400 ± 20 kg. For tests on restraint systems the trolley with the attached vehicle structure shall have a mass of 800 kg. However, if necessary, the total mass of the trolley and vehicle structure may be increased by increments of 200 kg. In no case shall the total mass differ from the nominal value by more than ± 40 kg.

2. SEAT

Except in the case of tests on restraint systems, the seat shall be of rigid construction and present a smooth surface. The particulars given in Figure 1 to this Annex shall be respected, care being taken that no metal part can come into contact with the belt.

3. ANCHORAGES

3.1. In the case of a belt equipped with a belt adjustment device for height as defined in paragraph 2.14.6 of this Regulation, this device shall be secured either to a rigid frame, or to a part of the vehicle on which it is normally mounted which shall be securely fixed on the test trolley.

3.2. The anchorages shall be positioned as shown in Figure 1. The marks which correspond to the arrangement of the anchorages show where the ends of the belt are to be connected to the trolley or to the load transducer, as the case may be. The anchorages for normal use are the points A, B and K if the strap length between the upper edge of the buckle and the hole for attachment of the strap support is not more than 250 mm. Otherwise, the points A1 and B1 shall be used. The tolerance on the position of the anchorage points is such that each anchorage point shall be situated at most at 50 mm from corresponding points A, B and K indicated in Figure 1 or A1, B1 and K, as the case may be.

3.3. The structure carrying the anchorages shall be rigid. The upper anchorage must not be displaced by more than 0,2 mm in the longitudinal direction when a load of 98 daN is applied to it in that direction. The trolley shall be so constructed that no permanent deformation shall occur in the parts bearing the anchorages during the test.

3.4. If a fourth anchorage is necessary to attach the retractor, this anchorage:

Shall be located in the vertical longitudinal plane passing through K;

Shall enable the retractor to be tilted to the angle prescribed by the manufacturer;

Shall be located on the arc of a circle with radius $KB1 = 790$ mm if the length between the upper strap guide and the strap outlet at the retractor is not less than 540 mm or, in all other cases, on the arc of a circle with centre K and radius 350 mm.

4. STOPPING DEVICE

4.1. The device consists of two identical absorbers mounted in parallel, except in the case of restraint systems when four absorbers shall be used for a nominal mass of 800 kg. If necessary, an additional absorber shall be used for each 200 kg increase of nominal mass. Each absorber comprises:

an outer casing formed from a steel tube;

a polyurethane energy-absorber tube;

a polished-steel olive-shaped knob penetrating into the absorber; and

a shaft and an impact plate.

4.2. The dimensions of the various parts of this absorber are shown in the diagrams reproduced in Figures 2, 3 and 4.

- 4.3. The characteristics of the absorbing material are given in Table 1 of this Annex. Immediately before each test the tubes shall be conditioned at a temperature between 15° and 25 °C for at least 12 hours without being used. During the dynamic testing of safety-belts or restraint systems, the stopping device shall be at the same temperature as during the calibration test, with a tolerance of ± 2 °C. The requirements to be met by the stopping device are given in Annex 8 to this Regulation. Any other device giving equivalent results may be used.

Table 1

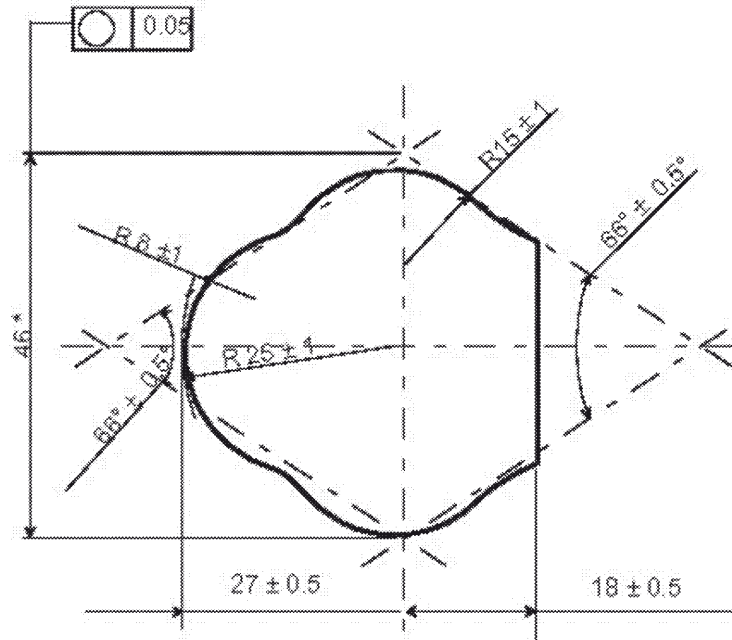
Characteristics of the absorbing material

(ASTM Method D 735 unless otherwise stated)

Shore hardness A:	95 $\pm$ 2 at 20 $\pm$ 5 °C temperature
Breaking strength:	$R_0 > 343 \text{ daN/cm}^2$
Minimum elongation:	$A_0 > 400$ per cent
Module at 100 per cent elongation:	$> 108 \text{ daN/cm}^2$
at 300 per cent elongation:	$> 235 \text{ daN/cm}^2$
Low-temperature brittleness (ASTM Method D 736):	5 hours at – 55 °C
Compression set (Method B):	22 hours at 70 °C < 45 per cent
Density at 25 °C:	between 1,05 and 1,10
Ageing in air (ASTM Method D 573):	
70 hours at 100 °C	— Shore-A-hardness: max variation ± 3
	— breaking strength: decrease < 10 per cent of R_0
	— elongation: decrease < 10 per cent of A_0
	— mass: decrease < 1 per cent
Immersion in oil (ASTM Method No 1 Oil):	
70 hours at 100 °C	— Shore-A-hardness: max variation ± 4
	— breaking strength: decrease < 15 per cent of R_0
	— elongation: decrease < 10 per cent of A_0
	— volume: swelling < 5 per cent
Immersion in oil (ASTM Method No 3 Oil):	
70 hours at 100 °C	— breaking strength: decrease < 15 per cent of R_0
	— elongation: decrease < 15 per cent of A_0
	— volume: swelling < 20 per cent
Immersion in distilled water:	
1 week at 70 °C	— breaking strength: decrease < 35 per cent of R_0
	— elongation: increase < 20 per cent of A_0

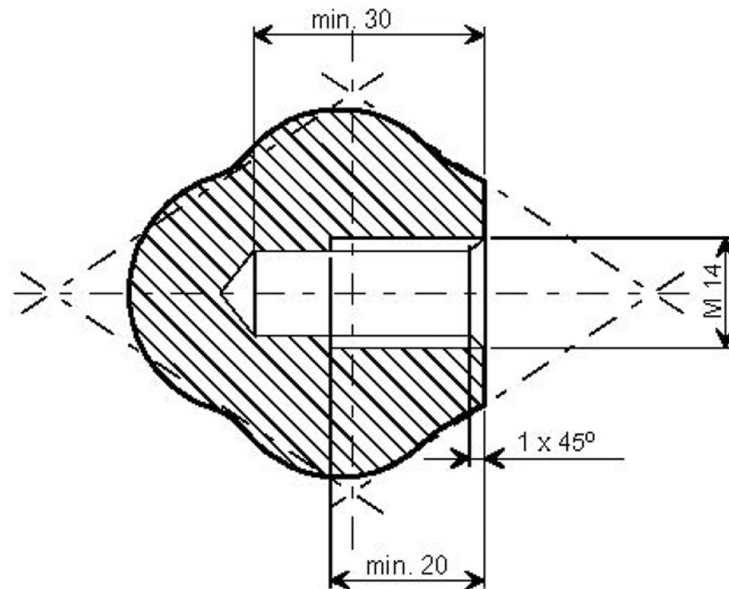
Figure 4

Stopping device
(Olive-shaped knob)



* This dimension can vary between 43 and 49 mm

Dimensions in mm



Surface finish $\sqrt{0.4}$

Dimensions in mm

Interference tolerance $\pm 0,1$

ANNEX 7

DESCRIPTION OF MANIKIN

1. SPECIFICATIONS OF THE MANIKIN

1.1. General

The main characteristics of the manikin are illustrated in the following figures and tables:

Figure 1 Side view of head, neck and torso;

Figure 2 Front view of head, neck and torso;

Figure 3 Side view of hip, thighs and lower leg;

Figure 4 Front view of hip, thighs and lower leg;

Figure 5 Principal dimensions;

Figure 6 Manikin in sitting position, showing:

location of the centre of gravity;

location of points at which displacement shall be measured; and

shoulder height.

Table 1 References, names, materials and principal dimensions of components of the manikin; and

Table 2 Masses of head, neck, torso, thighs and lower leg.

1.2. Description of the manikin

1.2.1. Structure of the lower leg (see Figures 3 and 4)

The structure of the lower leg consists of three components:

— a sole plate (30),

— a shin tube (29), and

— a knee tube (26).

The knee tube has two lugs which limit the movement of the lower leg in relation to the thigh.

The lower leg can be rotated rearwards 120° from the straight position.

1.2.2. Structure of the thigh (see Figures 3 and 4)

The structure of the thigh consists of three components:

— knee tube (22),

— a thigh bar (21), and

— a hip tube (20).

Movement of the knee is limited by two cut-outs in the knee tube (22) which engage with the lugs of the lower leg.

1.2.3. Structure of the torso (see Figures 1 and 2)

The structure of the torso consists of:

— a hip tube (2),

- a roller chain (4),
- ribs (6) and (7),
- a sternum (8), and
- chain attachments (3) and at parts (7) and (8).

1.2.4. Neck (see Figures 1 and 2)

The neck consists of seven polyurethane discs (9). The stiffness of the neck can be adjusted by means of a chain tensioner.

1.2.5. Head (see Figures 1 and 2)

The head (15) itself is hollow; the polyurethane form is reinforced by steel plate (17). The chain tensioner by which the neck can be adjusted consists of a polyamide block (10), a tubular spacer (11), and tensioning members (12) and (13). The head can be turned about the Atlas-Axis joint, which consists of the adjuster assembly (14) and (18), the spacer (16), and polyamide block (10).

1.2.6. Knee joint (see Figure 4)

The lower leg and thighs are connected by a tube (27) and a tensioner (28).

1.2.7. Hip joint (see Figure 4)

The thighs and torso are connected by a tube (23), friction plates (24), and tensioner assembly (25).

1.2.8. Polyurethane

Type: PU 123 CH Compound

Hardness: 50-60 Shore A

1.2.9. Overalls

The manikin is covered by a special overall (see Table 1).

2. CORRECTION DEVICES

2.1. General

In order to calibrate the manikin to certain values and its total mass, the mass distribution are adjusted by the use of six correction steel masses of 1 kg each, which can be mounted at the hip joint. Six polyurethane weights each of 1 kg mass can be mounted in the back of the torso.

3. CUSHION

A cushion must be positioned between the chest of the manikin and the overall. This cushion shall be made of polyethylene foam of the following specification:

Hardness: 7-10 shore A

Thickness: 25 mm ± 5

It shall be replaceable.

4. ADJUSTMENT OF THE JOINTS

4.1. General

In order to achieve reproducible results, it is necessary to specify and control the friction at each joint.

4.2. Knee joint

Tighten the knee joint.

Set the thigh and lower leg vertical.

Rotate the lower leg through 30°.

Gradually slacken the tensioner (28) until the lower leg starts to fall under its own mass.

Lock the tensioner in this position.

4.3. Hip joint

Tighten the hip joint.

Place the thigh in a horizontal position and the torso in a vertical position.

Rotate the torso in a forward direction until the angle between the torso and the thigh is 60°.

Gradually slacken the tensioner until the torso starts to fall under its own mass.

Lock the tensioner in this position.

4.4. Atlas-Axis joint

Adjust the Atlas-Axis joint so that it just resists its own weight in the fore and aft directions.

4.5. Neck

The neck can be adjusted by means of the chain tensioner (13). When the neck is adjusted, the upper end of the tensioner shall displace between 4-6 cm when subjected to a horizontal load of 10 daN.

Table 1

Reference No	Name	Material	Dimensions
1	Body material	Polyurethane	—
2	Hip tube	Steel	76 × 70 × 100 mm
3	Chain attachments	Steel	25 × 10 × 70 mm
4	Roller chain	Steel	3/4
5	Shoulder plate	Polyurethane	—
6	Rolled section	Steel	30 × 30 × 3 × 250 mm
7	Ribs	Perforated steel plate	400 × 85 × 1,5 mm
8	Sternum	Perforated steel plate	250 × 90 × 1,5 mm
9	Discs (six)	Polyurethane	ø 90 × 20 mm
			ø 80 × 20 mm
			ø 75 × 20 mm
			ø 70 × 20 mm
			ø 65 × 20 mm
			ø 60 × 20 mm
10	Block	Polyamide	60 × 60 × 25 mm
11	Tubular spacer	Steel	40 × 40 × 2 × 50 mm
12	Tensioning bolt	Steel	M16 × 90 mm

Reference No	Name	Material	Dimensions
13	Tensioner nut	Steel	M16
14	Tensioner for Atlas-Axis joint	Steel	Ø 12 × 130 mm (M12)
15	Head	Polyurethane	—
16	Tubular spacer	Steel	Ø 18 × 13 × 17 mm
17	Reinforcement plate	Steel	30 × 3 × 500 mm
18	Tensioner nut	Steel	M12 mm
19	Thighs	Polyurethane	—
20	Hip tube	Steel	76 × 70 × 80 mm
21	Thigh bar	Steel	30 × 30 × 440 mm
22	Knee tube	Steel	52 × 46 × 40 mm
23	Hip connection tube	Steel	70 × 64 × 250 mm
24	Friction plates (four)	Steel	160 × 75 × 1 mm
25	Tensioner assembly	Steel	M12 × 320 mm +
			Plates and nuts
26	Knee tube	Steel	52 × 46 × 160
27	Knee connection tube	Steel	44 × 39 × 190 mm
28	Tensioner plate	Steel	Ø 70 × 4 mm
29	Shin tube	Steel	50 × 50 × 2 × 460 mm
30	Sole plate	Steel	100 × 170 × 3 mm
31	Torso correction mass (six)	Polyurethane	Each mass 1 kg
32	Cushion	Polystyrene foam	350 × 250 × 25 mm
33	Overall	Cotton and polyamide straps	—
34	Hip correction masses (six)	Steel	Each mass 1 kg

Table 2

Components of manikin	Mass in kg
Head and neck	4,6 ± 0,3
Torso and arms	40,3 ± 1,0
Thighs	16,2 ± 0,5
Lower leg and foot	9,0 ± 0,5
Total mass including correction weights	75,5 ± 1,0

Figure 2

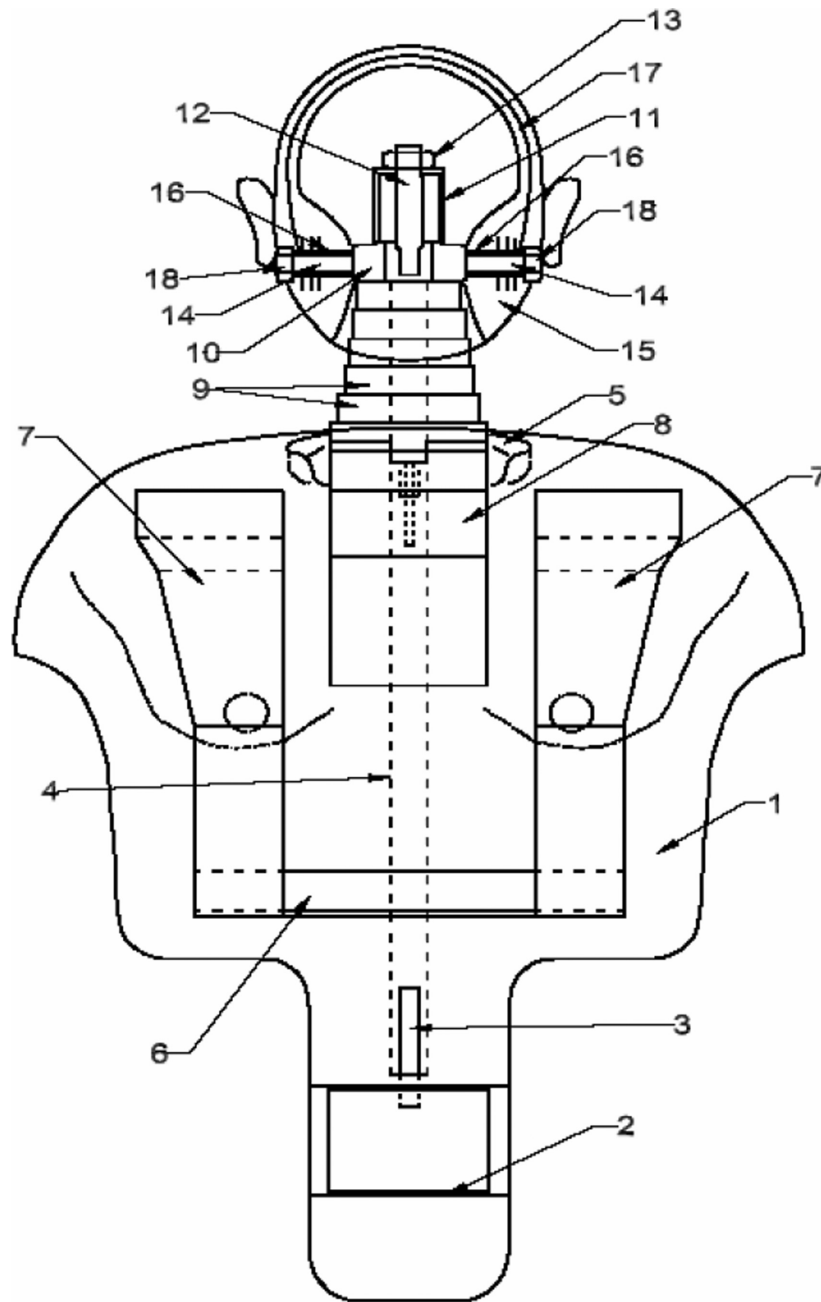


Figure 3

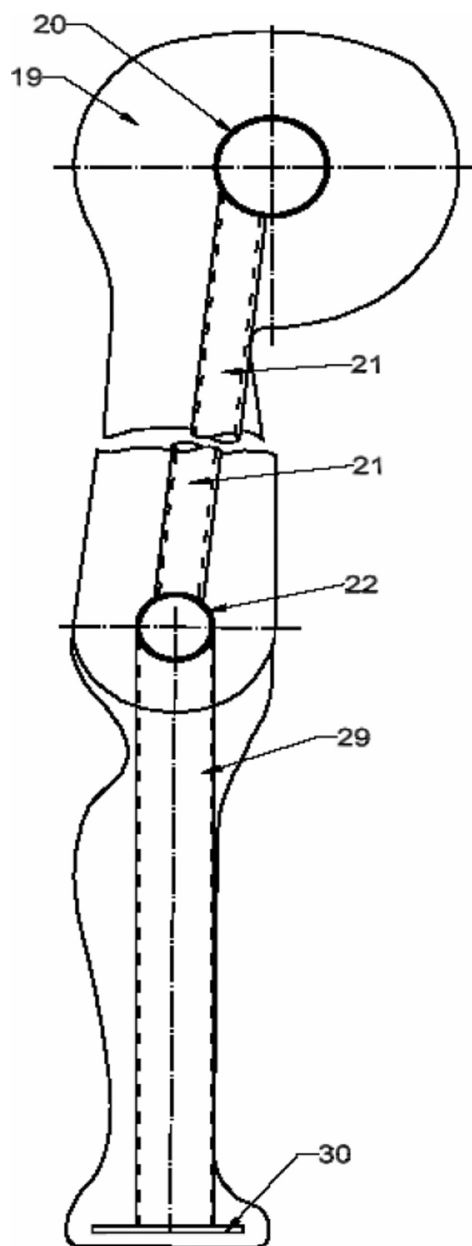


Figure 4

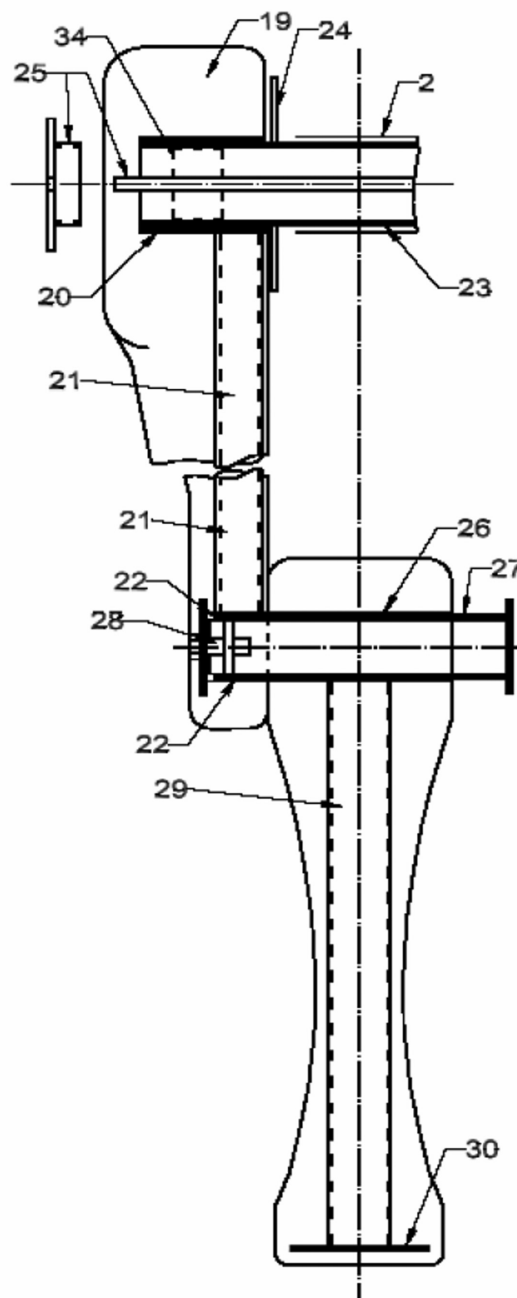


Figure 5

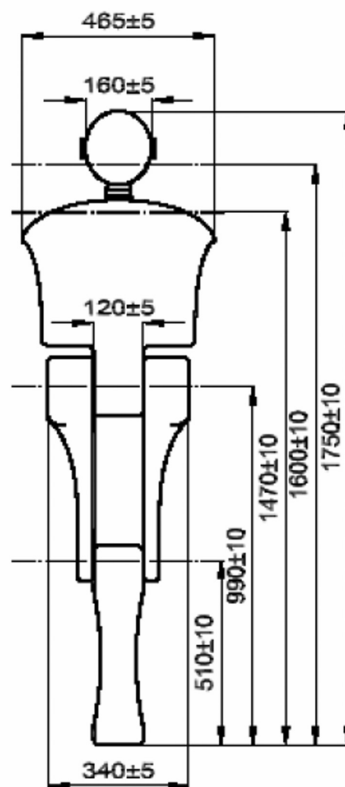
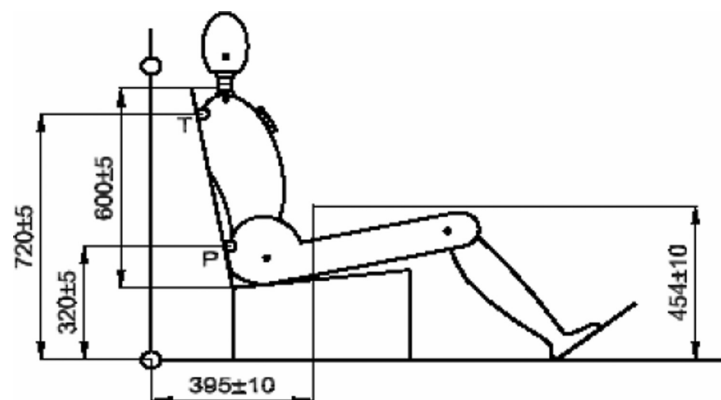


Figure 6



All dimensions in mm

G = centre of gravity

T = torso reference point (at the rear on the centre line of the manikin)

P = pelvis reference point (at the rear on the centre line of the manikin)

The displacement measurement at point P shall not contain rotational components around the hip axis and around a vertical axis.

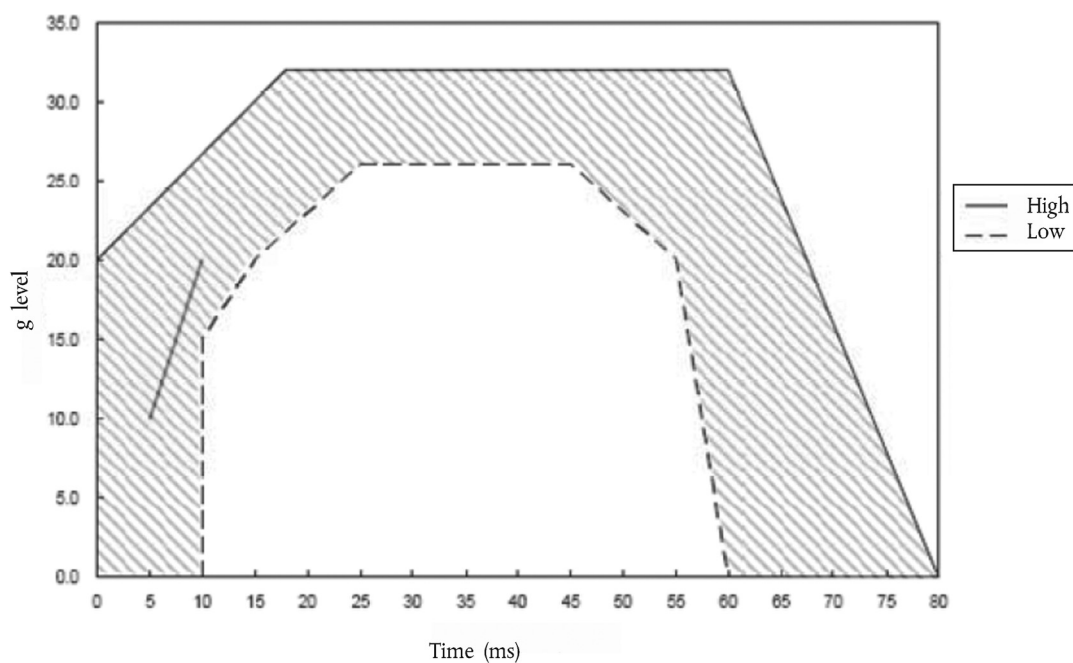
ANNEX 8

DESCRIPTION OF CURVE OF TROLLEY'S DECELERATION OR ACCELERATION AS A FUNCTION OF TIME

In all cases the calibration and measuring procedures shall correspond to those defined in the International Standard ISO 6487 (2002); the measuring equipment shall correspond to the specification of a data channel with a channel frequency class (CFC) 60.

Definition of the different curves

Time (ms)	Acceleration (g) Low corridor	Acceleration (g) High corridor
0	—	20
10	0	—
10	15	—
15	20	—
18	—	32
25	26	—
45	26	—
55	20	—
60	0	32
80	—	0



The additional segment (see paragraph 7.7.4.2) applies only for the acceleration sled.

ANNEX 9

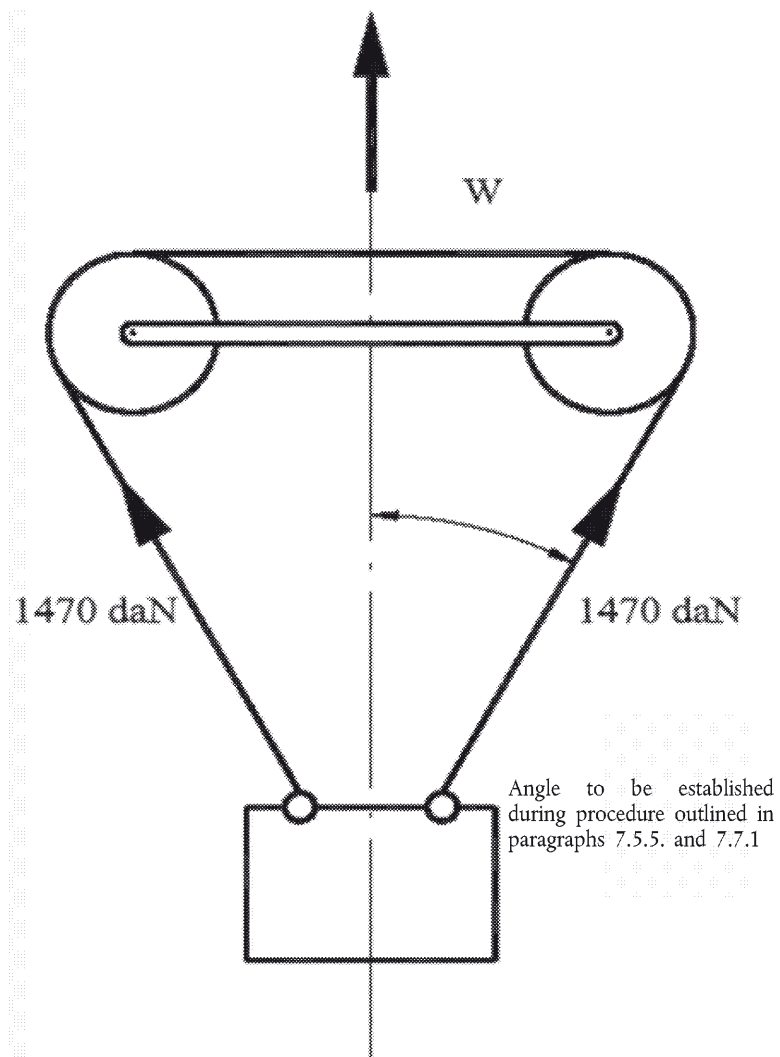
INSTRUCTIONS

Every safety-belt shall be accompanied by instructions of the following content or kind in the language or languages of the country in which it is to be placed on sale:

1. Installation instructions (not required if the vehicle manufacturer is to install the safety-belt) which specify for which vehicle models the assembly is suitable and the correct method of attachment of the assembly to the vehicle, including a warning to guard against chafing of the straps.
 2. User instructions (may be included in the vehicle user's handbook if the safety-belt is installed by the vehicle manufacturer) which specify the instructions to ensure that the user obtains the greatest benefit from the safety-belt. In these instructions reference shall be made to:
 - (a) the importance of wearing the assembly on all journeys;
 - (b) the correct manner of wearing the belt and in particular to:
 - (i) the intended location of the buckle;
 - (ii) the desirability of wearing belts tightly;
 - (iii) the correct positioning of the straps and the need to avoid twisting them;
 - (iv) the importance of each belt being used by one occupant only, and especially of not putting a belt around a child seated on the occupant's lap;
 - (c) the method of operating the buckle;
 - (d) the method of operating the adjuster;
 - (e) the method of operating any retractor which may be incorporated in the assembly and the method of checking that it locks;
 - (f) the recommended methods of cleaning the belt and reassembling it after cleaning where appropriate;
 - (g) the need to replace the safety-belt when it has been used in a severe accident or shows signs of severe fraying or having been cut, or when, with a belt fitted with a visual overload indicator, it indicates the belt's unsuitability for further use or when a seat-belt is equipped with a pre-loading device, when the latter has been activated;
 - (h) the fact that the belt must not be altered or modified in any way since such changes may render the belt ineffective, and in particular where the design permits part to be disassembled, instructions or ensure correct reassembly;
 - (i) the fact that the belt is intended for use by adult-sized occupants;
 - (j) the stowage of the belt when not in use.
 3. In the case of safety-belts fitted with a type 4N retractor, it shall be indicated in the installation instructions and on any packaging that this belt is not suitable for installation in motor vehicles used for the carriage of passengers having not more than nine seats, including that of the driver.
 4. An installation requirement for the consumer shall be provided by the manufacturer/applicant for all vehicles where the crotch strap assembly can be used. The manufacturer of the harness belt shall prescribe the mounting of the additional reinforcement elements for the anchorages of crotch straps and their installation in all vehicles where an installation is provided for.
-

ANNEX 10

DUAL BUCKLE TEST



W = applied load

ANNEX 11

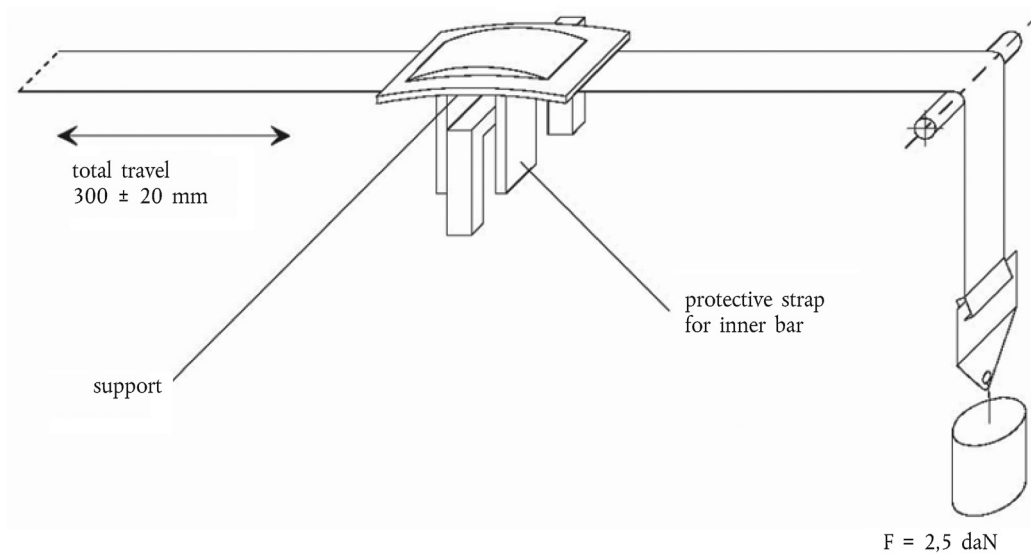
ABRASION AND MICROSLIP TEST

Figure 1

Type I procedure

Examples of test arrangements corresponding to the type of adjusting device

Example a



Example b

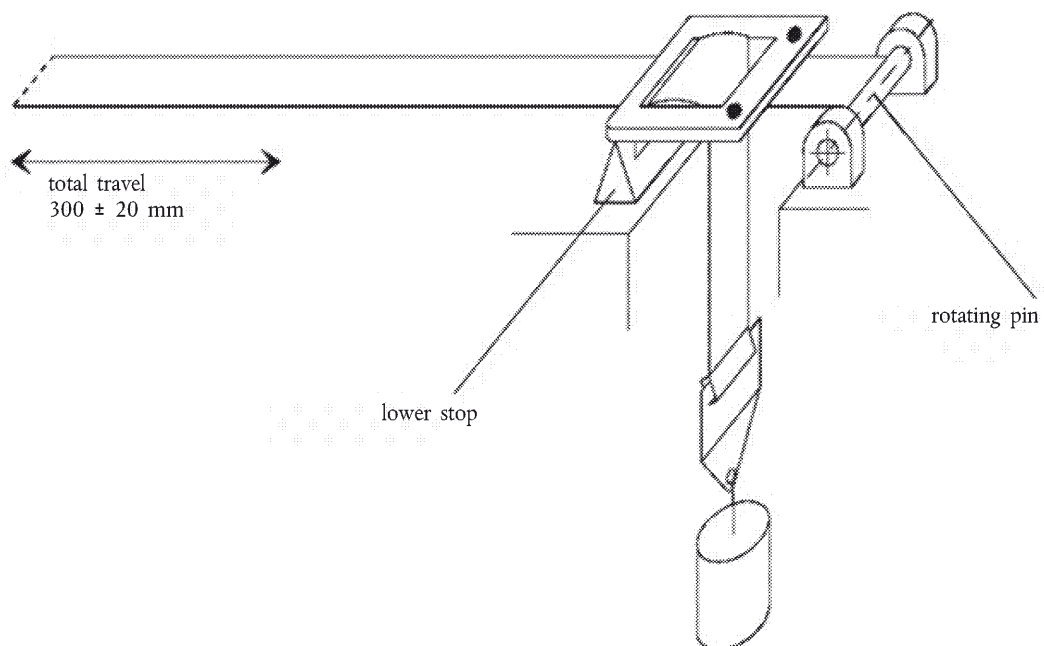
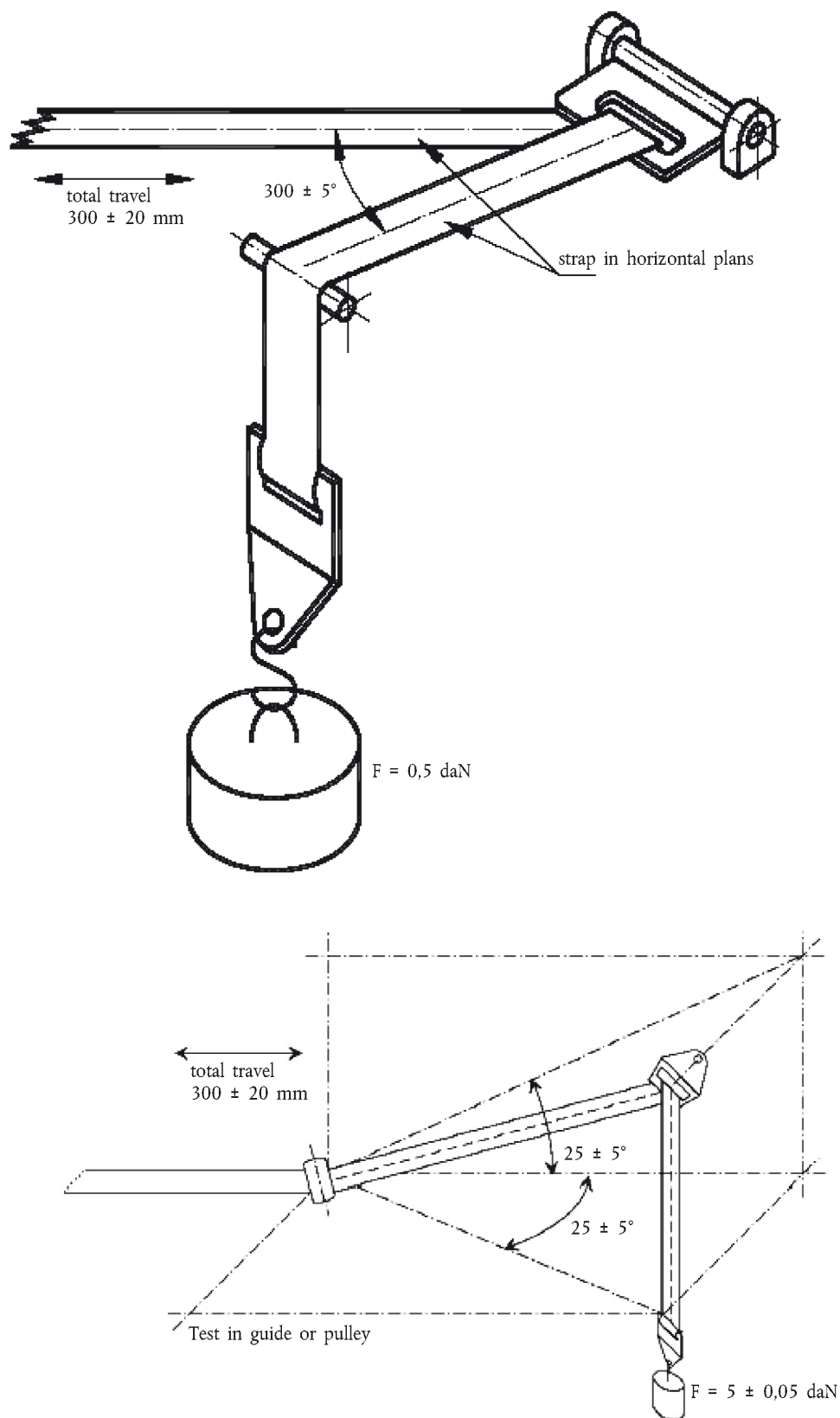
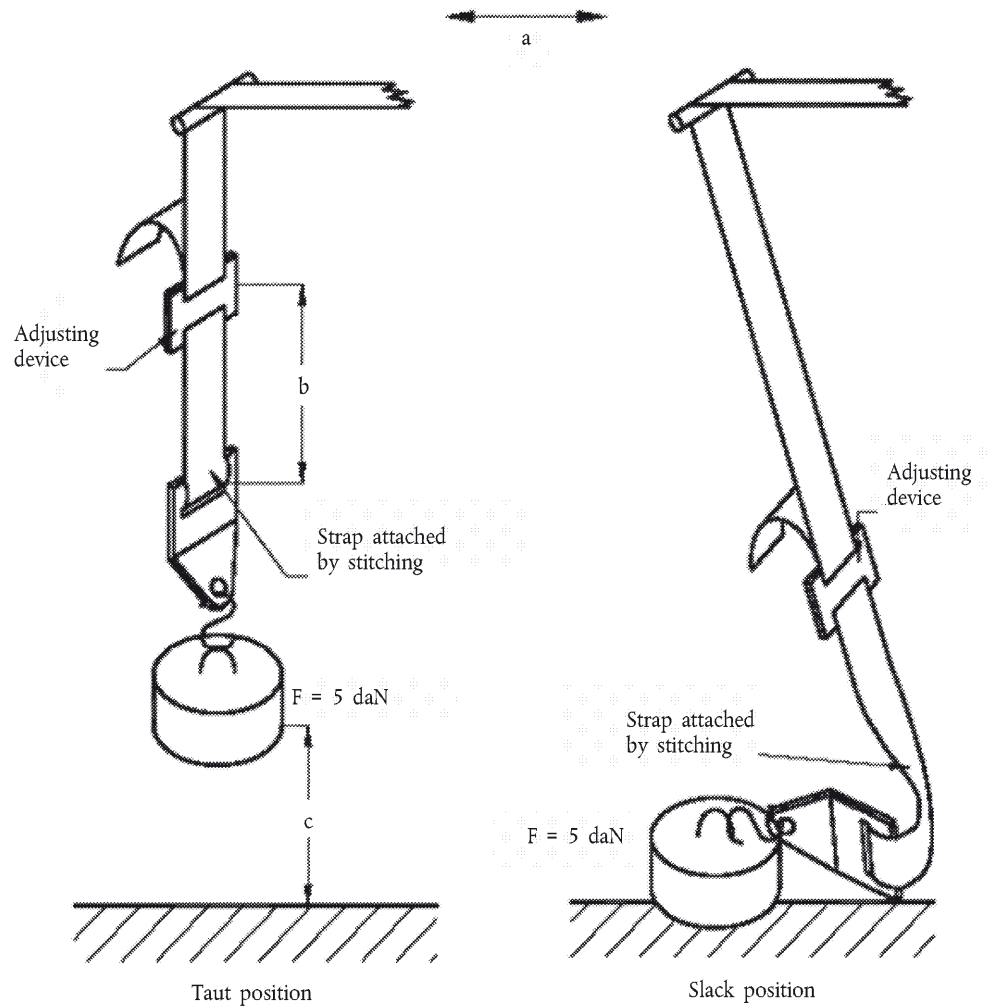


Figure 2
Type 2 procedure



All dimensions in mm

Figure 3

Type 3 procedure and micro-slip testTotal travel: 300 ± 20 mm

The load of 5 daN on the testing device shall be vertically guided in such a way as to avoid load-swing and twisting of the strap.

The attaching device shall be fixed to the load of 5 daN in the same manner as in a vehicle.

ANNEX 12

CORROSION TEST**1. TEST APPARATUS**

- 1.1. The apparatus shall consist of a mist chamber, a salt solution reservoir, a supply of suitably conditioned compressed air, one or more atomising nozzles, sample supports, provision for heating the chamber, and necessary means of control. The size and detail construction of the apparatus shall be optional, provided that the test conditions are met.
- 1.2. It is important to ensure that drops of solution accumulated on the ceiling or cover of the chamber do not fall on test samples.
- 1.3. Drops of solution which fall from test samples shall not return to the reservoir for respraying.
- 1.4. The apparatus shall not be constructed of materials that will affect the corrosiveness of the mist.

2. LOCATION OF TEST SAMPLES IN THE MIST CABINET

- 2.1. Samples, except retractors, shall be supported or suspended between 15° and 30° from the vertical and preferably parallel to the principal direction of horizontal flow of mist through the chamber, based upon the dominant surface being tested.
- 2.2. Retractors shall be supported or suspended so that the axes of the reel for storing the strap shall be normal to the principal direction of horizontal flow of mist through the chamber. The strap opening in the retractor shall also be facing in this principal direction.
- 2.3. Each sample shall be placed so as to permit free setting of mist on all samples.
- 2.4. Each sample shall be so placed as to prevent salt solution from one sample dripping on to any other sample.

3. SALT SOLUTION

- 3.1. The salt solution shall be prepared by dissolving 5 ± 1 parts by mass of sodium chloride in 95 parts of distilled water. The salt shall be sodium chloride substantially free of nickel and copper and containing on the dry basis not more than 0,1 per cent of sodium iodide and not more than 0,3 per cent of total impurities.
- 3.2. The solution shall be such that when atomised at 35 °C the collected solution is in the pH range of 6,5 to 7,2.

4. AIR SUPPLY

The compressed air supply to the nozzle or nozzles for atomising the salt solution shall be free of oil and dirt, and maintained at a pressure between 70 kN/m² and 170 kN/m².

5. CONDITIONS IN THE MIST CHAMBER

- 5.1. The exposure zone of the mist chamber shall be maintained at 35 ± 5 °C. At least two clean mist collectors shall be placed within the exposure zone so that no drops of solution from the test samples or any other sources are collected. The collectors shall be placed near the test samples, one nearest to any nozzle and one furthest from all nozzles. The mist shall be such that for each 80 cm² of horizontal collecting areas, there is collected in each collector from 1,0 to 2,0 ml of solution per hour when measured over an average of at least 16 hours.
- 5.2. The nozzle or nozzles shall be directed or baffled so that the spray does not impinge directly on test samples.

ANNEX 13

ORDER OF TESTS

[illegible]

[illegible]

ANNEX 14

CONTROL OF CONFORMITY OF PRODUCTION**1. TESTS**

Safety-belts shall be required to demonstrate compliance with the requirements on which the following tests are based:

1.1. Verification of the locking threshold and durability of emergency locking retractors

According to the provisions of paragraph 7.6.2 in the most unfavourable direction as appropriate after having undergone the durability testing detailed in paragraphs 7.6.1, 7.2, and 7.6.3 as a requirement of paragraph 6.2.5.3.5 of this Regulation.

1.2. Verification of the durability of automatically-locking retractors

According to the provisions of paragraph 7.6.1 supplemented by the tests in paragraphs 7.2 and 7.6.3 as a requirement of paragraph 6.2.5.2.3 of this Regulation.

1.3. Test for strength of straps after conditioning

According to the procedure described in paragraph 7.4.2 after conditioning according to the requirements of paragraphs 7.4.1.1 to 7.4.1.5 of this Regulation.

1.3.1. Test for strength of straps after abrasion

According to the procedure described in paragraph 7.4.2 after conditioning according to the requirements described in paragraph 7.4.1.6 of this Regulation.

1.4. Microslip test

According to the procedure described in paragraph 7.3 of this Regulation.

1.5. Test of the rigid parts

According to the procedure described in paragraph 7.5 of this Regulation.

1.6. Verification of the performance requirements of the safety-belt or restraint system when subjected to the dynamic test**1.6.1. Tests with conditioning****1.6.1.1. Belts or restraint systems fitted with an emergency locking retractor according to the provisions set out in paragraphs 7.7 and 7.8 of this Regulation, using a belt which has previously been subjected to 45 000 cycles of the endurance test of the retractor prescribed in paragraph 7.6.1 of this Regulation and to the tests defined in paragraphs 6.2.2.4, 7.2 and 7.6.3 of this Regulation.****1.6.1.2. Belts or restraint systems fitted with an automatically-locking retractor: according to the provisions set out in paragraphs 7.7 and 7.8 of this Regulation, using a belt which has previously been subjected to 10 000 cycles of the endurance test of the retractor prescribed in paragraph 7.6.1 and also to the tests prescribed in paragraphs 6.2.2.4, 7.2 and 7.6.3 of this Regulation.****1.6.1.3. Static belts: according to the provisions set out in paragraphs 7.7 and 7.8 of this Regulation, on a safety-belt which has been subjected to the test prescribed in paragraphs 6.2.2.4 and 7.2 of this Regulation.****1.6.2. Test without any conditioning**

According to the provisions set out in paragraphs 7.7 and 7.8 of this Regulation.

2. TEST FREQUENCY AND RESULTS**2.1. The frequency of testing to the requirements of paragraphs 1.1 to 1.5 of this Annex shall be on a statistically controlled and random basis in accordance with one of the regular quality assurance procedures.**

- 2.1.1. Furthermore, in the case of emergency locking retractors, all assemblies shall be checked:
- 2.1.1.1. Either according to the provisions set out in paragraphs 7.6.2.1 and 7.6.2.2 of this Regulation, in the most unfavourable direction as specified in paragraph 7.6.2.1.2. Test results shall meet the requirements of paragraphs 6.2.5.3.1.1 and 6.2.5.3.3 of this Regulation.
- 2.1.1.2. Or according to the provisions set out in paragraph 7.6.2.3 of this Regulation, in the most unfavourable direction. Nevertheless, the speed of inclination can be more than the prescribed speed insofar as it does not affect the test results. Test results shall meet the requirements of paragraph 6.2.5.3.1.4 of this Regulation.
- 2.2. In the case of compliance with the dynamic test according to paragraph 1.6 of this Annex, this shall be carried out with a minimum frequency of:
- 2.2.1. Tests with conditioning
- 2.2.1.1. In the case of belts fitted with an emergency locking retractor,
- where the daily production is greater than 1 000 belts: one in 100 000 belts produced, with a minimum frequency of one every 2 weeks,
- where the daily production is smaller than or equal to 1 000 belts: one in 10 000 belts produced, with a minimum frequency of one per year, per sort of locking mechanism ⁽¹⁾,
- shall be subjected to the test prescribed in paragraph 1.6.1.1 of this Annex.
- 2.2.1.2. In the case of belts fitted with an automatically-locking retractor and of static belts,
- where the daily production is greater than 1 000 belts: one in 100 000 belts produced, with a minimum frequency of one every 2 weeks,
- where the daily production is smaller than or equal to 1 000 belts: one in 10 000 belts produced, with a minimum frequency of one per year,
- shall be subjected to the test prescribed in paragraph 1.6.1.2 or 1.6.1.3 of this Annex respectively.
- 2.2.2. Tests without conditioning
- 2.2.2.1. In the case of belts fitted with an emergency locking retractor, the following number of samples shall be subject to the test prescribed in paragraph 1.6.2 above:
- 2.2.2.1.1. for a production of not less than 5 000 belts per day, two belts per 25 000 produced with a minimum frequency of one per day, per sort of locking mechanism;
- 2.2.2.1.2. for a production of less than 5 000 belts per day, one belt per 5 000 produced with a minimum frequency of one per year, per sort of locking mechanism;
- 2.2.2.2. In the case of belts fitted with an automatically-locking retractor and of static belts, the following number of samples shall be subjected to the test prescribed in paragraph 1.6.2 above.
- 2.2.2.2.1. for a production of not less than 5 000 belts per day, two belts per 25 000 produced with a minimum of one per day, per approved type;
- 2.2.2.2.2. for a production of less than 5 000 belts per day, one belt per 5 000 produced with a minimum frequency of one per year, per approved type;
- 2.2.3. Results
- Test results shall meet the requirements set out in paragraph 6.4.1.3.1 of this Regulation.
- The forward displacement of the manikin may be controlled with regard to paragraph 6.4.1.3.2 of this Regulation (or 6.4.1.4 where applicable) during a test performed with conditioning according to paragraph 1.6.1 of this Annex by means of a simplified adapted method.

⁽¹⁾ For the purposes of this annex, 'sort of locking mechanism' means all emergency locking retractors whose mechanisms differ only in the lead angle(s) of the sensing device to the vehicle's reference axis system.

- 2.2.3.1. In the case of approval following paragraph 6.4.1.3.3 of this Regulation and paragraph 1.6.1 of this Annex, it is only specified that no part of the belt shall be destructed or disengaged, and that a speed of 24 km/h of the chest reference point at 300 mm displacement shall not be exceeded.
- 2.3. Where a test sample fails a particular test to which it has been subjected, a further test to the same requirements shall be carried out on at least three other samples. In the case of dynamic tests, if one of the latter fails the test, the holder of the approval or his duly accredited representative shall notify the competent authority which has granted type approval indicating what steps have been taken to re-establish the conformity of production.
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ANNEX 15

PROCEDURE FOR DETERMINING THE 'H' POINT AND THE ACTUAL TORSO ANGLE FOR SEATING POSITIONS IN MOTOR VEHICLES**1. PURPOSE**

The procedure described in this Annex is used to establish the 'H' point location and the actual torso angle for one or several seating positions in a motor vehicle and to verify the relationship of measured data to design specifications given by the vehicle manufacturer ⁽¹⁾.

2. DEFINITIONS

2.1. 'Reference data' means one or several of the following characteristics of a seating position:

2.1.1. the 'H' point and the 'R' point and their relationship;

2.1.2. the actual torso angle and the design torso angle and their relationship.

2.2. 'Three-dimensional "H" point machine' (3-D H machine) means the device used for the determination of 'H' points and actual torso angles. This device is described in Appendix 1 to this Annex;

2.3. 'H point' means the pivot centre of the torso and the thigh of the 3-D H machine installed in the vehicle seat in accordance with paragraph 4 below. The 'H point' is located in the centre of the centreline of the device which is between the 'H point' sight buttons on either side of the 3-D H machine. The 'H' point corresponds theoretically to the 'R' point (for tolerances see paragraph 3.2.2 below). Once determined in accordance with the procedure described in paragraph 4, the 'H' point is considered fixed in relation to the seat-cushion structure and to move with it when the seat is adjusted;

2.4. '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;

2.5. 'Torso-line' means the centreline of the probe of the 3-D H machine with the probe in the fully rearward position;

2.6. 'Actual torso angle' means the angle measured between a vertical line through the 'H' point and the torso line using the back angle quadrant on the 3-D H machine. The actual torso angle corresponds theoretically to the design torso angle (for tolerances see paragraph 3.2.2 below);

2.7. 'Design torso angle' means the angle measures between a vertical line through the 'R' point and the torso line in a position which corresponds to the design position of the seat-back established by the vehicle manufacturer;

2.8. 'Centreplane of occupant' (C/LO) means the median plane of the 3-D H machine positioned in each designated seating position; it is represented by the coordinate of the 'H' point on the 'Y' axis. For individual seats, the centreplane of the seat coincides with the centreplane of the occupant. For other seats, the centreplane of the occupant is specified by the manufacturer;

2.9. 'Three-dimensional reference system' means a system as described in Appendix 2 to this Annex;

2.10. 'Fiducial marks' are physical points (holes, surfaces, marks or indentations) on the vehicle body as defined by the manufacturer;

2.11. 'Vehicle measuring attitude' means the position of the vehicle as defined by the coordinates of fiducial marks in the three-dimensional reference system.

3. REQUIREMENTS**3.1. Data presentation**

For each seating position where reference data are required in order to demonstrate compliance with the provisions of the present Regulation, all or an appropriate selection of the following data shall be presented in the form indicated in Appendix 3 to this Annex:

⁽¹⁾ In any seating position other than front seats where the 'H' point cannot be determined using the 'Three-dimensional "H" point machine' or procedures, the 'R' point indicated by the manufacturer may be taken as a reference at the discretion of the competent authority.

- 3.1.1. the coordinates of the 'R' point relative to the three-dimensional reference system;
- 3.1.2. the design torso angle;
- 3.1.3. all indications necessary to adjust the seat (if it is adjustable) to the measuring position set out in paragraph 4.3 below.
- 3.2. Relationship between measured data and design specifications
 - 3.2.1. The coordinates of the 'H' point and the value of the actual torso angle obtained by the procedure set out in paragraph 4 below shall be compared, respectively, with the coordinates of the 'R' point and the value of the design torso angle indicated by the vehicle manufacturer.
 - 3.2.2. The relative positions of the 'R' point and the 'H' point and the relationship between the design torso angle and the actual torso angle shall be considered satisfactory for the seating position in question if the 'H' point, as defined by its coordinates, lies within a square of 50 mm side length with horizontal and vertical sides whose diagonals intersect at the 'R' point, and if the actual torso angle is within 5° of the design torso angle.
 - 3.2.3. If these conditions are met, the 'R' point and the design torso angle, shall be used to demonstrate compliance with the provisions of this Regulation.
 - 3.2.4. If the 'H' point or the actual torso angle does not satisfy the requirements of paragraph 3.2.2 above, the 'H' point and the actual torso angle shall be determined twice more (three times in all). If the results of two of these three operations satisfy the requirements, the conditions of paragraph 3.2.3 above shall apply.
 - 3.2.5. If the results of at least two of the three operations described in paragraph 3.2.4 above do not satisfy the requirements of paragraph 3.2.2 above, or if the verification cannot take place because the vehicle manufacturer has failed to supply information regarding the position of the 'R' point or regarding the design torso angle, the centroid of the three measured points or the average of the three measured angles shall be used and be regarded as applicable in all cases where the 'R' point or the design torso angle is referred to in this Regulation.
- 4. PROCEDURE FOR 'H' POINT AND ACTUAL TORSO ANGLE DETERMINATION
 - 4.1. The vehicle shall be preconditioned at the manufacturer's discretion, at a temperature of 20 ± 10 °C to ensure that the seat material reached room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for 1 minute to flex the cushion and back. At the manufacturer's request, all seat assemblies shall remain unloaded for a minimum period of 30 minutes prior to installation of the 3-D H machine.
 - 4.2. The vehicle shall be at the measuring attitude defined in paragraph 2.11 above.
 - 4.3. The seat, if it is adjustable, shall be adjusted first to the rearmost normal driving or riding position, as indicated by the vehicle manufacturer, taking into consideration only the longitudinal adjustment of the seat, excluding seat travel used for purposes other than normal driving or riding positions. Where other modes of seat adjustment exist (vertical, angular, seat-back, etc.) these will then be adjusted to the position specified by the vehicle manufacturer. For suspension seats, the vertical position shall be rigidly fixed corresponding to a normal driving position as specified by the manufacturer.
 - 4.4. The area of the seating position contacted by the 3-D H machine shall be covered by a muslin cotton, of sufficient size and appropriate texture, described as a plain cotton fabric having 18,9 threads per cm² and weighing 0,228 kg/m² or knitted or non-woven fabric having equivalent characteristics. If the test is run on a seat outside the vehicle, the floor on which the seat is placed shall have the same essential characteristics ⁽¹⁾ as the floor of the vehicle in which the seat is intended to be used.
 - 4.5. Place the seat and back assembly of the 3-D H machine so that the centreplane of the occupant (C/LO) coincides with the centreplane of the 3-D H machine. At the manufacturer's request, the 3-D H machine may be moved inboard with respect to the C/LO if the 3-D H machine is located so far outboard that the seat edge will not permit levelling of the 3-D H machine.
 - 4.6. Attach the foot and lower leg assemblies to the seat pan assembly, either individually or by using the T-bar and lower leg assembly. A line through the 'H' point sight buttons shall be parallel to the ground and perpendicular to the longitudinal centreplane of the seat.

⁽¹⁾ Tilt angle, height difference with a seat mounting, surface.

4.7. Adjust the feet and leg positions of the 3-D H machine as follows:

4.7.1. Designated seating position: driver and outside front passenger

4.7.1.1. Both feet and leg assemblies shall be moved forward in such a way that the feet take up natural positions on the floor, between the operating pedals if necessary. Where possible the left foot shall be located approximately the same distance to the left of the centreplane of the 3-D H machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3-D H machine is brought to the horizontal by readjustment of the seat pan if necessary, or by adjusting the leg and foot assemblies towards the rear. The line passing through the 'H' point sight buttons shall be maintained perpendicular to the longitudinal centreplane of the seat.

4.7.1.2. If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure, move the left foot until it is supported. The alignment of the sight buttons shall be maintained.

4.7.2. Designated seating position: outboard rear

For rear seats or auxiliary seats, the legs are located as specified by the manufacturer. If the feet then rest on parts of the floor which are at different levels, the foot which first comes into contact with the front seat shall serve as a reference and the other foot shall be so arranged that the spirit level giving the transverse orientation of the seat of the device indicates the horizontal.

4.7.3. Other designated seating positions:

The general procedure indicated in paragraph 4.7.1 above shall be followed except that the feet shall be placed as specified by the vehicle manufacturer.

4.8. Apply lower leg and thigh weights and level the 3-D H machine.

4.9. Tilt the back pan forward against the forward stop and draw the 3-D H machine away from the seat-back using the T-bar. Reposition the 3-D H machine on the seat by one of the following methods:

4.9.1. If the 3-D H machine tends to slide rearward, use the following procedure. Allow the 3-D H machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required i.e. until the seat pan contacts the seat-back. If necessary, reposition the lower leg.

4.9.2. If the 3-D H machine does not tend to slide rearward, use the following procedure. Slide the 3-D H machine rearwards by applying a horizontal rearward load to the T-bar until the seat pan contacts the seat-back (see Figure 2 of Appendix 1 to this Annex).

4.10. Apply a 100 ± 10 N load to the back and pan assembly of the 3-D H machine at the intersection of the hip angle quadrant and the T-bar housing. The direction of load application shall be maintained along a line passing by the above intersection to a point just above the thigh bar housing (see Figure 2 of Appendix 1 to this Annex). Then carefully return the back pan to the seat-back. Care must be exercised throughout the remainder of the procedure to prevent the 3-D H machine from sliding forward.

4.11. Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3-D H machine level.

4.12. Tilt the back pan forward to release the tension on the seat-back. Rock the 3-D H machine from side to side through a 10° arc (5° to each side of the vertical centreplane) for three complete cycles to release any accumulated friction between the 3-D H machine and the seat.

During the rocking action, the T-bar of the 3-D H machine may tend to diverge from the specified horizontal and vertical alignment. The T-bar must therefore be restrained by applying an appropriate lateral load during the rocking motions. Care shall be exercised in holding the T-bar and rocking the 3-D H machine to ensure that no inadvertent exterior loads are applied in a vertical or fore and aft direction.

The feet of the 3-D H machine are not to be restrained or held during this step. If the feet change position, they should be allowed to remain in that attitude for the moment.

Carefully return the back pan to the seat-back and check the two spirit levels for zero position. If any movement of the feet has occurred during the rocking operation of the 3-D H machine, they must be repositioned as follows:

Alternately, lift each foot off the floor the minimum necessary amount until no additional foot movement is obtained. During this lifting, the feet are to be free to rotate; and no forward or lateral loads are to be applied. When each foot is placed back in the down position, the heel is to be in contact with the structure designed for this.

Check the lateral spirit level for zero position; if necessary, apply a lateral load to the top of the back pan sufficient to level the 3-D H machine's seat pan on the seat.

4.13. Holding the T-bar to prevent the 3-D H machine from sliding forward on the seat cushion, proceed as follows:

(a) return the back pan to the seat-back;

(b) alternately apply and release a horizontal rearward load, not to exceed 25 N, to the back angle bar at a height approximately at the centre of the torso weights until the hip angle quadrant indicates that a stable position has been reached after load release. Care shall be exercised to ensure that no exterior downward or lateral loads are applied to the 3-D H machine. If another level adjustment of the 3-D H machine is necessary, rotate the back pan forward, re-level, and repeat the procedure from paragraph 4.12.

4.14. Take all measurements:

4.14.1. The coordinates of the 'H' point are measured with respect to the three-dimensional reference system.

4.14.2. The actual torso angle is read at the back angle quadrant of the 3-D H machine with the probe in its fully rearward position.

4.15. If a re-run of the installation of the 3-D H machine is desired the seat assembly should remain unloaded for a minimum period of 30 minutes prior to the re-run. The 3-D H machine should not be left loaded on the seat assembly longer than the time required to perform the test.

4.16. If the seats in the same row can be regarded as similar (bench seat, identical seats, etc.) only one 'H' point and one 'actual torso angle' shall be determined for each row of seats, the 3-D H machine described in Appendix 1 to this Annex being seated in a place regarded as representative for the row. This place shall be:

4.16.1. in the case of the front row, the driver's seat;

4.16.2. in the case of the rear row or rows, an outer seat.

Appendix 1

DESCRIPTION OF THE THREE DIMENSIONAL 'H' POINT MACHINE (*)

(3-D H machine)

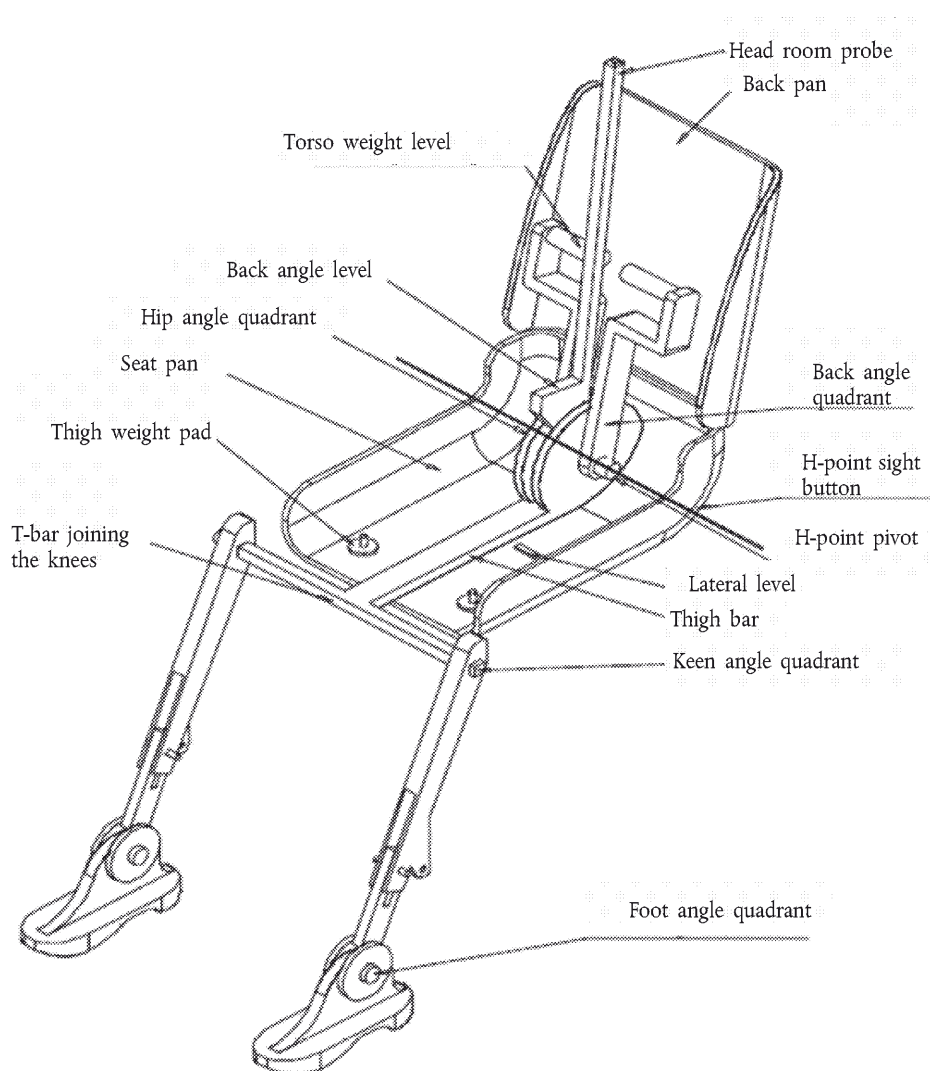
1. BACK AND SEAT PANS

The back and seat pans are constructed of reinforced plastic and metal; they simulate the human torso and thigh and are mechanically hinged at the 'H' point. A quadrant is fastened to the probe hinged at the 'H' point to measure the actual torso angle. An adjustable thigh bar, attached to the seat pan, establishes the thigh centreline and serves as a baseline for the hip angle quadrant.

2. BODY AND LEG ELEMENTS

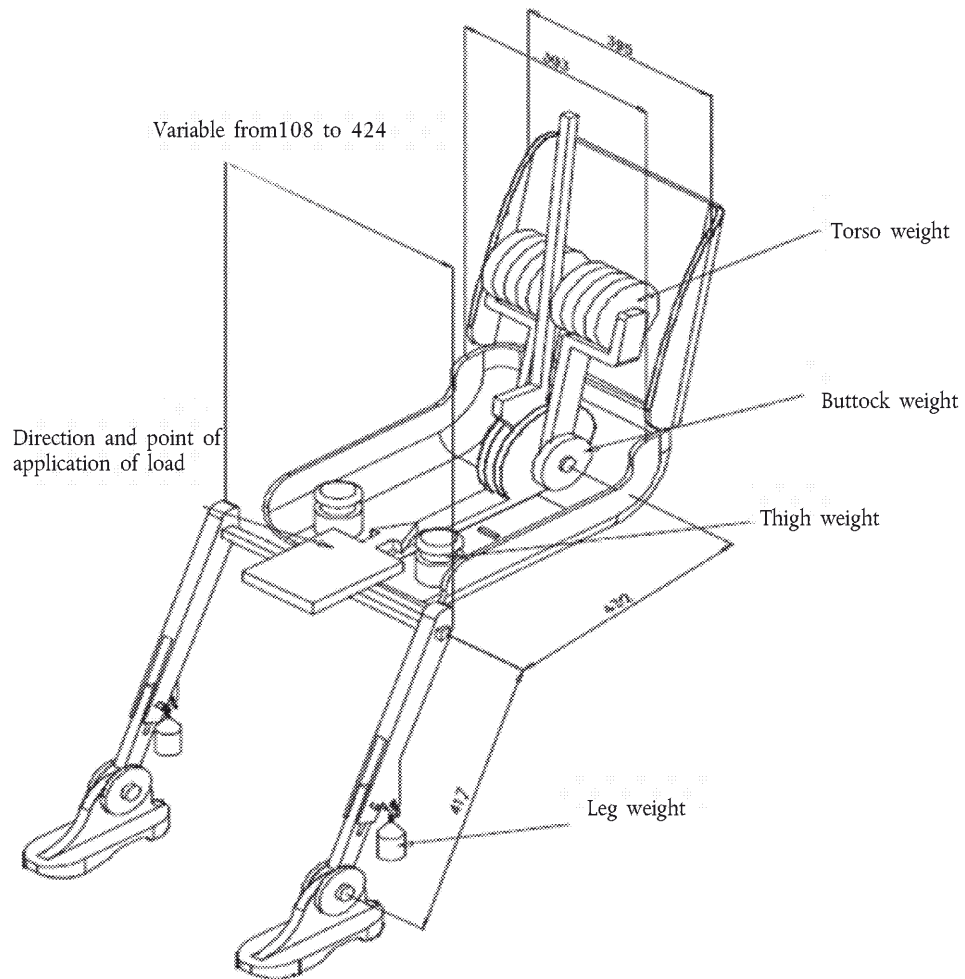
Lower leg segments are connected to the seat pan assembly at the T-bar joining the knees, which is a lateral extension of the adjustable thigh bar. Quadrants are incorporated in the lower leg segments to measure knee angles. Shoe and foot assemblies are calibrated to measure the foot angle. Two spirit levels orient the device in space. Body element weights are placed at the corresponding centres of gravity to provide seat penetration equivalent to a 76 kg male. All joints of the 3-D H machine should be checked for free movement without encountering noticeable friction.

Figure 1

3-D H machine elements designation

(*) For details of the construction of the 3-D H machine refer to Society of Automobile Engineers (SAE), 400 Commonwealth Drive, Warrendale, Pennsylvania 15096, United States of America.
The machine corresponds to that described in Standard ISO 6549:1980.

Figure 2

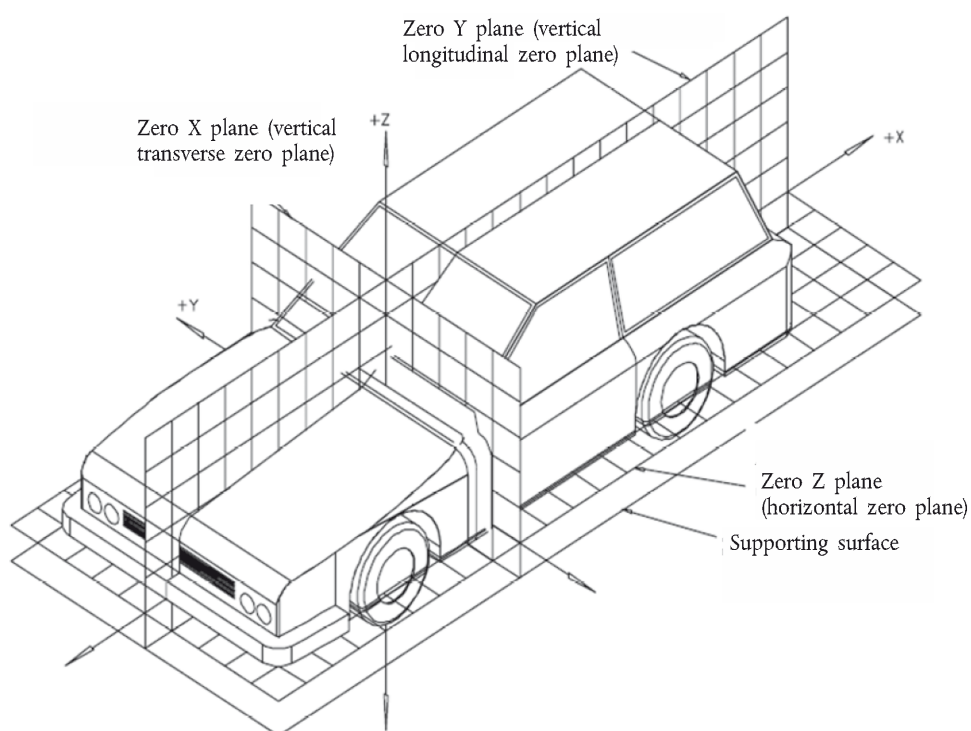
Dimensions of the 3-D machine elements and load distribution

Appendix 2

THREE-DIMENSIONAL REFERENCE SYSTEM

1. The three-dimensional reference system is defined by three orthogonal planes established by the vehicle manufacturer (see figure) (*).
2. The vehicle measuring attitude is established by positioning the vehicle on the supporting surface such that the coordinates of the fiducial marks correspond to the values indicated by the manufacturer.
3. The coordinates of the 'R' point and the 'H' point are established in relation to the fiducial marks defined by the vehicle manufacturer.

Figure

Three-dimensional reference system

(*) The reference system corresponds to Standard ISO 4130:1978.

Appendix 3

REFERENCE DATA CONCERNING SEATING POSITIONS

1. CODING OF REFERENCE DATA

Reference data are listed consecutively for each seating position. Seating positions are identified by a two-digit code. The first digit is an Arabic numeral and designates the row of seats, counting from the front to the rear of the vehicle. The second digit is a capital letter which designates the location of the seating position in a row, as viewed in the direction of forward motion of the vehicle; the following letters shall be used:

L = left

C = centre

R = right

2. DESCRIPTION OF VEHICLE MEASURING ATTITUDE

2.1. Coordinates of fiducial marks

X

Y

Z

3. LIST OF REFERENCE DATA

3.1. Seating position:

3.1.1. Coordinates of 'R' point

X

Y

Z

3.1.2. Design torso angle:

3.1.3. Specifications for seat adjustment (*)

horizontal:

vertical:

angular:

torso angle:

Note: List reference data for further seating positions under paragraphs 3.2, 3.3, etc.

(*) Strike out what does not apply

MINIMUM REQUIREMENTS FOR SAFETY-BELTS AND RETRACTORS

Vehicle Category	Forward facing seating positions				Rear facing Seating positions
	Outboard seating positions		Centre seating position		
	Front	Other than front	Front	Other than front	
M1	Ar4m	Ar4m	Ar4m	Ar4m	B, Br3, Br4m
M2 ≤ 3,5 t	Ar4m, Ar4Nm	Ar4m, Ar4Nm	Ar4m, Ar4Nm	Ar4m, Ar4Nm	Br3, Br4m, Br4Nm
M2 > 3,5 t	Br3, Br4m, Br4Nm, or Ar4m or Ar4Nm •	Br3, Br4m, Br4Nm, or Ar4m or Ar4Nm •	Br3, Br4m, Br4Nm or Ar4m or Ar4Nm •	Br3, Br4m, Br4Nm or Ar4m or Ar4Nm •	Br3, Br4m, Br4Nm
M3	See paragraph 8.1.7 for conditions when a lap belt is permitted	See paragraph 8.1.7 for conditions when a lap belt is permitted	See paragraph 8.1.7 for conditions when a lap belt is permitted	See paragraph 8.1.7 for conditions when a lap belt is permitted	
N1	Ar4m, Ar4Nm	Ar4m, Ar4Nm, Br4m,Br4Nm Ø	B, Br3, Br4m, Br4Nm or A, Ar4m, Ar4Nm (*) ⁽¹⁾	B, Br3, Br4m, Br4Nm	B, Br3, Br4m, Br4Nm
		Paragraph 8.1.2.1 lap belt permitted if seat is inboard of a passageway	Paragraph 8.1.6 lap belt permitted if the windscreen is not in the reference zone.		
N2	Br3, Br4m, Br4Nm orAr4m, Ar4Nm (*)	B, Br3, Br4m, Br4Nm	B, Br3, Br4m, Br4Nm, or A, Ar4m, Ar4Nm (*)	B, Br3, Br4m, Br4Nm	B, Br3, Br4m, Br4Nm
N3	Paragraph 8.1.6 lap belt permitted if the windscreen is outside the reference zone and for the driver's seat.		Paragraph 8.1.6 lap belt permitted if the windscreen is not in the reference zone.		

A: three-point (lap and diagonal) belt

B: 2-point (lap) belt

r: retractor

m: emergency locking retractor with multiple sensitivity

3: automatically locking retractor

4: emergency locking retractor

N: higher response threshold

(see Regulation No 16, paragraphs 2.14.3 and 2.14.5)

(*) Refers to paragraph 8.1.6 of this Regulation ⁽²⁾

Ø: Refers to paragraph 8.1.2.1 of this Regulation

•: refers to paragraph 8.1.7 of this Regulation ⁽²⁾⁽¹⁾ Erratum to Supplement 12 to the 04 series of amendments, applicable 'ab initio'.⁽²⁾ Erratum to Revision 4, applicable 'ab initio'.**Note:** In all cases all S-type belts may be fitted in place of all possible A or B type belts, provided their anchorages comply with Regulation No 14.

Where a harness belt has been approved as a S-type belt according to this Regulation, using the lap belt strap, the shoulder belt straps and possibly one or more retractors, one or two additional crotch straps including their attachments for their anchorages may be provided by the manufacturer/applicant. These additional anchorages need not meet the requirements of Regulation No 14 (Erratum to Supplement 14 to the 04 series of amendments, applicable 'ab initio').

ANNEX 17

REQUIREMENTS FOR THE INSTALLATION OF SAFETY-BELTS AND RESTRAINT SYSTEMS FOR ADULT OCCUPANTS OF POWER-DRIVEN VEHICLES ON FORWARD FACING SEATS AND FOR THE INSTALLATION OF ISOFIX CHILD RESTRAINT SYSTEMS**1. COMPATIBILITY WITH CHILD RESTRAINT SYSTEMS**

- 1.1. The vehicle manufacturer shall include in the vehicle handbook advice on the suitability of each passenger seat position for the carriage of children up to 12 years old (or up to 1,5 m tall), or the fitting of child restraint systems. This information shall be given in the national language, or at least one of the national languages, of the country in which the vehicle is offered for sale.

For each forward-facing passenger seat position, and for each ISOFIX position, the vehicle manufacturer shall either:

- (a) indicate that the seat position is suitable for child restraints of the 'universal' category (see paragraph 1.2 below);
- (b) indicate if the ISOFIX position is suitable for ISOFIX child restraint systems of the 'universal' category (see paragraph 1.2 below);
- (c) provide a list of child restraint systems of the 'semi-universal', 'restricted' or 'vehicle-specific' categories, suitable for that vehicle seating position, indicating the mass group(s) for which the restraints are intended;
- (d) provide a list of ISOFIX child restraint systems of the 'semi-universal', 'restricted' or 'vehicle specific' categories, suitable for that vehicle ISOFIX position, indicating the mass group and the ISOFIX size class for which the ISOFIX child restraints are intended;
- (e) provide a built-in child restraint system, indicating the mass group(s) for which the restraint is intended and the corresponding configuration(s);
- (f) provide any combination of (a), (b), (c), (d), (e);
- (g) indicate the mass group(s) of the children which shall not be carried in that seat position.

If a seat position is only suitable for use with forward-facing child restraint systems, this shall be indicated.

Tables in a suitable format for the above information are given in Appendix 3 to this Annex.

- 1.2. A child restraint system or ISOFIX child restraint system, of the universal category means a child restraint approved to the 'universal' category of Regulation No 44, Supplement 5 to 03 series of amendments. Seat positions, or ISOFIX positions, which are indicated by the vehicle manufacturer as being suitable for the installation of child restraints systems or ISOFIX child restraints systems shall comply with the provisions of Appendix 1 or 2 to this Annex. Where applicable any restriction on the simultaneous use on adjacent positions of ISOFIX child restraint systems and/or between ISOFIX positions and adult seating positions shall be reported in the Table 2 of Appendix 3 to this Annex.
-

*Appendix 1***PROVISIONS CONCERNING THE INSTALLATION OF 'UNIVERSAL' CATEGORY CHILD RESTRAINT SYSTEMS INSTALLED WITH THE SAFETY-BELT EQUIPMENT OF THE VEHICLE****1. GENERAL**

- 1.1. The test procedure and the requirements in this appendix shall be used to determine the suitability of seat positions for the installation of child restraints of the 'universal' category.
- 1.2. The tests may be carried out in the vehicle or in a representative part of the vehicle.

2. TEST PROCEDURE

- 2.1. Adjust the seat to its fully rearward and lowest position.
- 2.2. Adjust the seat-back angle to the manufacturer's design position. In the absence of any specification, an angle of 25 degrees from the vertical, or the nearest fixed position of the seat-back, should be used.
- 2.3. Set the shoulder anchorage to the lowest position.
- 2.4. Place a cotton cloth on the seat-back and cushion.
- 2.5. Place the fixture (as described in Figure 1 of this appendix) on the vehicle seat.
- 2.6. If the seating position is intended to accommodate a forward-facing or rearward-facing universal restraint system, proceed according to paragraphs 2.6.1, 2.7, 2.8, 2.9 and 2.10. If the seating position is intended to accommodate only a forward-facing universal restraint system, proceed according to paragraphs 2.6.2, 2.7, 2.8, 2.9 and 2.10.
 - 2.6.1. Arrange the safety-belt strap around the fixture in approximately the correct position as shown in Figures 2 and 3, then latch the buckle.
 - 2.6.2. Arrange the safety-belt lap strap approximately in the correct position around the lower part of the fixture of 150 mm radius as shown in Figure 3, then latch the buckle.
- 2.7. Ensure that the fixture is located with its centreline on the apparent centreline of the seating position ± 25 mm with its centreline parallel with the centreline of the vehicle.
- 2.8. Ensure that all webbing slack is removed. Use sufficient force to remove the slack, do not attempt to tension the webbing.
- 2.9. Push rearwards on the centre of the front of the fixture with a force of $100\text{ N} \pm 10\text{ N}$, applied parallel to the lower surface, and remove the force.
- 2.10. Push vertically downwards on the centre of the upper surface of the fixture with a force of $100\text{ N} \pm 10\text{ N}$, and remove the force.

3. REQUIREMENTS

- 3.1. The base of the fixture shall contact both the forward and rearward parts of the seat cushion surface. If such contact does not occur due to the belt access gap in the test fixture, this gap may be covered in line with the bottom surface of the test fixture.
- 3.2. The lap portion of the belt shall touch the fixture on both sides at the rear of the lap belt path (see Figure 3).
- 3.3. Should the above requirements not be met with the adjustments indicated in paragraphs 2.1, 2.2 and 2.3, the seat, seat-back and safety-belt anchorages may be adjusted to an alternative position designated by the manufacturer for normal use at which the above installation procedure shall be repeated and the requirements again verified and met. This alternative position shall be included as an information in the Table 1 given in Appendix 3 to this Annex.

Figure 1

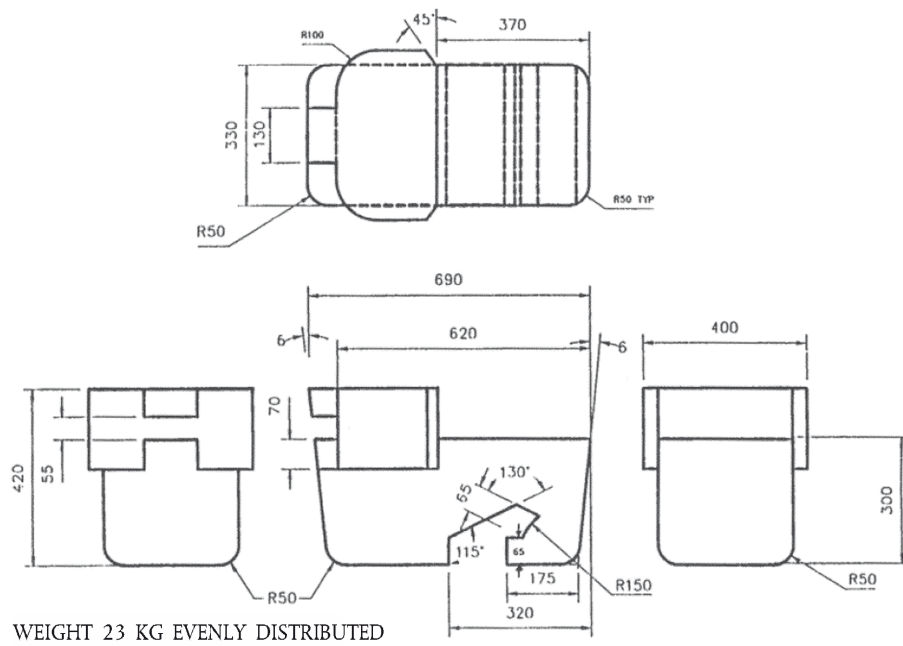
Specifications of the fixture

Figure 2

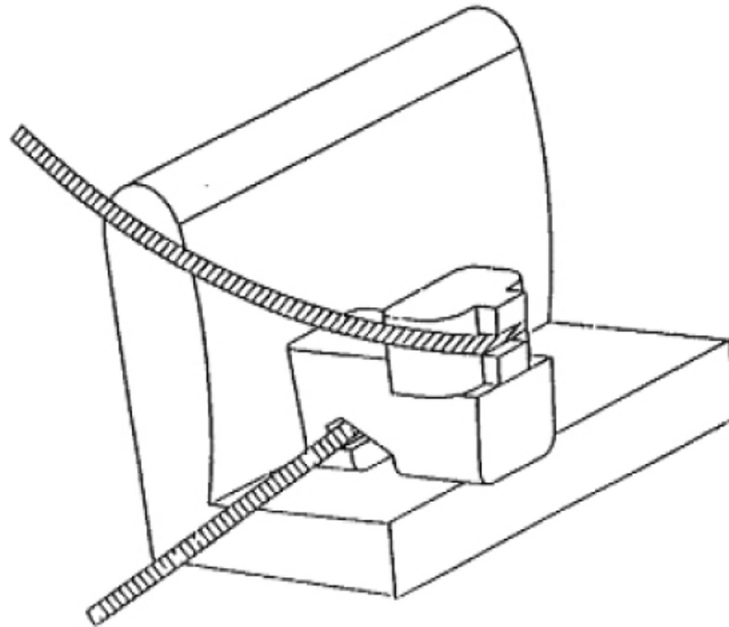
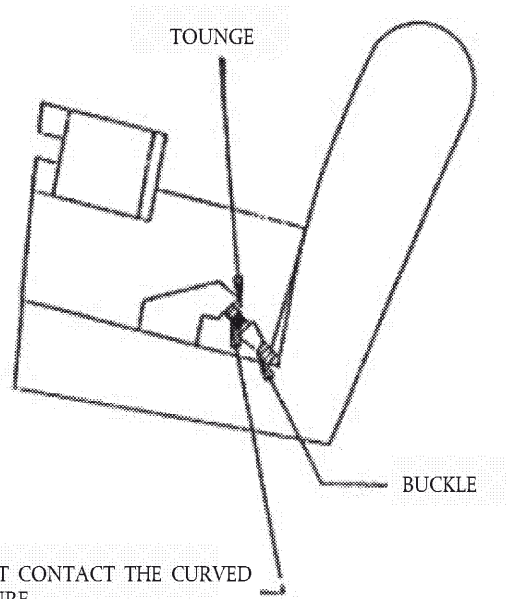
Installation of fixture onto vehicle seat (see paragraph 2.6.1)

Figure 3

Check for compatibility (see paragraphs 2.6.1 and 3.2)



Note: THE SEAT BELT WEBBING MUST CONTACT THE CURVED
EDGE ON BOTH SIDES OF THE FIXTURE

LAP BELT ONLY SHOWN

*Appendix 2***PROVISIONS CONCERNING THE INSTALLATION OF FORWARD-FACING AND REARWARD-FACING ISOFIX CHILD RESTRAINT SYSTEMS OF UNIVERSAL AND SEMI-UNIVERSAL CATEGORIES INSTALLED ON ISOFIX POSITIONS****1. GENERAL**

- 1.1. The test procedure and the requirements in this appendix shall be used to determine the suitability of ISOFIX positions for the installation of ISOFIX child restraint systems of universal and semi-universal categories.
- 1.2. The tests may be carried out in the vehicle or in a representative part of the vehicle.

2. TEST PROCEDURE

For any ISOFIX position in the vehicle, as indicated by the car manufacturer, in Table 2 of Appendix 3, it has to be checked that it is possible to accommodate the corresponding child restraint fixture(s) (CRF):

- 2.1. When checking a CRF on a seat, this seat may be adjusted longitudinally to its rearmost position and in its lowest position.
- 2.2. Adjust the seat-back angle to the manufacturer's design position and the head restraint in the lowest and rearmost position. In the absence of any specification an angle of the seat-back corresponding to a torso angle of 25° from the vertical, or the nearest fixed position of the seat-back, shall be used.

When checking a CRF on a rear seat, the vehicle seat located in front of this rear seat may be adjusted longitudinally forward but not further than the mid position between its rearmost and fore most positions. The seat backrest angle may also be adjusted, but not to a more upright angle than corresponding to a torso angle of 15°.

- 2.3. Place a cotton cloth on the seat-back and cushion.
- 2.4. Place the CRF on the ISOFIX position.
- 2.5. Push, towards ISOFIX anchorages system, on the centre between the ISOFIX anchorages with a force of 100 N ± 10 N, applied parallel to the lower surface, and remove the force.
- 2.6. Attach the CRF to the ISOFIX anchorages system.
- 2.7. Push vertically downwards on the centre of the upper surface of the fixture with a force of 100 N ± 10 N, and remove the force.

3. REQUIREMENTS

The following testing conditions only apply for the CRF(s) when accommodated in the ISOFIX position. It is not required that the CRF(s) shall be possible to move in and out of the ISOFIX position under these conditions.

- 3.1. It has to be possible to accommodate the CRF(s) without interference with the vehicle interior. The CRF base shall have a pitch angle of 15° ± 10°, above the horizontal plane passing through the ISOFIX anchorages system.
- 3.2. The ISOFIX top tether anchorage, if any, shall remain accessible.
- 3.3. Should the above requirements not be met with the adjustments indicated in paragraph 2 above, the seats, the seat-backs, the head restraints may be adjusted to alternative positions designated by the manufacturer for normal use following which the above installation procedure shall be repeated and the requirements verified and met. These alternative positions shall be included as information in Table 2 given in Appendix 3 to this Annex.
- 3.4. Should the above requirements not be fulfilled when some removable interior fittings were present, such fittings may be removed and then requirements of paragraph 3 have to be verified again and fulfilled. In such a case corresponding information shall be included in Table 2 of Appendix 3 of this Annex.

4. ISOFIX CHILD RESTRAINT SYSTEM SIZE CLASSES AND FIXTURES

- A — ISO/F3: Full-Height Forward Facing toddler CRS
- B — ISO/F2: Reduced-Height Forward Facing toddler CRS
- B1 — ISO/F2X: Reduced-Height Forward Facing toddler CRS
- C — ISO/R3: Full-Size Rearward Facing toddler CRS
- D — ISO/R2: Reduced-Size Rearward Facing toddler CRS
- E — ISO/R1: Rearward Facing infant CRS
- F — ISO/L1: Left Lateral Facing position CRS (carry-cot)
- G — ISO/L2: Right Lateral Facing position CRS (carry-cot)

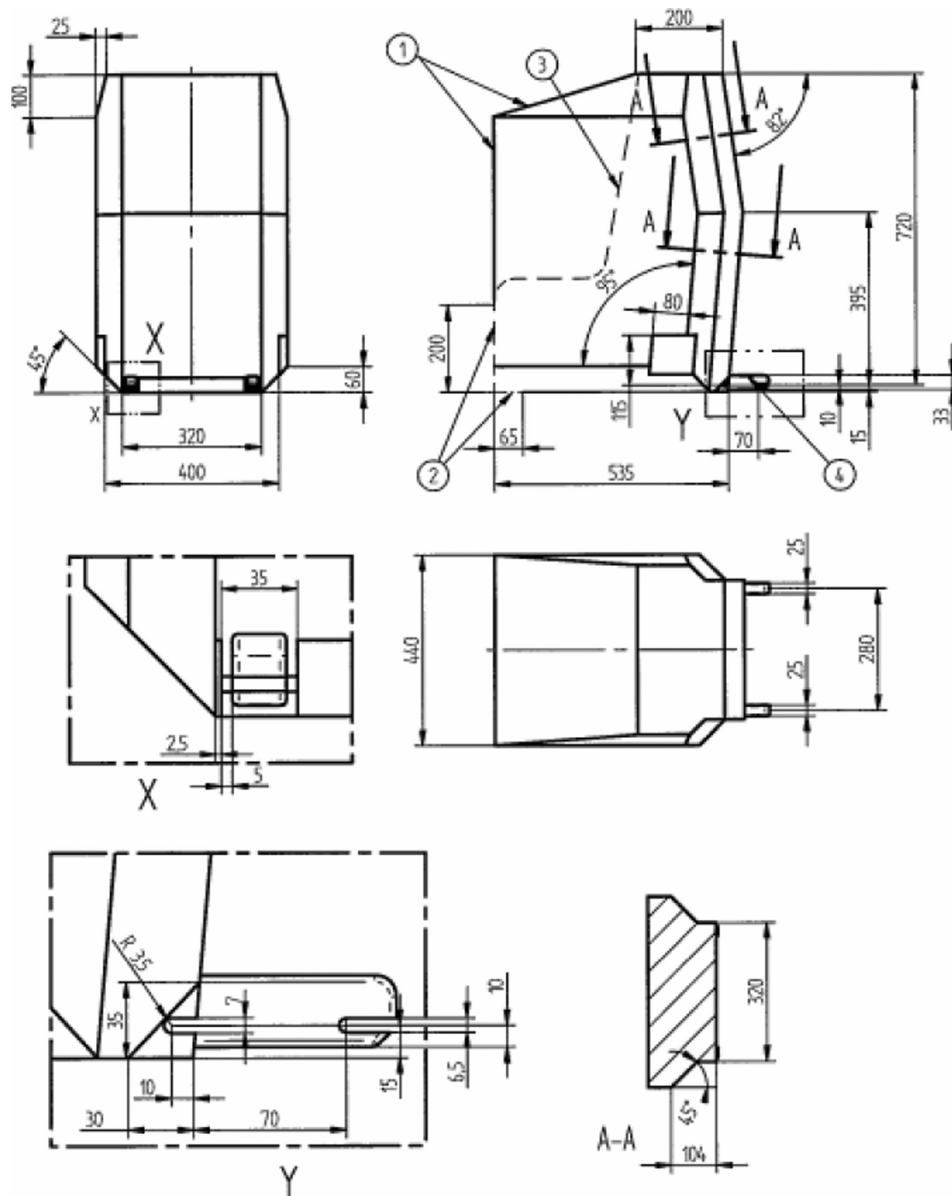
The fixtures below shall be constructed with a mass between 5 and 15 kg and shall be of suitable durability and stiffness to satisfy the functional requirements.

Mass group	ISOFIX size class	Fixture (CRF)
0 — up to 10 kg	F	ISO/L1
	G	ISO/L2
	E	ISO/R1
0+ — up to 13 kg	C	ISO/R3
	D	ISO/R2
	E	ISO/R1
I — 9 to 18 kg	A	ISO/F3
	B	ISO/
	B1	ISO/F2X
	C	ISO/R3
	D	ISO/R2

4.1. Full-height forward-facing toddler child restraint systems envelope

Figure 1

ISO/F3 envelope dimensions for a full-height forward-facing toddler CRS (height 720 mm) ISOFIX SIZE CLASS A



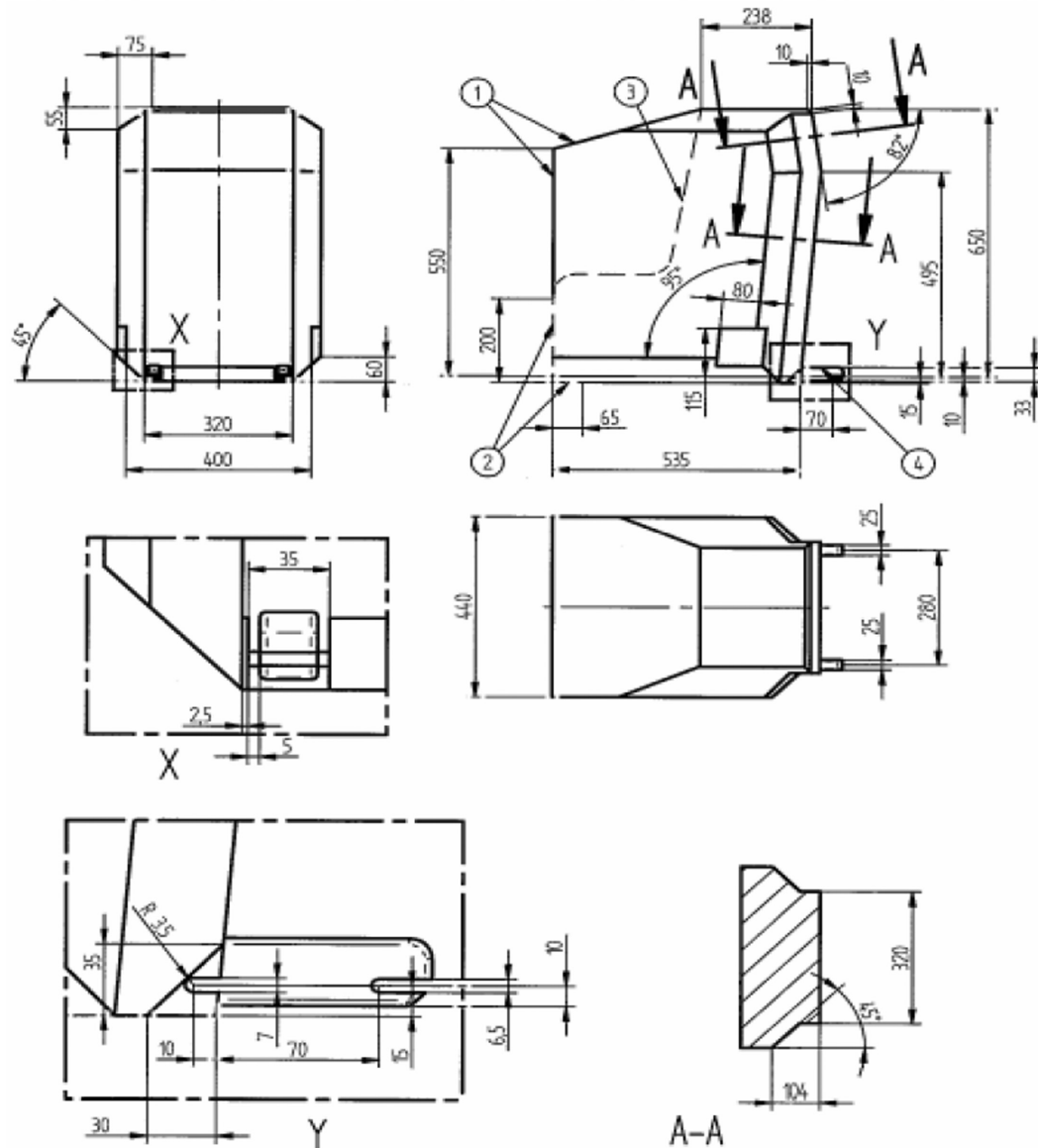
Key

- 1 Limits in the forward and upwards directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 N/A
- 4 Further specifications of the connector area are given in Regulation No 44

4.3. Reduced-height second version back shape forward-facing toddler child restraint systems envelope

Figure 3

ISO/F2X envelope dimensions for a reduced-height second version back surface shape forward-facing toddler CRS (height 650 mm) — ISOFIX SIZE CLASS B1



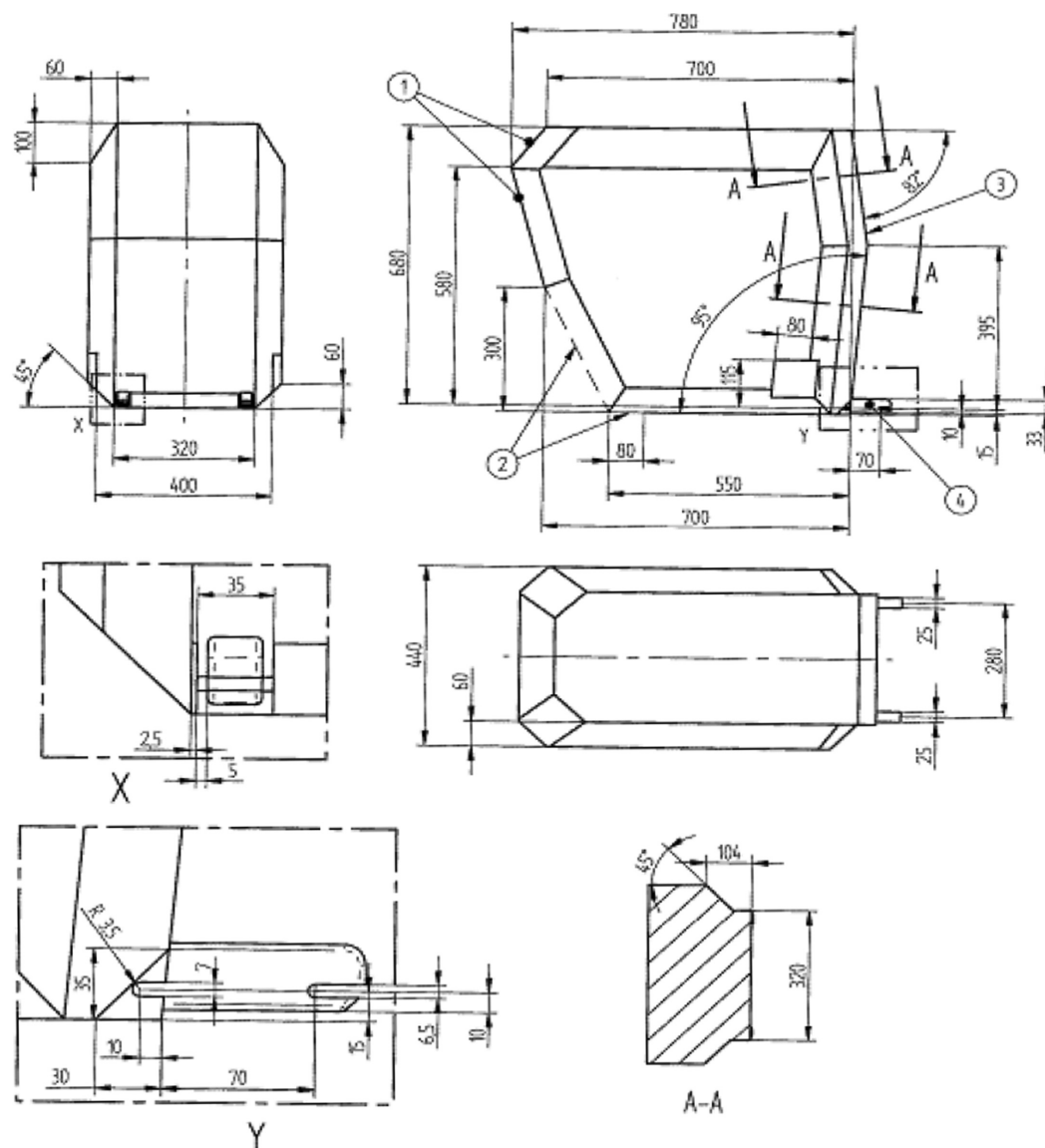
Key

- 1 Limits in the forward and upwards directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 N/A
- 4 Further specifications of the connector area are given in Regulation No 44

4.4. Full-size rearward facing toddler child restraint system envelope

Figure 4

ISO/R3 envelope dimensions for a full-size rearward-facing toddler CRS ISOFIX SIZE CLASS C



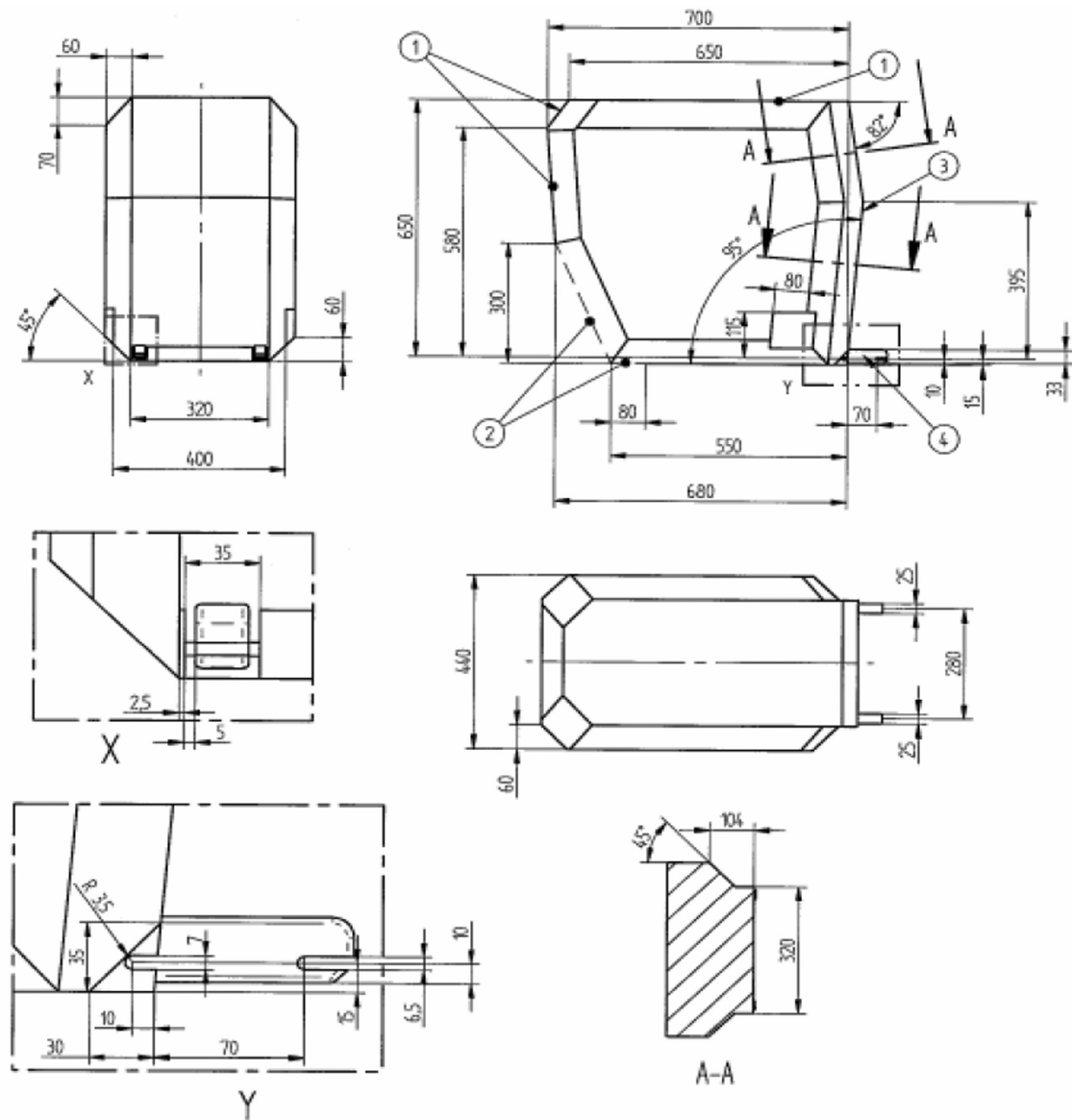
Key

- 1 Limits in the rearward and upwards directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 The backwards limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
- 4 Further specifications of the connector area are given in Regulation No 44

4.5. Reduced-size rearward-facing toddler child restraint systems envelope

Figure 5

ISO/R2 envelope dimensions for a reduced-size rearward-facing toddler CRS ISOFIX SIZE CLASS D



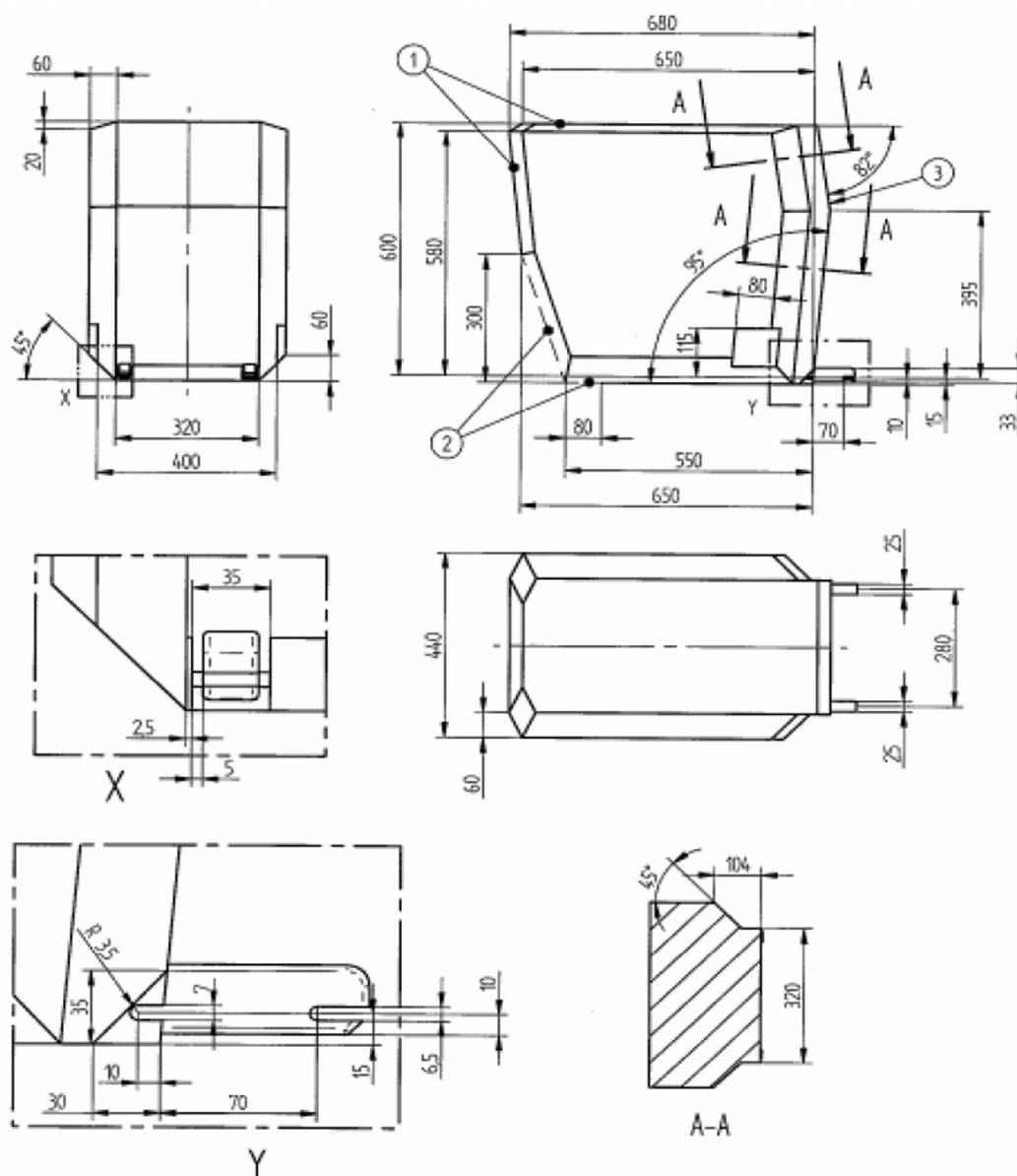
Key

- 1 Limits in the rearward and upwards directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 The backwards limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
- 4 Further specifications of the connector area are given in Regulation No 44

4.6. Rearward facing infant child restraint systems envelope

Figure 6

ISO/R1 envelope dimensions for an infant-size rearward-facing CRS ISOFIX SIZE CLASS E



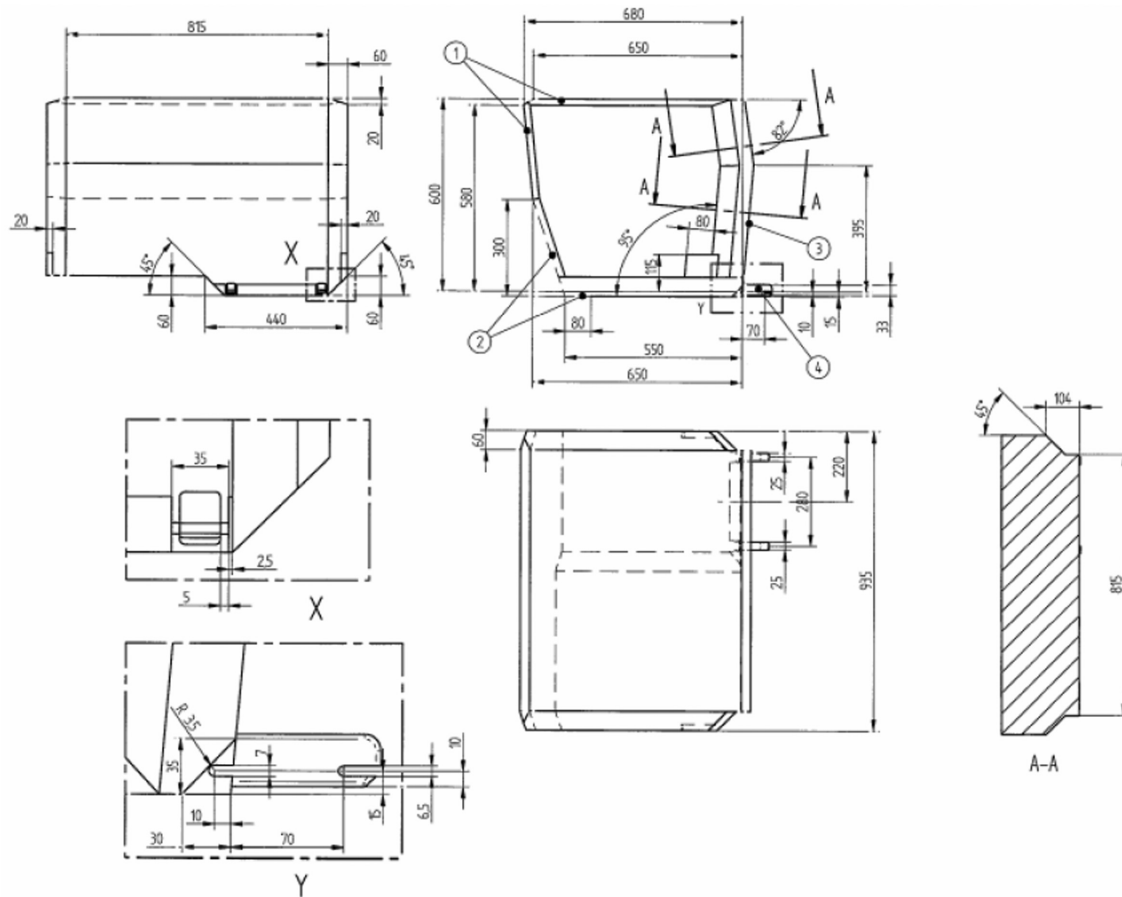
Key

- 1 Limits in the rearward and upward directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 The backwards limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
- 4 Further specifications of the connector area are given in Regulation No 44

4.7. Lateral facing child restraint systems envelope

Figure 7

Envelope dimensions for lateral facing position CRS — ISO/L1 — ISOFIX SIZE CLASS F or symmetrically opposite — ISO/L2 — ISOFIX CLASS G



Key

- 1 Limits in the rearward and upward directions
- 2 Dashed line marks area where a support leg, or similar, is allowed to protrude
- 3 The backward limitation (to the right in the figure) is given by the forward-facing envelope in Figure 2
- 4 Further specifications of the connector area are given in ISO 13216-1, Figures 2 and 3

Appendix 3

Table 1

Table of vehicle handbook information on child restraint systems installation suitability for various seating positions

Mass Group	Seating position (or other site)				
	Front Passenger	Rear Outboard	Rear Centre	Intermediate Outboard	Intermediate Centre
group 0 up to 10 kg					
group 0+ up to 13 kg					
group I 9 to 18 kg					
group II 15 to 25 kg					
group III 22 to 36 kg					

Key of letters to be inserted in the above Table:

U = Suitable for 'universal' category restraints approved for use in this mass group.

UF = Suitable for forward-facing 'universal' category restraints approved for use in this mass group.

L = Suitable for particular child restraints given on attached list. These restraints may be of the 'specific vehicle', 'restricted' or 'semi-universal' categories.

B = Built-in restraint approved for this mass group.

X = Seat position not suitable for children in this mass group.

Table 2

Table of vehicle handbook information on isofix child restraint systems installation suitability for various isofix positions

Mass Group	Size class	Fixture	Vehicle ISOFIX positions					
			Front Passenger	Rear Outboard	Rear Centre	Intermediate Outboard	Intermediate Centre	Other sites
carrycot	F	ISO/L1						
	G	ISO/L2						
		(¹)						
0 — up to 10 kg	E	ISO/R1						
		(¹)						
0+ — up to 13 kg	E	ISO/R1						
	D	ISO/R2						
	C	ISO/R3						
		(¹)						
I — 9 to 18 kg	D	ISO/R2						
	C	ISO/R3						
	B	ISO/F2						
	B1	ISO/F2X						
	A	ISO/F3						
		(¹)						

Mass Group	Size class	Fixture	Vehicle ISOFIX positions					
			Front Passenger	Rear Outboard	Rear Centre	Intermediate Outboard	Intermediate Centre	Other sites
II — 15 to 25 kg		(¹)						
III — 22 to 36 kg		(¹)						

(¹) For the CRS which do not carry the ISO/XX size class identification (A to G), for the applicable mass group, the car manufacturer shall indicate the vehicle specific ISOFIX child restraint system(s) recommended for each position.

Key of letters to be inserted in the above Table:

IUF = suitable for ISOFIX forward child restraints systems of universal category approved for use in the mass group

IL = suitable for particular ISOFIX child restraint systems (CRS) given in the attached list. These ISOFIX CRS are those of the 'specific vehicle', 'restricted' or 'semi-universal' categories.

X = ISOFIX position not suitable for ISOFIX child restraint systems in this mass group and/or this size class.

*Appendix 4***Installation of 10-year manikin**

- (a) Adjust the seat to its fully rearward position.
 - (b) Adjust the seat height in accordance with the manufacturer's specifications. In the absence of any specification, adjust the seat to the lowest position.
 - (c) Adjust the seat back angle to the manufacturer's design position. In the absence of any specification, an angle of 25 degrees from the vertical, or the nearest fixed position of the seat back, should be used.
 - (d) Set the shoulder anchorage to the lowest position.
 - (e) Set the manikin on the seat ensuring that the pelvis is in contact with the seat back.
 - (f) The longitudinal plan passing by the manikin centre line will be on the apparent centre line of the seating position.
-

ANNEX 18

SAFETY-BELT REMINDER TESTS

1. The first level warning shall be tested according to the following conditions:
 - (a) safety-belt is not fastened;
 - (b) engine is stopped or idling and the vehicle is not in forward or reverse motion;
 - (c) transmission is in neutral position;
 - (d) ignition switch is engaged.
 2. The second level warning shall be tested according to the following conditions:
 - (a) safety-belt is not fastened;
 - (b) test vehicle driven with one or any combination of the conditions of paragraphs 2.1 to 2.3 of this Annex at the manufacturer's choice.
 - 2.1. Accelerate the test vehicle to 25 -0/+10 km/h from a halt and continue on the same speed.
 - 2.2. The test vehicle is driven forward at least 500 m from a halt position.
 - 2.3. The vehicle is tested when the vehicle is in normal operation for at least 60 seconds.
 3. A system that the first level warning stops after a certain period of time, the second level warning shall be tested according to paragraph 2 of this Annex after the first level warning has been deactivated. A system that the first level warning does not stop after a certain period of time, the second level warning shall be tested according to paragraph 2 of this Annex while the first level warning is activated.
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Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocsts.html>

Regulation No 44 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of restraining devices for child occupants of power-driven vehicles ('Child Restraint Systems')

Incorporating all valid text up to:

Corrigendum 4 to Revision 2 of the Regulation — Date of entry into force: 10 November 2010

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1. SCOPE
- 1.1. This Regulation applies to child restraint systems which are suitable for installation in power-driven vehicles having three or more wheels, and which are not intended for use with folding (tip-up) or with side-facing seats.
2. DEFINITIONS
- For the purpose of this Regulation:
- 2.1. Child restraint system ('restraint') means an arrangement of components which may comprise the combination of straps or flexible components with a securing buckle, adjusting devices, attachments and in some cases a supplementary device as a carry cot, infant carrier, a supplementary chair and/or an impact shield, capable of being anchored to a power-driven vehicle. It is so designed as to diminish the risk of injury to the wearer, in the event of a collision or of abrupt deceleration of the vehicle, by limiting the mobility of the wearer's body.
- 'ISOFIX' is a system for the connection of child restraint systems to vehicles which has two vehicle rigid anchorages, two corresponding rigid attachments on the child restraint system and a mean to limit the pitch rotation of the child restraint system.
- 2.1.1. Child restraints fall into five 'mass groups':
- 2.1.1.1. group 0 for children of a mass less than 10 kg;
- 2.1.1.2. group 0+ for children of a mass less than 13 kg;
- 2.1.1.3. group I for children of mass from 9 kg to 18 kg;
- 2.1.1.4. group II for children of mass from 15 kg to 25 kg;
- 2.1.1.5. group III for children of mass from 22 kg to 36 kg.
- 2.1.1.6. ISOFIX Child restraint systems fall into 7 ISOFIX size classes described in Regulation No 16 Annex 17, Appendix 2:
 - A — ISO/F3: Full Height Forward Facing toddler CRS
 - B — ISO/F2: Reduced Height Forward Facing toddler CRS
 - B1 — ISO/F2X: Reduced Height Forward Facing Toddler CRS
 - C — ISO/R3: Full Size Rearward Facing toddler CRS
 - D — ISO/R2: Reduced Size Rearward Facing toddler CRS
 - E — ISO/R1: Rearward Facing infant CRS
 - F — ISO/L1: Left Lateral Facing position CRS (carry cot)
 - G — ISO/L2: Right Lateral Facing position CRS (carry cot)

Mass group		ISOFIX size category
0 — up to 10 kg	F	ISO/L1
	G	ISO/L2
	E	ISO/R1

Mass group		ISOFIX size category
0+ — up to 13 kg	C	ISO/R3
	D	ISO/R2
	E	ISO/R1
I — 9 to 18 kg	A	ISO/F3
	B	ISO/F2
	B1	ISO/F2X
	C	ISO/R3
	D	ISO/R2

2.1.2. Child restraints fall into four 'categories':

2.1.2.1. A 'universal' category for use as specified in paragraphs 6.1.1, 6.1.3.1, and 6.1.3.2 on most vehicle seat positions, and in particular those which have been assessed according to Regulation No 16 — as being compatible with such a category of child restraint.

2.1.2.2. a 'restricted' category for use as specified in paragraphs 6.1.1 and 6.1.3.1 in designated seat positions for particular vehicle types as indicated by either the child restraint manufacturer or the vehicle manufacturer;

2.1.2.3. a 'semi-universal' category for use as specified in paragraphs 6.1.1 and 6.1.3.2;

2.1.2.4. a 'specific vehicle' category for use either;

2.1.2.4.1. on specific vehicle types, in accordance with paragraphs 6.1.2 and 6.1.3.3; or

2.1.2.4.2. as a 'built in' child restraint.

2.1.3. The retention system of child restraint systems may be of two classes:

an integral class if the retention of the child within the restraint system is independent of any means directly connected to the vehicle;

a non-integral class if the retention of the child within the restraint system is dependent upon any means directly connected to the vehicle;

2.1.3.1. 'partial restraint' means a device, such as a booster cushion, which, when used in conjunction with an adult seat belt, which passes around the body of the child or restrains the device in which the child is placed, forms a complete child restraint system;

2.1.3.2. 'booster cushion' means a firm cushion, which can be used with an adult seat belt.

2.2. 'Child-safety chair' means a child restraint incorporating a chair in which the child is held.

2.3. 'Belt' means a child restraint comprising a combination of straps with a securing buckle, adjusting devices and attachments.

2.4. 'Chair' means a structure which is a constituent part of the child restraint and is intended to accommodate a child in a seated position;

- 2.4.1. 'carry cot' means a restraint system intended to accommodate and restrain the child in a supine or prone position with the child's spine perpendicular to the median longitudinal plane of the vehicle. It is so designed as to distribute the restraining forces over the child's head and body excluding its limbs in the event of a collision;
- 2.4.2. 'carry-cot restraint' means a device used to restrain a carry cot to the structure of the vehicle;
- 2.4.3. 'infant carrier' means a restraint system intended to accommodate the child in a rearward-facing semi-recumbent position. It is so designed as to distribute the restraining forces over the child's head and body excluding its limbs in the event of the frontal collision.
- 2.5. 'Chair support' means that part of a child restraint by which the chair can be raised.
- 2.6. 'Child support' means that part of a child restraint by which the child can be raised within the child restraint.
- 2.7. 'Impact shield' means a device secured in front of the child and designed to distribute the restraining forces over the greater part of the height of the child's body in the event of a frontal impact.
- 2.8. 'Strap' means a flexible component designed to transmit forces;
- 2.8.1. 'lap strap' means a strap which, either in the form of a complete belt or in the form of a component of such a belt, passes across the front of, and restrains, the child's pelvic region;
- 2.8.2. 'shoulder restraint' means that part of a belt which restrains the child's upper torso;
- 2.8.3. 'crotch strap' means a strap (or divided straps, where two or more pieces of webbing make it) attached to the child restraint and the lap strap and is so positioned as to pass between the child's thighs; it is designed to prevent the child sliding under the lap belt in normal use and prevent the lap belt moving up off the pelvis in an impact;
- 2.8.4. 'child-restraining strap' means a strap which is a constituent part of the belt and restrains only the body of the child;
- 2.8.5. 'child-restraint attachment strap' means a strap which attaches the child restraint to the structure of the vehicle and may be a part of the vehicle-seat retaining device;
- 2.8.6. 'harness belt' means a belt assembly comprising a lap belt, shoulder restraints and, where fitted, a crotch strap;
- 2.8.7. 'Y-shaped belt' means a belt where the combination of straps is formed by a strap to be guided between the child's legs and a strap for each shoulder;
- 2.8.8. 'guide strap' means a strap which constrains the shoulder strap of the adult seat belt in a position to suit the child and where the effective position at which the shoulder strap changes direction can be adjusted by means of a device which can be moved up and down the strap to locate the wearer's shoulder, and then locked into that position. This guide strap is not meant to carry a significant part of the dynamic load.
- 2.9. 'Buckle' means a quick release device which enables the child to be held by the restraint or the restraint by the structure of the car and can be quickly opened. The buckle may incorporate the adjusting device;
- 2.9.1. 'enclosed buckle release button', a buckle release button such that it must not be possible to release the buckle using a sphere having a diameter of 40 mm;

- 2.9.2. 'non-enclosed buckle release button', a buckle release button such that it must be possible to release the buckle using a sphere having a diameter of 40 mm.
- 2.10. 'Adjusting device' means a device enabling the restraint or its attachments to be adjusted to the physique of the wearer, the configuration of the vehicle, or both. The adjusting device may either be part of the buckle or be a retractor or any other part of the safety belt;
 - 2.10.1. 'quick adjuster' means an adjusting device which can be operated by one hand in one smooth movement.
 - 2.10.2. 'adjuster mounted directly on child restraint' means an adjuster for the integral harness which is directly mounted on the child restraint, as opposed to being directly supported by the webbing that it is designed to adjust.
- 2.11. 'Attachments' means parts of the child restraint, including securing components, which enable the child restraint to be firmly secured to the vehicle structure either directly or through the vehicle seat;
 - 2.11.1. 'Support leg' means a permanent attachment to a child restraint creating a compressive load path between the child restraint and a vehicle structure in order to by-pass seat cushion effects during deceleration; a support leg may be adjustable.
- 2.12. 'Energy absorber' means a device which is designed to dissipate energy independently of or jointly with the strap and forms part of a child restraint.
- 2.13. 'Retractor' means a device designed to accommodate a part or the whole of the strap of a child restraint. The term covers the following devices:
 - 2.13.1. 'an automatically-locking retractor', a retractor which allows extraction of the desired length of a strap and, when the buckle is fastened, automatically adjusts the strap to the wearer's physique, further extraction of the strap without voluntary intervention by the wearer being prevented;
 - 2.13.2. 'an emergency-locking retractor', a retractor which does not restrict the belt wearer's freedom of movement in normal driving conditions. Such a device has length-adjusting devices which automatically adjust the strap to the wearer's physique, and a locking mechanism actuated in an emergency by:
 - 2.13.2.1. deceleration of the vehicle, extraction of the strap from the retractor, or any other automatic means (single sensitivity); or
 - 2.13.2.2. a combination of any of these means (multiple sensitivity).
- 2.14. 'Restraint anchorages' means these parts of the vehicle structure or seat structure to which the child-restraint attachments are secured;
 - 2.14.1. 'additional anchorage' means a part of the vehicle structure or of the vehicle seat structure, or any other part of the vehicle, to which a child restraint is intended to be secured and which is additional to the anchorages approved under Regulation No 14. This includes the trolley floor pan as described in Annex 6 or other structural features of a the specific vehicle(s) when loaded by a support leg.
 - 2.14.2. 'ISOFIX low anchorage' means one 6 mm diameter rigid round horizontal bar, extending from vehicle or seat structure to accept and restrain an ISOFIX child restraint system with ISOFIX attachments;
 - 2.14.3. 'ISOFIX anchorages system' means a system made up of two ISOFIX low anchorages fulfilling the requirements of Regulation No 14 which is designed for attaching an ISOFIX child restraint system in conjunction with an anti-rotation device;

- 2.14.4. 'Anti-rotation device'
- (a) an anti-rotation device for an ISOFIX universal child restraint system consists of the ISOFIX top-tether;
 - (b) an anti-rotation device for an ISOFIX semi-universal child restraint system consists of either a top tether, the vehicle dashboard or a support leg intended to limit the rotation of the restraint during a frontal impact;
 - (c) for ISOFIX, universal and semi-universal, child restraint systems the vehicle seat itself does not constitute an anti-rotation device;
- 2.14.5. 'ISOFIX top tether anchorage' means a feature fulfilling the requirements of Regulation No 14, such as a bar, located in a defined zone, designed to accept an ISOFIX top tether strap connector and transfer its restraint force to the vehicle structure.
- 2.15. 'Forward-facing' means facing in the normal direction of travel of the vehicle.
- 2.16. 'Rearward-facing' means facing in the direction opposite to the normal direction of travel of the vehicle.
- 2.17. 'Inclined position' means a special position of the chair which allows the child to recline.
- 2.18. 'Lying down/supine/prone position' means a position where at least the child's head and body excluding its limbs are on a horizontal surface when at rest in the restraint.
- 2.19. 'Child-restraint type' means child restraints which do not differ in such essential respects as:
- 2.19.1. the category, and the mass group(s) for which and the position and orientation (as defined in paragraphs 2.15 and 2.16) in which the restraint is intended to be used;
 - 2.19.2. the geometry of the child restraint;
 - 2.19.3. the dimensions, mass, material and colour of:
 - the seat;
 - the padding; and
 - the impact shield;
 - 2.19.4. the material, weave, dimensions and colour of the straps;
 - 2.19.5. the rigid components (buckle, attachments, etc.).
- 2.20. 'Vehicle seat' means a structure, which may or may not be integral with the vehicle structure, complete with trim and intended to seat one adult person. In this respect:
- 2.20.1. 'group of vehicle seats' means either a bench seat or a plurality of seats which are separate but side by side (i.e. so fixed that the front anchorages of one seat are in line with the front or rear anchorages of another seat or on a line passing between those anchorages), each seat accommodating one or more seated adult persons;
 - 2.20.2. 'vehicle bench seat' means a structure complete with trim and intended to seat more than one adult person;

- 2.20.3. 'vehicle front seats' means the group of seats situated foremost in the passenger compartment, i.e. having no other seat directly in front of them;
- 2.20.4. 'vehicle rear seats' are fixed, forward-facing seats situated behind another group of vehicle seats;
- 2.20.5. 'ISOFIX position' means a system which allows to install:
- (a) either an universal ISOFIX forward facing child restraint system as defined in this Regulation;
 - (b) or a semi-universal ISOFIX forward facing child restraint system as defined in this Regulation;
 - (c) or a semi-universal ISOFIX rearward facing child restraint system as defined in this Regulation;
 - (d) or a semi-universal ISOFIX lateral facing position child restraint system as defined in this Regulation;
 - (e) or a specific vehicle ISOFIX child restraint system as defined in this Regulation.
- 2.21. 'Adjustment system' means the complete device by which the vehicle seat or its parts can be adjusted to suit the physique of the seat's adult occupant; this device may, in particular, permit:
- 2.21.1. longitudinal displacement; and/or
 - 2.21.2. vertical displacement; and/or
 - 2.21.3. angular displacement.
- 2.22. 'Vehicle seat anchorage' means the system, including the affected parts of the vehicle structure, by which the adult seat as a whole is secured to the vehicle structure.
- 2.23. 'Seat type' means a category of adult seats which do not differ in such essential respects as:
- 2.23.1. the shape, dimensions and materials of the seat structure;
 - 2.23.2. the types and dimensions of the seat-lock adjustment and locking systems; and
 - 2.23.3. the type and dimensions of the adult safety-belt anchorage on the seat, of the seat anchorage, and of the affected parts of the vehicle structure.
- 2.24. 'Displacement system' means a device enabling the adult seat or one of its parts to be displaced angularly or longitudinally, without a fixed intermediate position, to facilitate the entry and exit of passengers and the loading and unloading of objects.
- 2.25. 'Locking system' means a device ensuring that the adult seat and its parts are maintained in the position of use.
- 2.26. 'Lock-off device' is a device which locks and prevents movement of one section of the webbing of an adult safety-belt relative to another section of the webbing of the same belt. Such devices may act upon either diagonal or lap section or secure together both lap and diagonal sections of the adult belt. The term covers the following classes:
- 2.26.1. 'Class A device', a device that prevents the child pulling webbing from the retractor through to the lap part of the belt, when the adult belt is used to restrain the child directly;

- 2.26.2. 'Class B device', a device that allows the retention of an applied tension in the lap part of an adult safety-belt, when the adult belt is used to restrain the child restraint. The device is intended to prevent webbing slipping from the retractor through the device, which would release the tension and place the restraint in a non-optimal position.
- 2.27. 'Special Needs Restraint' is a child restraint system designed for children who have special needs as a result of either a physical or mental handicap; this device may in particular permit additional restraining devices for any part of the child, but it must contain as a minimum a primary means of restraint which complies with the requirements of this Regulation.
- 2.28. 'ISOFIX attachment' means one of the two connections, fulfilling the requirement of paragraph 6.3.2 of this Regulation, extending from the ISOFIX child restraint system structure, and compatible with an ISOFIX low anchorage.
- 2.29. 'ISOFIX child restraint system' means a child restraint system which has to be attached to an ISOFIX anchorage system fulfilling the requirement of Regulation No 14.
- 2.30. 'Seat bight' means the area close to the intersection of the surfaces of the vehicle seat cushion and the seat back.
- 2.31. 'Vehicle seat fixture (VSF)' means a fixture, according to ISOFIX size classes defined in paragraph 2.1.1.7 and whose dimension are given in Figures 1 to 6 of Annex 17 Appendix 2 of Regulation No 16, used by a child restraint manufacturer to determine the appropriate dimensions of an ISOFIX child restraint system and the location of its ISOFIX attachments.
- 2.32. 'ISOFIX top tether connector' means a device intended to be attached to an ISOFIX top tether anchorage.
- 2.33. 'ISOFIX top tether hook' means an ISOFIX top tether connector typically used to attach an ISOFIX top tether strap to an ISOFIX top tether anchorage as defined in Figure 3 of Regulation No 14.
- 2.34. 'ISOFIX top tether strap' means a webbing strap (or equivalent) which extends from the top of an ISOFIX child restraint system to the ISOFIX top tether anchorage, and which is equipped with an adjustment device, a tension-relieving device, and an ISOFIX top tether connector.
- 2.35. 'ISOFIX top tether attachment' is a device to secure the ISOFIX top tether strap to the ISOFIX child restraint system.
- 2.36. 'A tension relieving device' means a system which allow to release the device which adjust and maintain the tension in the ISOFIX top tether strap.
- 2.37. 'Adult safety-belt webbing guide' means a device through which the adult belt passes for its correct routing, that allows free webbing movement.
- 2.38. 'type approval test', means a test to determine the extent to which a child restraint system type submitted for approval is capable of satisfying the requirements.
- 2.39. 'production qualification test', means a test to determine whether the manufacturer is able to produce a child restraint system in conformity with the child restraint systems submitted for type approval.
- 2.40. 'Routine testing', means the testing of a number of restraint systems selected from a single batch to verify the extent to which they satisfy the requirements.

3. APPLICATION FOR APPROVAL
- 3.1. The application for approval of a type of child restraint shall be submitted by the holder of the trade mark or by his duly accredited representative, and follow the type approval scheme described in Annex 14.
- 3.2. The application for approval, relating to each type of child restraint, shall be accompanied by:
 - 3.2.1. a technical description of the child restraint, specifying the straps and other materials used, and accompanied by drawings of the parts making up the child restraint and in the case of retractors, installation instructions for these retractors and their sensing devices, declaration on toxicity (paragraph 6.1.5) and flammability (paragraph 6.1.6), the drawings must show the position intended for the approval number and additional symbol(s) in relation to the circle of the approval mark. The description shall mention the colour of the model submitted for approval;
 - 3.2.2. four samples of the child restraint;
 - 3.2.3. a 10-metre length of each category of strap used in the child restraint; and
 - 3.2.4. additional samples shall be supplied at the request of the Technical Service responsible for conducting the test;
 - 3.2.5. instructions and details of packaging in accordance with paragraph 15 below;
 - 3.2.6. in case of carry cots, if the carry-cot restraint may be used in combination with a number of types of carry cots, the restraint manufacturer shall supply a list of the latter.
- 3.3. Where an approved adult safety belt is used to secure the child restraint, the application must stipulate the category of adult safety belt to be used, e.g. static lap belts.
- 3.4. The Approval Authority of a Contracting Party must verify, before granting type approval the existence of satisfactory arrangements and procedures for ensuring effective control so that child restraint systems, equipment or parts when in production conform to the approved type.
4. MARKINGS
- 4.1. The samples of child restraint submitted for approval in conformity with the provisions of paragraphs 3.2.2 and 3.2.3 above shall be clearly and indelibly marked with the manufacturer's name, initials or trade mark.
- 4.2. One of the parts made of plastics of the child restraint device (such as shell, impact shield, booster cushion, etc.), except the belt(s) or harness, shall be marked clearly (and indelibly) with the year of production.
- 4.3. If the restraint is to be used in combination with an adult safety belt the correct routing of the webbing shall be clearly indicated by means of a drawing permanently attached to the restraint. If the restraint is held in place by the adult safety-belt, the routes of the webbing shall be clearly marked on the product by colour coding. The colours for the safety-belt route to be used when the device is installed forward facing shall be red and when installed rear-facing shall be blue. The same colours shall also be used on the labels on the device that illustrate the methods of use.

There must be a clear differentiation between the intended routes for the lap section and the diagonal section of the safety belt. Indication such as colour coding, words, shapes, etc. shall distinguish each section of the safety belt.

In any illustration of the belt route on the product, the orientation of the child restraint relative to the vehicle must be clearly indicated. Belt route diagrams that do not show the vehicle seat are not acceptable.

The marking defined in this paragraph shall be visible with the restraint in the vehicle. For group 0 restraints, this marking shall also be visible with the child in the restraint.

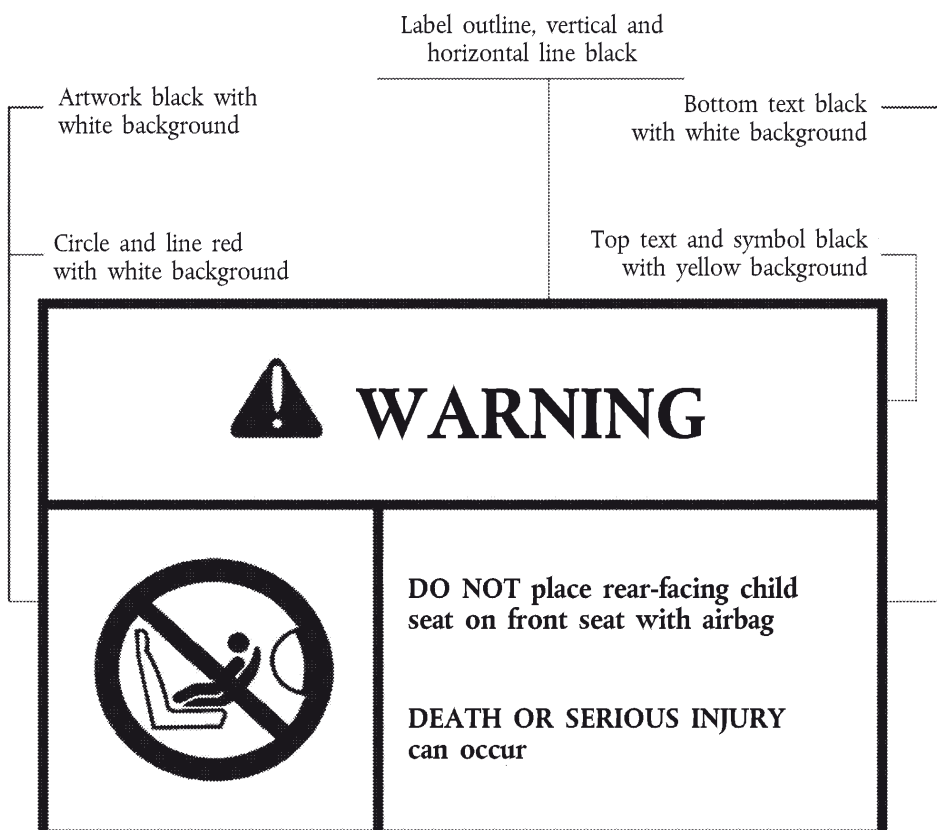
- 4.4. On the visible inner surface (including the side wing beside the child's head) in the approximate area where the child's head rests within the child restraint, rearward facing restraints shall have the following label permanently attached (the text information shown is a minimum).

This label shall be provided in the language(s) of the country where the device is sold.

Label minimum size: 60 × 120 mm

The label shall be stitched to the cover around its entire perimeter and/or permanently bonded to the cover over its entire back surface. Any other form of attachment that is permanent and not liable to removal from the product or to becoming obscured is acceptable. Flag type labels are specifically prohibited.

If sections of the restraint or any accessories supplied by the child restraint manufacturer are able to obscure the label an additional label is required. One warning label shall be permanently visible in all situations when the restraint is prepared for use in any configuration.



- 4.5. In the case of child restraints that can be used forward and rear-facing, include the words:

'IMPORTANT — DO NOT USE FORWARD FACING BEFORE THE CHILD'S WEIGHT EXCEEDS (Refer to instructions)'

- 4.6. In the case of child restraints with alternative belt routes, the alternative load bearing contact points between the child restraint and the adult safety-belt must be permanently marked. This marking shall indicate that it is the alternative belt route, and shall conform with the above coding requirements for forward and rearward facing seats.

- 4.7. If the child restraint offers alternative load bearing contact points, the marking required in paragraph 4.3 shall include an indication that the alternative belt route is described in the instructions.

4.8. **ISOFIX Marking**

If the product includes ISOFIX attachments, the following information must be permanently visible to someone installing the restraint in a vehicle:

The ISO ISOFIX logo followed by the letter(s) that is/are appropriate for the ISOFIX size class(es) into which the product fits. As a minimum, a symbol consisting of a circle with a diameter of minimum 13 mm and containing a pictogram, the pictogram shall contrast with the background of the circle. The pictogram shall be clearly visible either by means of contrast colours or by adequate relief if it is moulded or embossed.



B, C and F

The following information may be conveyed by pictograms and/or text. The marking must indicate:

- (a) the essential relevant steps needed for making the seat ready for installation. For example, the method of extending the ISOFIX latch system must be explained;
- (b) the position, function, and interpretation of any indicator must be explained;
- (c) the position and if necessary the routing of top tethers, or other means of limiting seat rotation requiring action by the user, must be indicated using one of the following symbols as appropriate;



- (d) the adjustment of ISOFIX latches and the top tether, or other means of limiting seat rotation, requiring action of the user must be indicated;

- (e) the marking must be permanently attached and be visible to a user installing the seat;
- (f) where necessary reference should be made to the child restraint user instructions and to the location of that document using the symbol below.



5. APPROVAL

- 5.1. Each sample submitted in conformity with paragraphs 3.2.2 and 3.2.3 above shall meet the specifications set forth in paragraphs 6 to 8 of this Regulation in every respect before approval can be granted.
- 5.2. An approval number shall be assigned to each type approved. Its first two digits (at present 04 corresponding to the 04 series of amendments which entered into force on 12 September 1995) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of child restraint covered by this Regulation.
- 5.3. Notice of approval or of extension or refusal of approval of a child restraint pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 to this Regulation.
- 5.4. In addition to the marks prescribed in paragraph 4 above, the following particulars shall be affixed in a suitable space to every child restraint conforming to a type approved under this Regulation:
 - 5.4.1. an international approval mark consisting of:
 - 5.4.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽¹⁾;
 - 5.4.1.2. an approval number;
 - 5.4.2. the following additional symbols:
 - 5.4.2.1. the word(s) 'universal', 'restricted', 'semi-universal' or 'vehicle specific' depending on the category of restraint;
 - 5.4.2.2. the mass range for which the child restraint has been designed, namely, 0-10 kg; 0-13 kg; 9-18 kg; 15-25 kg; 22-36 kg; 0-18 kg; 9-25 kg; 15-36 kg; 0-25 kg; 9-36 kg; 0-36 kg;

⁽¹⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Serbia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 for Bulgaria, 35 (vacant), 36 for Lithuania, 37 for Turkey, 38 (vacant), 39 for Azerbaijan, 40 for The former Yugoslav Republic of Macedonia, 41 (vacant), 42 for the European Community (Approvals are granted by its Member States using their respective ECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for South Africa, 48 for New Zealand, 49 for Cyprus, 50 for Malta, 51 for the Republic of Korea, 52 for Malaysia, 53 for Thailand, 54 and 55 (vacant) and 56 for Montenegro. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

- 5.4.2.3. the symbol 'Y', in the case of a device containing a crotch strap, in conformity with the requirements of supplement 3 to the 02 series of amendments to the Regulation;
- 5.4.2.4. the symbol 'S' in the case of a 'Special Needs Restraint'.
- 5.5. Annex 2 to this Regulation gives an example of the arrangement of the approval mark.
- 5.6. The particulars referred to in paragraph 5.4 above shall be clearly legible and be indelible, and may be affixed either by means of a label or by direct marking. The label or marking shall be resistant to wear.
- 5.7. The labels referred to in paragraph 5.6 above may be issued either by the authority which has granted the approval or, subject to that authority's authorisation, by the manufacturer.
6. GENERAL SPECIFICATIONS
- 6.1. Positioning and securing on the vehicle
- 6.1.1. The use of child restraints in the 'universal', 'semi-universal' and 'restricted' categories is permitted in the front and rear seat positions if the restraints are fitted in conformity with the manufacturer's instructions.
- 6.1.2. The use of child restraints in the 'specific vehicle' category is permitted in all seat positions and also in the luggage area if the restraints are fitted in conformity with the manufacturer's instructions. In the case of a rear-facing restraint, the design must ensure that support for the child's head is provided whenever the restraint is ready to use. This is to be determined as a line perpendicular to the seat back through the eye line, the point of intersection shall be at least 40 mm below the start of radius of such a head support.
- 6.1.3. According to the category which it belongs to, the child restraint shall be secured to the vehicle structure or to the seat structure.

POSSIBLE CONFIGURATIONS FOR APPROVAL

GROUPS/CATEGORIES TABLE

GROUP CATEGORY		Universal ⁽¹⁾		Semi-universal ⁽²⁾		Restricted		Specific Vehicle	
		CRS	ISOFIXCRS	CRS	ISOFIXCRS	CRS	ISOFIXCRS	CRS	ISOFIXCRS
0	Carry cot	A	NA	A	A	A	NA	A	A
	Rearward facing	A	NA	A	A	A	NA	A	A
0+	Rearward facing	A	NA	A	A	A	NA	A	A
I	Rearward facing	A	NA	A	A	A	NA	A	A
	Forward facing (integral)	A	A	A	A	A	NA	A	A
	Forward facing (non-integral)	NA	NA	NA	NA	NA	NA	NA	NA
	Forward facing (non-integral — see point 6.1.12)	A	NA	A	NA	A	NA	A	A
II	Rearward facing	A	NA	A	NA	A	NA	A	A
	Forward facing (integral)	A	NA	A	NA	A	NA	A	A
	Forward facing (non-integral)	A	NA	A	NA	A	NA	A	A

GROUP CATEGORY		Universal ⁽¹⁾		Semi-universal ⁽²⁾		Restricted		Specific Vehicle	
		CRS	ISOFIXCRS	CRS	ISOFIXCRS	CRS	ISOFIXCRS	CRS	ISOFIXCRS
III	Rearward facing	A	NA	A	NA	A	NA	A	A
	Forward facing (integral)	A	NA	A	NA	A	NA	A	A
	Forward facing (non-integral)	A	NA	A	NA	A	NA	A	A

With:

CRS: Child restraint system

A: Applicable

NA: Not Applicable

⁽¹⁾ ISOFIX universal CRS means forward facing restraints for use in vehicles with positions equipped with ISOFIX anchorages system and a top tether anchorage.

⁽²⁾ ISOFIX semi universal CRS means:

- forward facing restraints equipped with support leg, or
- rearward facing restraints equipped with a support leg or a top tether strap for use in vehicles with positions equipped with ISOFIX anchorages system and a top tether anchorage if needed, or
- rearward facing restraints, supported by the vehicle dashboard, for use in the front passenger seat equipped with ISOFIX anchorages system, or
- lateral facing position restraint equipped if needed with an anti-rotation device for use in vehicles with positions equipped with ISOFIX anchorages system and top tether anchorage if needed.

- 6.1.3.1. For the 'universal' and 'restricted' categories, by means of an adult safety-belt (with or without a retractor) meeting the requirements of Regulation No 16 (or equivalent) fitted to anchorages meeting the requirements of Regulation No 14 (or equivalent).
- 6.1.3.2. For ISOFIX 'universal' child restraint systems by means of ISOFIX attachments and ISOFIX top tether strap meeting the requirements of this Regulation fitted to ISOFIX anchorages system and ISOFIX top tether anchorage meeting the requirements of Regulation No 14.
- 6.1.3.3. For the 'semi-universal' category: by means of the lower anchorages prescribed in Regulation No 14 and additional anchorages meeting the recommendation of Annex 11 to this Regulation.
- 6.1.3.4. For ISOFIX 'semi-universal' Child Restraint Systems by means of ISOFIX attachments and ISOFIX top tether strap or a support leg or vehicle dashboard, meeting the requirements of this Regulation fitted to ISOFIX anchorages and/or to ISOFIX top tether anchorage meeting the requirements of Regulation No 14.
- 6.1.3.5. For the 'specific vehicle' category: by means of the anchorages designed by the manufacturer of the vehicle or the manufacturer of the child restraint.
- 6.1.3.6. In the case of child restraining straps or child restraint attachment strap utilising belt anchorages to which are already fitted an adult belt or belts, the Technical Service shall check that:

the effective adult anchorage position is as approved under Regulation No 14 or equivalent;

effective operation of both devices is not hindered by the other;

the buckles of the adult and additional system must not be interchangeable.

In the case of child restraining devices utilising bars, or extra devices attached to the anchorages approved under Regulation No 14, which move the effective anchorage position outside the field of Regulation No 14, the following points shall apply:

such devices will only be approved as semi-universal or specific vehicle devices;

the Technical Service shall apply the requirements of Annex 11 to this Regulation to the bar and the fastenings;

the bar will be included in the dynamic test, with the loading being applied to the mid-position and the bar and its greatest extension, if adjustable;

the effective position and operation of any adult anchorage by which the bar is fixed shall not be impaired.

- 6.1.3.7. Child restraints utilising a support leg shall only be approved under the 'semi-universal' or the 'specific vehicle' category and the requirements of Annex 11 to this Regulation shall be applied. The manufacturer of the child restraint system shall take into account the needs of the support leg for their correct functioning in each vehicle and provide this information.
- 6.1.4. A booster cushion must be restrained by either an adult belt, using the test as specified in paragraph 8.1.4, or by separate means.
- 6.1.5. The child restraint manufacturer has to declare in written form that the toxicity of materials used in the manufacture of restraint systems and accessible to the restrained child is in conformity with the relevant parts of CEN Safety of Toys, part 3 (June 1982) ⁽¹⁾. Tests confirming the validity of the declaration may be carried out at the discretion of the test authority. This paragraph does not apply to restraint devices of groups II and III.
- 6.1.6. The child restraint manufacturer has to declare in written form that the flammability of materials used to manufacture the restraint system is in conformity with the relevant paragraphs of the ECE Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1, paragraph 1.20). Tests confirming the validity of the declaration may be carried out at the discretion of the test authority.
- 6.1.7. In the case of rearward-facing child restraints supported by the vehicle dashboard, for the purpose of approval to this Regulation the dashboard is assumed to be sufficiently rigid.
- 6.1.8. In the case of a child restraint system of the 'universal' category, except ISOFIX universal child restraint systems, the main load-bearing contact point, between the child restraint and the adult safety-belt shall not be less than 150 mm from the Cr axis when measured with the child restraint on the dynamic test bench. This shall apply to all adjustment configurations. Additional alternative belt routes are allowed. Where an alternative belt route exists, the manufacturer must make specific reference to the alternative route in the user instructions, as required in paragraph 15. When tested, using such alternative belt route(s), the restraint shall comply with all the requirements of the Regulation with the exception of this paragraph.
- 6.1.9. If the adult belt is required to secure a 'universal' category child restraint, its maximum length to be used on the dynamic test bench is defined in Annex 13 to this Regulation.

To check compliance with this requirement, the child restraint shall be secured onto the test bench using the appropriate standard seat belt described in Annex 13. The dummy shall not be installed unless the design of the restraint is such that the installation of a dummy would increase the amount of belt used. With the child restraint in the installed position there shall be no tension in the belt apart from that exerted by the standard retractor, where fitted. Where the retractor belt is used, this condition shall be met with at least 150 mm of belt remaining on the spool.

- 6.1.10. Child restraints of groups 0 and 0+ shall not be used forward facing.

⁽¹⁾ The address to obtain the relevant CEN standards is: CEN, 2 rue Bréderode, B.P. 5, 1000 Bruxelles, Belgium.

- 6.1.11. Child restraint systems of groups 0 and 0+, with the exception of carry cots as defined in paragraph 2.4.1, shall belong to the integral class.
- 6.1.12. Child restraint systems of group I shall belong to the integral class unless they are fitted with an impact shield as defined in paragraph 2.7.
- 6.2. Configuration
- 6.2.1. The configuration of the restraint shall be such that:
- 6.2.1.1. the restraint gives the required protection in any intended position of the restraint system; for 'Special Needs Restraints' the primary means of restraint shall give the required protection in any intended position of the restraint system without the use of the additional restraining devices which may be present;
- 6.2.1.2. the child is easily and quickly installed and removed; in the case of a child restraint system in which the child is restrained by means of a harness belt or a Y-shaped belt without a retractor each shoulder restraint and lap strap shall be capable of movement relative to each other during the procedure prescribed in paragraph 7.2.1.4.
- In these cases the belt assembly of the child restraint system may be designed with two or more connecting parts. For 'Special Needs Restraints' it is recognised that the additional restraining devices will restrict the speed by which a child can be installed and removed. However, the additional devices shall be designed to release quickly so far as possible;
- 6.2.1.3. if it is possible to change the inclination of the restraint, this change in inclination shall not require manual readjustment of the straps. A deliberate hand-action is required in order to change the inclination of the restraint;
- 6.2.1.4. the groups 0, 0+ and I restraint systems shall keep the child so positioned as to give the required protection even when the child is asleep;
- 6.2.1.5. to prevent submarining, either by impact or through restlessness, a crotch strap shall be required on all forward-facing group I restraints incorporating an integral harness belt system. With the crotch strap attached, and in its longest position if adjustable, it shall not be possible to adjust the lap strap to lie above the pelvis in either the 9 kg or the 15 kg dummy.
- 6.2.2. For groups I, II and III, all restraint devices utilising a 'lap strap' must positively guide the 'lap strap' to ensure that the loads transmitted by the 'lap strap' are transmitted through the pelvis.
- 6.2.3. All straps of the restraint shall be so placed that they cannot cause discomfort to the wearer in normal use or assume a dangerous configuration. The distance between the shoulder-straps in the vicinity of the neck should be at least the width of the neck of the appropriate manikin.
- 6.2.4. The assembly shall not subject weak parts of the child's body (abdomen, crotch, etc.) to excessive stresses. The design shall be such that compression loads shall not be imposed on the crown of the child's head in the event of a collision.
- 6.2.4.1. Y-shaped belts may only be used in rearward facing and lateral facing child restraint systems (carrycots).

- 6.2.5. The child restraint shall be so designed and installed as:
- 6.2.5.1. to minimise the danger of injury to the child or to other occupants of the vehicle through sharp edges or protrusions (as defined in Regulation No 21, for example);
 - 6.2.5.2. not to exhibit sharp edges or protrusions liable to cause damage to vehicle-seat covers or to occupant's clothing;
 - 6.2.5.3. not to subject weak parts of the child's body (abdomen, crotch, etc.) to supplementary inertial forces it sets up;
 - 6.2.5.4. to ensure that its rigid parts do not, at points where they are in contact with straps, exhibit sharp edges capable of abrading the straps.
- 6.2.6. Any part made separable to enable components to be fixed and detached shall be so designed as to avoid any risk of incorrect assembly and use so far as possible. 'Special Needs Restraints' may have additional restraining devices; these shall be designed to avoid any risk of incorrect assembly and that their means of release and mode of operation is immediately obvious to a rescuer in an emergency.
- 6.2.7. Where the child restraint intended for group I, group II and groups I and II combined includes a chair back, the internal height of the latter, determined in accordance with the diagram in Annex 12, shall be not less than 500 mm.
- 6.2.8. Only automatically-locking retractors or emergency-locking retractors may be used.
- 6.2.9. For devices intended for use in group I it must not be possible for the child to easily slacken that part of the system that restrains the pelvis after the child has been installed; for this purpose the requirements of paragraph 7.2.5 (lock-off devices) shall be fulfilled; any device that is designed to obtain this must be permanently attached to the child restraint system.
- 6.2.10. A child restraint may be designed for use in more than one mass group and/or by more than one child, provided that it is able to satisfy the requirements laid down for each of the groups concerned. A child restraint in the 'universal' category must meet the requirements of that category for all mass groups for which it has been approved.
- 6.2.11. Child restraints with retractor
- In the case of a child restraint incorporating a retractor, the retractor shall have met the requirements of paragraph 7.2.3 below.
- 6.2.12. In case of booster cushions, the ease with which the straps and tongue of an adult belt pass through the fixture points must be examined. This goes particularly for booster cushions which are designed for the front seats of cars, which may have long semi-rigid stalks. The fixed buckle should not be allowed to pass through the fixture points of booster seats, or to permit a lie of belt completely different from that of the test-trolley.
- 6.2.13. If the child restraint is designed for more than one child, each restraint system shall be fully independent with regard to load transfer and adjustments.
- 6.2.14. The child restraints incorporating inflatable elements shall be so designed that the conditions of use (pressure, temperature, humidity) have no influence on their ability to comply with the requirements of this Regulation.

6.3. ISOFIX restraint specifications

6.3.1. General characteristics

6.3.1.1. Dimensions

The maximum lateral, downward, and rearward dimensions for the ISOFIX child restraint system and the locations of the ISOFIX anchorages system with which its attachments must engage are defined for the ISOFIX child restraint system manufacturer by the Vehicle Seat Fixture (VSF) defined by paragraph 2.31 of this Regulation.

6.3.1.2. Mass

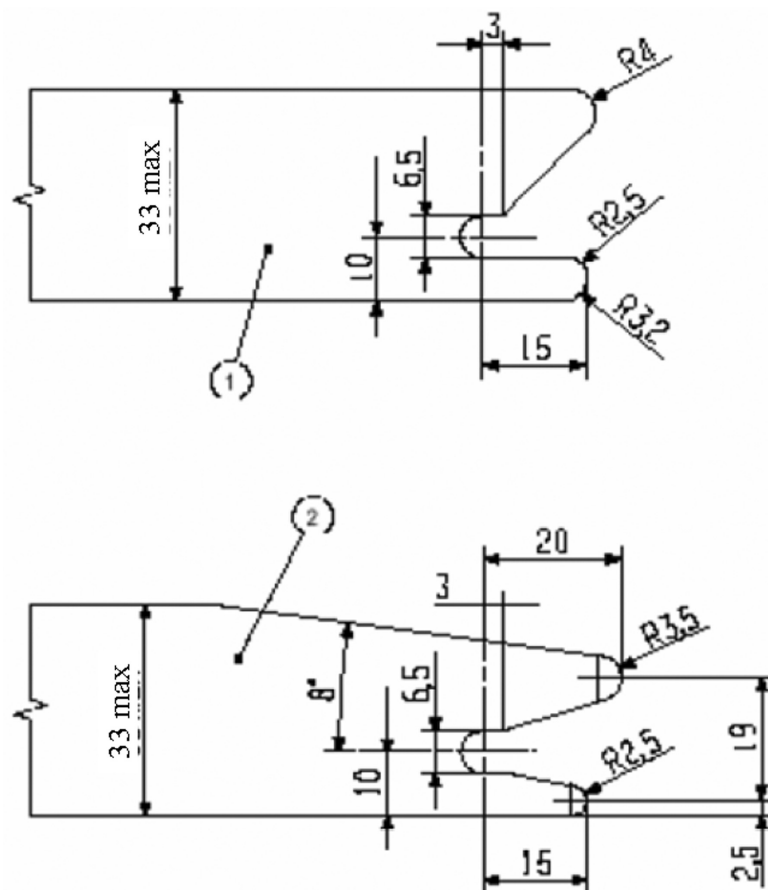
The mass of an ISOFIX child restraint system of universal and semi-universal categories and of mass groups 0, 0+, 1 shall not exceed 15 kg.

6.3.2. ISOFIX Attachments

6.3.2.1. Type

ISOFIX Attachments may be according to examples shown in Figure 0 (a), or other appropriate designs that are part of a rigid mechanism having provision for adjustment, the nature of which is determined by the ISOFIX child restraint system manufacturer.

Figure 0 (a)



Dimensions in mm

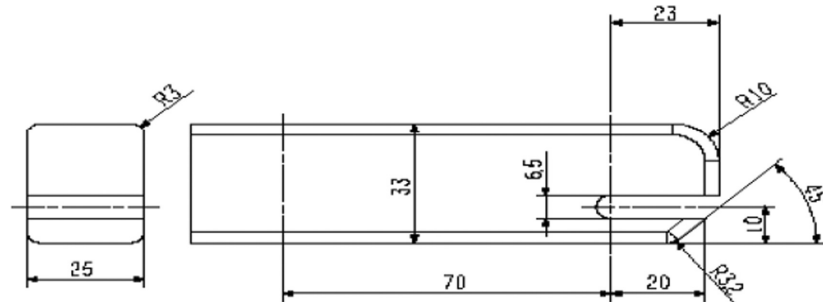
Key

1. ISOFIX child restraint system attachment — example 1
2. ISOFIX child restraint system attachment — example 2

6.3.2.2. Dimensions

Dimensions for the portion of the ISOFIX child restraint system attachment that engages the ISOFIX anchorage system must not exceed the maximum dimensions given by the envelope in Figure 0 (b)

Figure 0 (b)



Dimensions in mm

6.3.2.3. Partial latching indication

The ISOFIX child restraint system shall incorporate means by which there is a clear indication that both of the ISOFIX attachments are completely latched with the corresponding ISOFIX lower anchorages. The indication means may be audible, tactile or visual or a combination of two or more. In case of visual indication it must be detectable under all normal lighting conditions.

6.3.3. ISOFIX child restraint top tether strap specifications

6.3.3.1. Top tether connector

The top tether connector should be ISOFIX top tether hook as shown in Figure 0 (c), or similar devices that fit within the envelope given by Figure 0 (c).

6.3.3.2. ISOFIX Top tether strap features

The ISOFIX top tether strap shall be supported by webbing (or its equivalent), having a provision for adjustment and release of tension.

6.3.3.2.1. ISOFIX Top tether strap length

ISOFIX Child restraint top tether strap length shall be at least 2 000 mm.

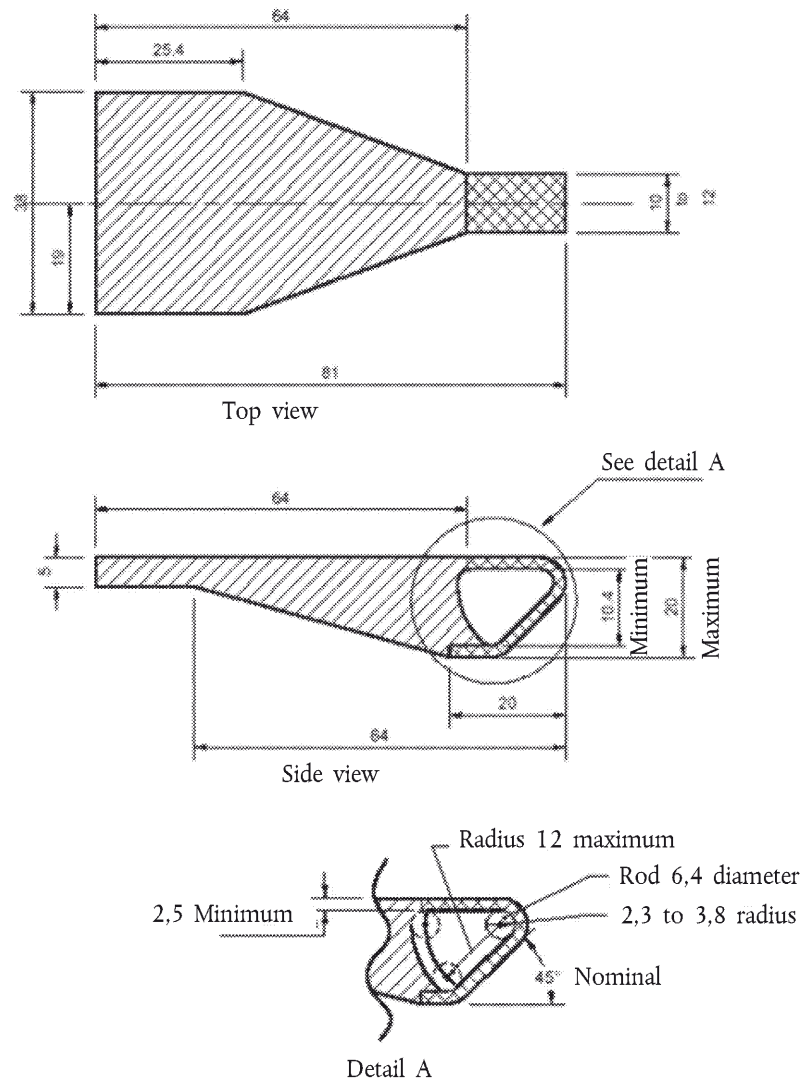
6.3.3.2.2. No-slack indicator

The ISOFIX top tether strap or the ISOFIX child seat shall be equipped with a device that will indicate that all slack has been removed from the strap. The device may be part of adjustment and tension relieving device.

6.3.3.2.3. Dimensions

Engagement dimensions for ISOFIX top tether hooks are shown in Figure 0 (c).

Figure 0 (c)

ISOFIX Top tether connector (hook type) dimensions**LEGEND:**

-  Surrounding structure (if present)
-  Area in which the tether strap hook interface profile must be wholly located

Dimensions in mm

6.3.4. Adjustment provisions

The ISOFIX attachments, or the ISOFIX child restraint system itself, shall be adjustable to accommodate the range of ISOFIX anchorage locations described in Regulation No 14.

6.4. Control of Markings

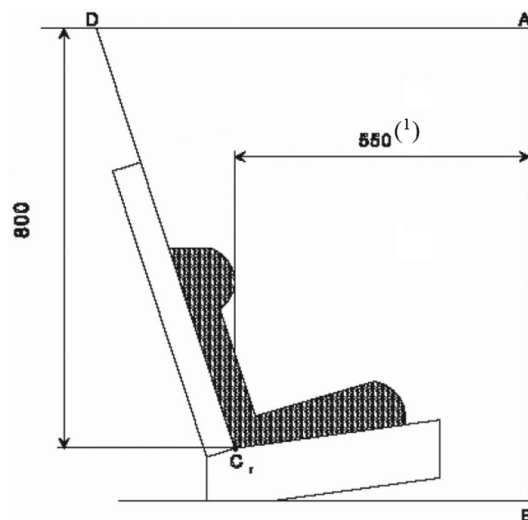
6.4.1. The Technical Service conducting the approval tests shall verify that the markings conform to the requirements of paragraph 4.

- 6.5. Control of Instructions on Installation and the Instructions for Use
- 6.5.1. The Technical Service conducting the approval tests shall verify that the instructions on installation and the instructions for use conform to paragraph 15.
- 7. PARTICULAR SPECIFICATIONS
- 7.1. Provisions applicable to the assembled restraint
- 7.1.1. Resistance to corrosion
- 7.1.1.1. A complete child restraint, or the parts thereof that are liable to corrosion, shall be subject to the corrosion test specified in paragraph 8.1.1 below.
- 7.1.1.2. After the corrosion test as prescribed in paragraphs 8.1.1.1 and 8.1.1.2, no signs of deterioration likely to impair the proper functioning of the child restraint, and no significant corrosion, shall be visible to the unaided eye of a qualified observer.
- 7.1.2. Energy absorption
- 7.1.2.1. For all devices with backrests, the areas defined in Annex 18 to this regulation, when tested according to Annex 17, shall give a peak acceleration of less than 60 g. This requirement applies also to areas of impact shields which are in the head strike area.
- 7.1.2.2. In the case of child restraint systems with permanent mechanically attached adjustable head support devices, in which the height of either the adult safety belt or of the child harness is directly controlled by the adjustable head support, it is not necessary to demand energy absorption in areas as defined in Annex 18, which are not contactable by the manikin's head, i.e. behind the head support.
- 7.1.3. Overturning
- 7.1.3.1. The child restraint shall be tested as prescribed in paragraph 8.1.2; the manikin shall not fall out of the device and, when the test seat is in the upside down position the manikin's head shall not move more than 300 mm from its original position in a vertical direction relative to the test seat.
- 7.1.4. Dynamic test
- 7.1.4.1. General. The child restraint shall be subjected to a dynamic test in conformity with paragraph 8.1.3 below.
- 7.1.4.1.1. Child restraints of the 'universal', 'restricted' and 'semi-universal' categories shall be tested on the test trolley by means of the test seat prescribed in paragraph 6, and in conformity with paragraph 8.1.3.1.
- 7.1.4.1.2. Child restraints of the 'specific vehicle' category shall be tested with each vehicle model for which the child restraint is intended. The Technical Service responsible for conducting the test may reduce the number of vehicle models tested if they do not differ greatly in the aspects listed in paragraph 7.1.4.1.2.3. The child restraint may be tested in one of the following ways:
 - 7.1.4.1.2.1. on a complete vehicle, as prescribed in paragraph 8.1.3.3;
 - 7.1.4.1.2.2. in a vehicle body shell on the test trolley, as prescribed in paragraph 8.1.3.2; or

- 7.1.4.1.2.3. in sufficient parts of the vehicle bodyshell to be representative of the vehicle structure and impact surfaces. If the child restraint is intended for use in the rear seat, these shall include the back of the front seat, the rear seat, the floor pan, the B and C pillars and the roof. If the child restraint is intended for use in the front seat, the parts shall include the dashboard, the A pillars, the windscreen, any levers or knobs installed in the floor or on a console, the front seat, the floor pan and the roof. Furthermore, if the child restraint is intended for use in combination with the adult safety belt, the parts shall include the appropriate adult belt(s). The Technical Service responsible for conducting the test may permit items to be excluded if they are found to be superfluous. Testing shall be as prescribed in paragraph 8.1.3.2.
- 7.1.4.1.3. The dynamic test shall be performed on child restraints which have not previously been under load.
- 7.1.4.1.4. During the dynamic tests, no part of the child restraint actually helping to keep the child in position shall break, and no buckles or locking system or displacement system shall release.
- 7.1.4.1.5. In the case of 'non-integral type' the seat belt used shall be the standard belt and its anchorage brackets prescribed in Annex 13 to this Regulation. This does not apply to 'specific vehicle' approvals where the actual belt of the vehicle shall be used.
- 7.1.4.1.6. If a 'specific vehicle' child restraint system is installed in the area behind the rearmost forward facing adult seat positions (for example, the luggage area), one test with the largest dummy/dummies on a complete vehicle as prescribed in paragraph 8.1.3.3.3 shall be performed. The other tests, including the conformity of production, may be done as prescribed in paragraph 8.1.3.2, if the manufacturer so wishes.
- 7.1.4.1.7. In the case of a 'Special Needs Restraint' every dynamic test specified by this Regulation for each mass group shall be performed twice: first, using the primary means of restraint and second, with all restraining devices in use. In these tests, special attention shall be given to the requirements in paragraphs 6.2.3 and 6.2.4.
- 7.1.4.1.8. During the dynamic tests, the standard safety-belt used to install the child restraint shall not become disengaged from any guide or locking device utilised for the test conducted.
- 7.1.4.1.9. A child restraint with a support leg shall be tested as follows:
- (a) in the case of semi-universal category, the tests for frontal impact shall be conducted with the support leg adjusted to both its maximum and minimum adjustment compatible with the positioning of the trolley floor pan. The tests for rearward impact shall be conducted with the worst case position selected by the Technical Service. During the tests the support leg shall be supported by the trolley floor pan as described in Annex 6, Appendix 3, Figure 2. If there is clearance between the shortest leg length and the highest floor pan level, the leg is adjusted to the floor pan level of 140 mm below Cr. If the maximum leg length is more than the lowest floor pan level would allow to be used, the leg is adjusted to that lowest floor pan level of 280 mm below Cr. In the case of support leg with adjustable steps, the support leg length shall be adjusted to the next adjustment position, in order to ensure the support leg is in contact with the floor;
 - (b) in the case of support legs out of the plane of symmetry, the worst case shall be selected by the Technical Service for the test;
 - (c) in the case of specific vehicle category, the support leg shall be adjusted as specified by the child restraint manufacturer.
- 7.1.4.1.10. In the case of a child restraint making use of an ISOFIX anchorage system and anti-rotation device, if any, the dynamic test shall be carried out:
- 7.1.4.1.10.1. for ISOFIX CRS of size classes A and B:
- 7.1.4.1.10.1.1. with the anti-rotation device in use; and

- 7.1.4.1.10.1.2. without the anti-rotation device in use. This requirement does not apply when a permanent and non-adjustable support leg is used as an anti-rotation device.
- 7.1.4.1.10.2. For ISOFIX child restraint system of other size classes with the anti-rotation device in use.
- 7.1.4.2. Chest acceleration ⁽¹⁾
- 7.1.4.2.1. The resultant chest acceleration shall not exceed 55 g except during periods whose sum does not exceed 3 ms.
- 7.1.4.2.2. The vertical component of the acceleration from the abdomen towards the head shall not exceed 30 g except during periods whose sum does not exceed 3 ms.
- 7.1.4.3. Abdominal penetration ⁽²⁾
- 7.1.4.3.1. During the verification described in Annex 8 — Appendix 1, paragraph 5.3, there shall be no visible signs of penetration of the modelling clay of the abdomen caused by any part of the restraining device.
- 7.1.4.4. Manikin displacement
- 7.1.4.4.1. Child restraints of the 'universal', 'restricted' and 'semi-universal' categories:
- 7.1.4.4.1.1. Forward facing child restraints: the head of the manikin shall not pass beyond the planes BA and DA as defined in Figure 1 below, except for booster seats when using the largest dummy P10 where the value in relation to DA plane is 840 mm.

Figure 1

Arrangement for testing a forward-facing device

⁽¹⁾ For the purpose of the test specified in paragraph 7.1.4.1.10.1.1, this dimension shall be 500 mm.

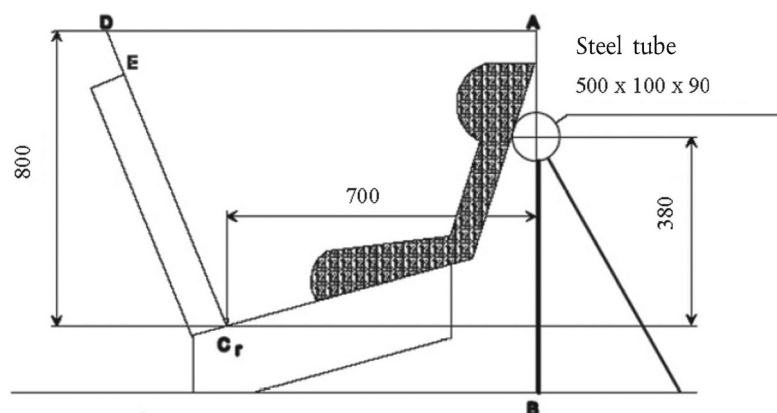
Dimensions in mm

- 7.1.4.4.1.2. Rear-facing child restraints:
- 7.1.4.4.1.2.1. Child restraints supported by dashboard: the head of the manikin shall not pass beyond the planes AB, AD and DCr, as defined in Figure 2 below. This shall be judged up to 300 ms or the moment that the manikin has come to a definitive standstill whatever occurs first.

⁽¹⁾ Chest acceleration limits do not apply when using the 'new born' manikin as it is not instrumented.

⁽²⁾ The new-born manikin is not fitted with any abdominal insert. Therefore only a subjective analysis can be used as a guide to abdominal penetration.

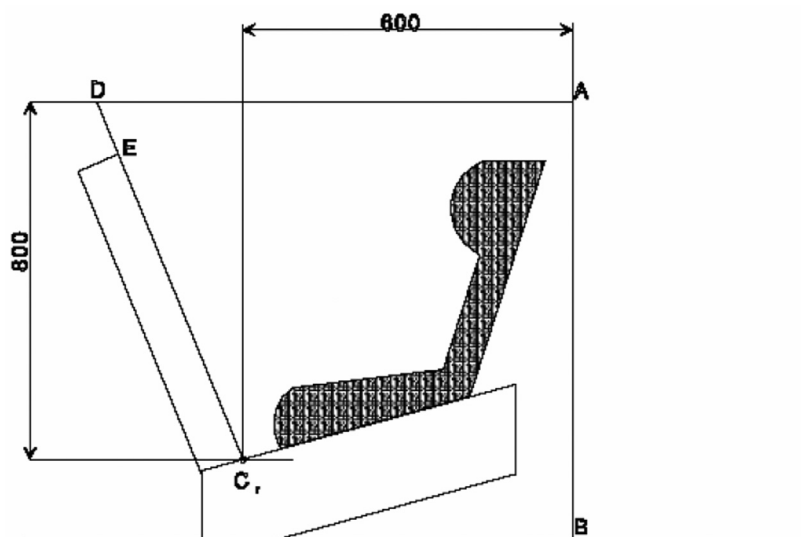
Figure 2

Arrangement for testing a rearward-facing device

Dimensions in mm

- 7.1.4.4.1.2.2. Child restraints in group 0 not supported by the dashboard, and carrycots: the head of the manikin shall not pass the planes AB, AD and DE as shown in Figure 3 below. This shall be judged up to 300 ms or the moment that the manikin has come to a definitive standstill whatever occurs first.

Figure 3

Arrangement for testing child restraint devices group 0, not supported by the dashboard

Dimensions in mm

- 7.1.4.4.1.2.3. Child restraints other than group 0 not supported by the dashboard:

The head of the manikin shall not pass the planes FD, FG and DE, as shown in Figure 4 below. This shall be judged up to 300 ms or the moment that the manikin has come to a definitive standstill whatever occurs first.

- 7.2.1.2. The buckle, even when not under tension, shall remain closed whatever its position. It shall be easy to operate and to grasp. It shall be possible to open it by pressure on a button or on a similar device. The surface to which this pressure must be applied must have in the position of actual unlocking and when projected into a plane perpendicular to the button's initial direction of motion: for enclosed devices, an area of not less than 4,5 cm² with a width of not less than 15 mm; for non-enclosed devices, an area of 2,5 cm² and a width of not less than 10 mm. The width shall be the smaller of the two dimensions forming the prescribed area and shall be measured rectangular to the direction of movement of the release button.
- 7.2.1.3. The buckle release area shall be coloured red. No other part of the buckle shall be of this colour.
- 7.2.1.4. It shall be possible to release the child from the restraint by a single operation on a single buckle. For groups 0 and 0+ it is allowed to remove the child together with devices such as infant carrier/carry cot/carry-cot restraints if the child restraint system can be released by operation of a maximum of two buckles.
- 7.2.1.4.1. A clip connection between the shoulder straps of a harness belt is deemed not to comply with the single operation requirement given in paragraph 7.2.1.4 above.
- 7.2.1.5. For groups II and III the buckle shall be so placed that the child occupant can reach it. In addition it shall for all groups be so placed that its purpose and mode of operation are immediately obvious to a rescuer in an emergency.
- 7.2.1.6. Opening of the buckle shall enable the child to be removed independently of the 'chair', 'chair support' or 'impact shield', if fitted, and if the device includes a crotch strap the crotch strap shall be released by operation of the same buckle.
- 7.2.1.7. The buckle shall be capable of withstanding the temperature test operation requirements given in paragraph 8.2.8.1 and repeated operation, and shall, before the dynamic test prescribed in paragraph 8.1.3 undergo a test comprising 5 000 ± 5 opening and closing cycles under normal conditions for use.
- 7.2.1.8. The buckle shall be subjected to the following tests of opening:
- 7.2.1.8.1. Test under load
- 7.2.1.8.1.1. A child restraint having already undergone the dynamic test prescribed in paragraph 8.1.3 below shall be used for this test.
- 7.2.1.8.1.2. The force required to open the buckle in the test prescribed in paragraph 8.2.1.1 below shall not exceed 80 N.
- 7.2.1.8.2. No-load test
- 7.2.1.8.2.1. A buckle which has not previously been subjected to a load shall be used for this test. The force needed to open the buckle when it is not under load shall be in the range of 40-80 N in the tests prescribed in paragraph 8.2.1.2 below.
- 7.2.1.9. Strength.
- 7.2.1.9.1. During the test in accordance with paragraph 8.2.1.3.2 no part of the buckle or the adjacent straps or adjusters shall break or be detached.
- 7.2.1.9.2. A harness buckle of mass groups 0 and 0+ shall withstand 4 000 N.
- 7.2.1.9.3. A harness buckle of mass group I and higher shall withstand 10 000 N.

- 7.2.1.9.4. The competent authority may dispense with the buckle strength test if information already available renders the test superfluous.
- 7.2.2. Adjusting device
- 7.2.2.1. The range of adjustment shall be sufficient to permit correct adjustment of the child restraint with all manikins of the weight group for which the device is intended and to permit satisfactory installation in all specified vehicle models.
- 7.2.2.2. All adjusting devices shall be of the 'quick adjuster' type, except that adjusting devices used only for the initial installation of the restraint in the vehicle may be of other than the 'quick adjuster' type.
- 7.2.2.3. Devices of the 'quick adjuster' type shall be easy to reach when the child restraint is correctly installed and the child or manikin is in position.
- 7.2.2.4. A device of the 'quick adjuster' type shall be easily adjustable to the child's physique. In particular, in a test performed in accordance with paragraph 8.2.2.1, the force required to operate a manual adjusting device shall not exceed 50 N.
- 7.2.2.5. Two samples of the child-restraint adjusting devices shall be tested as prescribed by the temperature test operation requirements given in paragraph 8.2.8.1 and in paragraph 8.2.3 below.
- 7.2.2.5.1. The amount of strap slip shall not exceed 25 mm for one adjusting device or 40 mm for all adjusting devices.
- 7.2.2.6. The device must not break or become detached when tested as prescribed in paragraph 8.2.2.1 below.
- 7.2.2.7. An adjuster mounted directly on the child restraint shall be capable of withstanding repeated operation and shall, before the dynamic test prescribed in paragraph 8.1.3 undergo a test comprising $5\,000 \pm 5$ cycles as specified in paragraph 8.2.7.
- 7.2.3. Retractors
- 7.2.3.1. Automatically-locking retractors
- 7.2.3.1.1. The strap of a safety-belt equipped with an automatically-locking retractor shall not unwind by more than 30 mm between locking positions of the retractor. After a rearward movement of the wearer the belt must either remain in its initial position or return to that position automatically on subsequent forward movement of the wearer.
- 7.2.3.1.2. If the retractor is part of a lap belt, the retracting force of the strap shall be not less than 7 N as measured in the free length between the manikin and the retractor as prescribed in paragraph 8.2.4.1 below. If the retractor is part of a chest restraint, the retracting force of the strap shall be not less than 2 N or more than 7 N as similarly measured. If the strap passes through a guide or pulley, the retracting force shall be measured in the free length between the manikin and the guide or pulley. If the assembly incorporates a device, manually or automatically operated, that prevents the strap from being completely retracted, that device shall not be in operation when these measurements are effected.
- 7.2.3.1.3. The strap shall be repeatedly withdrawn from the retractor and allowed to retract, in the conditions prescribed in paragraph 8.2.4.2 below, until 5 000 cycles have been completed. The retractor shall then be subjected to the temperature test operation requirements given in paragraph 8.2.8.1 and corrosion test described in paragraph 8.1.1 and the dust-resistance test described in paragraph 8.2.4.5. It shall then satisfactorily complete a further 5 000 cycles of withdrawal and retraction. After the above tests the retractor shall continue to operate correctly and to meet the requirements of paragraphs 7.2.3.1.1 and 7.2.3.1.2 above.

- 7.2.3.2. Emergency-locking retractors
- 7.2.3.2.1. An emergency-locking retractor shall when tested as prescribed in paragraph 8.2.4.3 satisfy the conditions below:
- 7.2.3.2.1.1. it shall be locked when the deceleration of the vehicle reaches 0,45 g;
- 7.2.3.2.1.2. it shall not lock for strap accelerations of less than 0,8 g as measured in the axis of strap extraction;
- 7.2.3.2.1.3. it shall not lock when its sensing device is tilted by not more than 12° in any direction from the installation position specified by its manufacturer;
- 7.2.3.2.1.4. it shall lock when its sensing device is tilted by more than 27° in any direction from the installation position specified by its manufacturer.
- 7.2.3.2.2. Where the operation of a retractor depends on an external signal or power source, the design shall ensure that the retractor locks automatically upon failure or interruption of that signal or power source.
- 7.2.3.2.3. A multiple-sensitivity emergency-locking retractor shall meet the requirements set out above. In addition, if one of the sensitivity factors relates to strap extraction, locking must have occurred at a strap acceleration of 1,5 g as measured in the axis of strap extraction.
- 7.2.3.2.4. In the tests referred to in paragraphs 7.2.3.2.1.1 and 7.2.3.2.3 above, the amount of strap extraction occurring before the retractor locks shall not exceed 50 mm, starting at the length of unwinding specified in paragraph 8.2.4.3.1. In the test referred to in paragraph 7.2.3.2.1.2 above, locking shall not occur during the 50 mm of strap extraction starting at the length of unwinding specified in paragraph 8.2.4.3.1 below.
- 7.2.3.2.5. If the retractor is part of a lap belt, the retracting force of the strap shall be not less than 7 N as measured in the free length between the manikin and the retractor as prescribed in paragraph 8.2.4.1. If the retractor is part of a chest restraint, the retracting force of the strap shall be not less than 2 N or more than 7 N as similarly measured. If the strap passes through a guide or pulley, the retracting force shall be measured in the free length between the manikin and the guide or pulley. If the assembly incorporates a device, manually or automatically operated, that prevents the strap from being completely retracted, that device shall not be in operation when these measurements are effected.
- 7.2.3.2.6. The strap shall be repeatedly withdrawn from the retractor and allowed to retract, in the conditions prescribed in paragraph 8.2.4.2, until 40 000 cycles have been completed. The retractor shall then be subjected to the temperature test operation requirements given in paragraph 8.2.8.1 and corrosion test described in paragraph 8.1.1 and to the dust-resistance test described in paragraph 8.2.4.5. It shall then satisfactorily complete a further 5 000 cycles of withdrawal and retraction (making 45 000 in all). After the above tests the retractor shall continue to operate correctly and to meet the requirements of paragraphs 7.2.3.2.1 to 7.2.3.2.5 above.
- 7.2.4. Straps
- 7.2.4.1. Width
- 7.2.4.1.1. The minimum width at the child-restraint straps which contact the dummy shall be 25 mm for groups 0, 0+ and I, and 38 mm for groups II and III. These dimensions shall be measured during the strap strength test prescribed in paragraph 8.2.5.1, without stopping the machine and under a load equal to 75 per cent of the breaking load of the strap.

- 7.2.4.2. Strength after room conditioning
 - 7.2.4.2.1. On two sample straps conditioned as prescribed in paragraph 8.2.5.2.1, the breaking load of the strap shall be determined as prescribed in paragraph 8.2.5.1.2 below.
 - 7.2.4.2.2. The difference between the breaking loads of the two samples shall not exceed 10 per cent of the greater of the two breaking loads measured.
- 7.2.4.3. Strength after special conditioning
 - 7.2.4.3.1. On two straps conditioned as prescribed in one of the provisions of paragraph 8.2.5.2 (except paragraph 8.2.5.2.1), the breaking load of the strap shall be not less than 75 per cent of the average of the loads determined in the test referred to in paragraph 8.2.5.1 below.
 - 7.2.4.3.2. In addition, the breaking load shall be not less than 3,6 kN for the restraints of the groups 0, 0+ and I, 5 kN for those of group II, and 7,2 kN for those of group III.
 - 7.2.4.3.3. The competent authority may dispense with one or more of these tests if the composition of the material used, or information already available, renders the test or tests superfluous.
 - 7.2.4.3.4. The abrasion conditioning procedure of type 1 defined in paragraph 8.2.5.2.6 shall only be performed when the microslip test defined in paragraph 8.2.3 below gives a result above 50 per cent of the limit prescribed in paragraph 7.2.2.5.1 above.
- 7.2.4.4. It shall not be possible to pull the complete strap through any adjusters, buckles or anchoring points.
- 7.2.5. Lock-off device
 - 7.2.5.1. The lock-off device must be permanently attached to the child restraint.
 - 7.2.5.2. The lock-off device must not impair the durability of the adult belt and undergo temperature test operation requirements given in paragraph 8.2.8.1.
 - 7.2.5.3. The lock-off device must not prevent the rapid release of the child.
 - 7.2.5.4. Class A devices.

The amount of slip of the webbing shall not exceed 25 mm after the test prescribed in paragraph 8.2.6.1 below.
 - 7.2.5.5. Class B devices.

The amount of slip of the webbing shall not exceed 25 mm after the test prescribed in paragraph 8.2.6.2 below.
- 7.2.6. ISOFIX attachment specifications

'ISOFIX attachments' and latching indicators shall be capable of withstanding repeated operations and shall, before the dynamic test prescribed in paragraph 8.1.3, undergo a test comprising $2\,000 \pm 5$ opening and closing cycles under normal conditions of use.

8. DESCRIPTION OF TESTS ⁽¹⁾

8.1. Tests of the assembled restraint

8.1.1. Corrosion

8.1.1.1. The metal items of the child restraint shall be positioned in a test chamber as prescribed in Annex 4. In the case of a child restraint incorporating a retractor, the strap shall be unwound to full length less 100 ± 3 mm. Except for short interruptions that may be necessary, for example, to check and replenish the salt solution, the exposure test shall proceed continuously for a period of $50 \pm 0,5$ hours.

8.1.1.2. On completion of the exposure test the metal items of the child restraint shall be gently washed, or dipped, in clean running water with a temperature not higher than 38°C to remove any salt deposit that may have formed and then allowed to dry at room temperature of 18°C to 25°C for 24 ± 1 hours before inspection in accordance with paragraph 7.1.1.2 above.

8.1.2. Overturning

8.1.2.1. The manikin shall be placed in the restraints installed in accordance with this Regulation and taking into account the manufacturer's instructions and with the standard slack as specified in paragraph 8.1.3.6 below.

8.1.2.2. The restraint shall be fastened to the test seat or vehicle seat. The whole seat shall be rotated around a horizontal axis contained in the median longitudinal plane of the seat through an angle of 360° at a speed of 2-5 degrees/second. For the purposes of this test, devices intended for use in specific cars may be attached to the test seat described in Annex 6.

8.1.2.3. This test shall be carried out again rotating in the reverse direction after having replaced, if necessary, the manikin in its initial position. With the rotational axis in the horizontal plane and at 90° to that of the two earlier tests, the procedure shall be repeated in the two directions of rotation.

8.1.2.4. These tests shall be carried out using both the smallest and the largest appropriate manikin of the group or groups for which the restraining device is intended.

8.1.3. Dynamic tests

8.1.3.1. Tests on the trolley and test seat

8.1.3.1.1. Forward-facing

8.1.3.1.1.1. The trolley and test seat used in the dynamic test shall meet the requirements of Annex 6 to this Regulation, and the dynamic crash test installation procedure is to be in accordance with Annex 21.

8.1.3.1.1.2. The trolley shall remain horizontal throughout deceleration or acceleration.

8.1.3.1.1.3. Deceleration or acceleration devices

The applicant shall choose to use one of the two following devices:

⁽¹⁾ Tolerances on dimensions unless otherwise stated, not valid for boundaries

Range of dimensions (mm)	less than 6	above 6 to 30	above 30 to 120	above 120 to 315	above 315 to 1 000	above 1 000
Tolerance (mm)	$\pm 0,5$	± 1	$\pm 1,5$	± 2	± 3	± 4

Angular tolerances unless otherwise stated: $\pm 1^\circ$

8.1.3.1.1.3.1. Deceleration test device:

The deceleration of the trolley shall be achieved by using the apparatus prescribed in Annex 6 to this Regulation or any other device giving equivalent results. This apparatus shall be capable of the performance specified in paragraph 8.1.3.4 and hereafter specified:

Calibration procedure:

The deceleration curve of the trolley, in the case of child restraint tests performed in accordance with paragraph 8.1.3.1, ballasted with inert masses up to 55 kg in order to reproduce one occupied child restraint, and in the case of child restraint tests in a vehicle body shell performed in accordance with paragraph 8.1.3.2, where the trolley is ballasted with the vehicle structure and inert masses up to x times 55 kg reproducing the number of x occupied child restraint systems, must remain, in the case of frontal impact, within the hatched area of the graph in Annex 7, Appendix 1 of this Regulation, and, in the case of rear impact, within the hatched area of the graph in Annex 7, Appendix 2 of this Regulation.

During calibration of the stopping device, the stopping distance shall be 650 ± 30 mm for frontal impact, and 275 ± 20 mm for rear impact.

8.1.3.1.1.3.2. Acceleration test device

Dynamic testing conditions:

For frontal impact, the trolley shall be so propelled that, during the test, its total velocity change ΔV is $52 \pm 0/-2$ km/h and its acceleration curve is within the hatched area of the graph in Annex 7, Appendix 1 and stay above the segment defined by the coordinates (5 g, 10 ms) and (9 g, 20 ms). The start of the impact (T0) is defined, according to ISO 17373 for a level of acceleration of 0,5 g.

For rear impact, the trolley shall be so propelled that, during the test, its total velocity change ΔV is $32 \pm 2/-0$ km/h and its acceleration curve is within the hatched area of the graph in Annex 7, Appendix 2 and stay above the segment defined by the coordinates (5 g, 5 ms) and (10 g, 10 ms). The start of the impact (T0) is defined, according to ISO 17373 for a level of acceleration of 0,5 g.

Despite the fulfilment of the above requirements, the Technical Service shall use a mass of trolley (equipped with its seat), as specified in paragraph 1 of Annex 6, superior to 380 kg.

However, if the tests above were performed at a higher speed and/or the acceleration curve has exceeded the upper level of the hatched area and the child restraint meets the requirements, the test shall be considered satisfactory.

8.1.3.1.1.4. The following measurements shall be made:

- 8.1.3.1.1.4.1. the trolley speed immediately before impact (only for deceleration sleds, needed for stopping distance calculation);
- 8.1.3.1.1.4.2. the stopping distance (only for deceleration sleds), which may be calculated by double integration of the recorded sled deceleration;
- 8.1.3.1.1.4.3. the displacement of the manikin's head in the vertical and horizontal planes for groups I, II and III and for groups 0 and 0+ the displacement of the manikin without considering its limb;

- 8.1.3.1.1.4.4. the chest deceleration in three mutually perpendicular directions; except for new-born manikin;
- 8.1.3.1.1.4.5. any visible signs of penetration of the modelling clay in the abdomen (see paragraph 7.1.4.3.1); except for new-born manikin;
- 8.1.3.1.1.4.6. the trolley acceleration or deceleration for at least the first 300 ms.
- 8.1.3.1.1.5. After impact, the child restraint shall be inspected visually, without opening the buckle, to determine whether there has been any failure or breakage.
- 8.1.3.1.2. Rearward-facing
 - 8.1.3.1.2.1. The test seat shall be rotated 180° when testing in compliance with the requirements of the rear impact test.
 - 8.1.3.1.2.2. When testing a rearward-facing child restraint intended for use in the front seating position, the vehicle fascia shall be represented by a rigid bar attached to the trolley in such a way that all the energy absorption takes place in the child restraint.
 - 8.1.3.1.2.3. The deceleration conditions shall satisfy the requirements of paragraph 8.1.3.1.1.3.1.

The acceleration conditions shall satisfy the requirements of paragraph 8.1.3.1.1.3.2.
 - 8.1.3.1.2.4. The measurements to be made shall be similar to those listed in paragraphs 8.1.3.1.1.4 to 8.1.3.1.1.4.6 above.
- 8.1.3.2. Test on trolley and vehicle body shell
 - 8.1.3.2.1. Forward-facing
 - 8.1.3.2.1.1. The method used to secure the vehicle during the test shall not be such as to strengthen the anchorages of the vehicle seats, adult safety belts and any additional anchorages required to secure the child restraint or to lessen the normal deformation of the structure. No part of the vehicle shall be present which, by limiting the movement of the manikin, would reduce the load imposed on the child restraint during the test. The parts of the structure eliminated may be replaced by parts of equivalent strength, provided they do not hinder the movement of the manikin.
 - 8.1.3.2.1.2. A securing device shall be regarded as satisfactory if it produces no effect on an area extending over the whole width of the structure and if the vehicle or structure is blocked or fixed in front at a distance of not less than 500 mm from the anchorage of the restraint system. At the rear the structure shall be secured at a sufficient distance behind the anchorages to ensure that all requirements of paragraph 8.1.3.2.1.1 above are fulfilled.
 - 8.1.3.2.1.3. The vehicle seat and child restraint shall be fitted and shall be placed in a position chosen by the Technical Service conducting approval tests to give the most adverse conditions in respect of strength, compatible with installing the manikin in the vehicle. The position of the vehicle seat-back and child restraint shall be stated in the report. The vehicle seat-back, if adjustable for inclination, shall be locked as specified by the manufacturer or, in the absence of any specification, at an actual seat-back angle as near as possible to 25°.
 - 8.1.3.2.1.4. Unless the instructions for fitting and use require otherwise, the front seat shall be placed in the most forward normally used position for child restraints intended for use in the front seating position, and in the rearmost normally used position for child restraints intended for use in the rear seating position.

- 8.1.3.2.1.5. The deceleration conditions shall satisfy the requirements of paragraph 8.1.3.4 below. The test seat will be the seat of the actual vehicle.
- 8.1.3.2.1.6. The following measurements shall be made:
 - 8.1.3.2.1.6.1. the trolley speed immediately before impact (only for deceleration sleds, needed for stopping distance calculation);
 - 8.1.3.2.1.6.2. the stopping distance (only for deceleration sleds), which may be calculated by double integration of the recorded sled deceleration;
 - 8.1.3.2.1.6.3. any contact of the manikin's head with the interior of the vehicle body shell;
 - 8.1.3.2.1.6.4. the chest deceleration in three mutually perpendicular directions; except for new-born manikin;
 - 8.1.3.2.1.6.5. any visible signs of penetration of the modelling clay in the abdomen (see paragraph 7.1.4.3.1) except for new-born manikin;
 - 8.1.3.2.1.6.6. the trolley and vehicle body shell acceleration or deceleration for at least the first 300 ms.
 - 8.1.3.2.1.7. After impact, the child restraint shall be inspected visually, without opening the buckle, to determine whether there has been any failure.
- 8.1.3.2.2. Rearward-facing
 - 8.1.3.2.2.1. For rear impact tests the vehicle body shell shall be rotated 180° on the test trolley.
 - 8.1.3.2.2.2. Same requirements as for frontal impact.
- 8.1.3.3. Test with complete vehicle
 - 8.1.3.3.1. The deceleration conditions shall satisfy the requirements of paragraph 8.1.3.4 below.
 - 8.1.3.3.2. For frontal impact tests the procedure shall be that set out in Annex 9 to this Regulation.
 - 8.1.3.3.3. For rear impact tests the procedure shall be that set out in Annex 10 to this Regulation.
 - 8.1.3.3.4. The following measurements shall be made:
 - 8.1.3.3.4.1. the speed of the vehicle/impactor immediately before impact;
 - 8.1.3.3.4.2. any contact of the manikin's head (in the case of group 0 the manikin without considering its limbs) with the interior of the vehicle;
 - 8.1.3.3.4.3. the chest acceleration in three mutually perpendicular directions, except for new-born manikin;
 - 8.1.3.3.4.4. any visible signs of penetration of the modelling clay in the abdomen (see paragraph 7.1.4.3.1), except for new-born manikin.

8.1.3.3.5. The front seats, if adjustable for inclination, shall be locked as specified by the manufacturer or, in the absence of any specification, at an actual seat-back angle as near as possible to 25°.

8.1.3.3.6. After impact, the child restraint shall be inspected visually, without opening the buckle, to determine whether there has been any failure or breakage.

8.1.3.4. The conditions for dynamic test are summarised in the table below:

Test	Restraint	FRONTAL IMPACT			REAR IMPACT		
		Speed (km/h)	Test pulse	Stopping distance during test (mm)	Speed (km/h)	Test pulse	Stopping distance during test (mm)
Trolley with test seat	Forward facing front and rear seats universal, semi-universal or restricted (*)	50 + 0 – 2	1	650 ± 50	—	—	—
	Rearward facing front and rear seats universal, semi-universal or restricted (**)	50 + 0 – 2	1	650 ± 50	30 + 2 – 0	2	275 ± 25
Vehicle body on trolley	Forward facing (*)	50 + 0 – 2	1 or 3	650 ± 50	—	—	—
	Rearward facing (*)	50 + 2 – 2	1 or 3	650 ± 50	30 + 2 – 0	2 or 4	275 ± 25
Whole vehicle barrier test	Forward facing	50 + 0 – 2	3	not specified	—	—	—
	Rearward facing	50 + 0 – 2	3	not specified	30 + 2 – 0	4	not specified

(*) During calibration, the stopping distance should be 650 ± 30 mm.

(**) During calibration, the stopping distance should be 275 ± 20 mm.

Note: All restraint systems for groups 0 and 0+ shall be tested according to 'Rearward-facing' conditions in frontal and rearwards impact.

Legend:

Test Pulse No 1 — As prescribed in Annex 7 — frontal impact.

Test Pulse No 2 — As prescribed in Annex 7 — rear impact.

Test Pulse No 3 — Deceleration pulse of vehicle subjected to frontal impact.

Test Pulse No 4 — Deceleration pulse of vehicle subjected to rear impact.

8.1.3.5. Child restraints incorporating the use of additional anchorages

8.1.3.5.1. In the case of child restraints intended for use as specified in paragraph 2.1.2.3 and incorporating the use of additional anchorages, the requirement for a frontal impact test, in accordance with paragraph 8.1.3.4, shall be carried out as follows:

8.1.3.5.2. for devices with short upper attachment straps, e.g. intended to be attached to the rear parcel shelf, the upper anchorage configuration on the test trolley shall be as prescribed in Annex 6, Appendix 3;

8.1.3.5.3. for devices with long upper attachment straps, e.g. intended for use where there is no rigid parcel shelf and where the upper anchorage straps are attached to the vehicle floor, the anchorages on the test trolley shall be as prescribed in Annex 6, Appendix 3;

- 8.1.3.5.4. for devices, intended for use in both configurations, the tests prescribed in paragraphs 8.1.3.5.2 and 8.1.3.5.3 shall be carried out with the exception that, in case of the test carried out in accordance with the requirements of paragraph 8.1.3.5.3 above, only the heavier manikin shall be used;
- 8.1.3.5.5. for rearward-facing devices, the lower anchorage of configuration on the test trolley shall be as prescribed in Annex 6, Appendix 3;
- 8.1.3.5.6. for carry cots utilising additional straps that are attached to two adult safety belts, where the load path shall apply directly through the adult safety belt to the adult safety belt lower anchorage, the anchorage on the test trolley shall be as prescribed in Annex 6, Appendix 3, paragraph 7 (A1, B1). Installation on the test bench shall be as described in Annex 21, note 5. This system must work correctly even with the adult safety belts unlocked, and is considered as Universal when complying with paragraph 6.1.8.
- 8.1.3.6. Test manikins
- 8.1.3.6.1. The child restraint and manikins shall be installed in such a way that the requirements of paragraph 8.1.3.6.3 are met.
- 8.1.3.6.2. The child restraint shall be tested using the manikins prescribed in Annex 8 to this Regulation.
- 8.1.3.6.3. Installation of the manikin
- 8.1.3.6.3.1. The manikin shall be placed so that the gap is between the rear of the manikin and the restraint. In the case of carry cots the manikin is placed in a straight horizontal position as close as possible to the centre line of the carry cot.
- 8.1.3.6.3.2. Place the child chair on the test seat.
- Place the manikin in the child chair.
- Place a hinged board or a similar flexible device 2,5 cm thick and 6 cm wide and of length equal to the shoulder height (sitting, Annex 8) less the hip centre height (sitting, in Annex 8 popliteus height plus half of thigh height, sitting) relevant to the manikin size being tested between the manikin and the seat back of the chair. The board should follow as closely as possible the curvature of the chair and its lower end should be at the height of the manikin's hip joint.
- Adjust the belt in accordance with the manufacturer's instructions, but to a tension of 250 ± 25 N above the adjuster force, with a deflection angle of the strap at the adjuster of $45 \pm 5^\circ$, or alternatively, the angle prescribed by the manufacturer.
- Complete the installation of the child chair to the test seat in accordance with Annex 21 to this Regulation.
- Remove the flexible device.
- This only applies to harness restraints and to restraints where the child is restrained by the adult three-point belt and where a lock-off device is used and does not apply to child restraining straps connected directly to a retractor.
- 8.1.3.6.3.3. The longitudinal plane passing through the centre line of the dummy shall be set midway between the two lower belt anchorages, however note shall also be taken of paragraph 8.1.3.2.1.3. In case of child restraints to be tested with the manikin representing a 10-year-old child, the longitudinal plane passing through the centre line of the manikin shall be positioned up to 80 mm towards the side of anchorage point C with regard to the point midway between the two lower belt anchorages. The amount of this displacement shall be decided by the technical service in order to optimise the shoulder belt routing at the manikin.

- 8.1.3.6.3.4. In the case of devices requiring the use of a standard belt, the routing of the shoulder strap may be maintained on the manikin prior to the dynamic test by the use of a light-weight masking tape of a maximum length of 250 mm and a maximum width of 20 mm. In the case of rearward facing devices the head may be held against the backrest of the restraint system using a light-weight masking tape of sufficient length and a maximum width of 20 mm.
- 8.1.3.7. Category of manikin to be used
- 8.1.3.7.1. Group 0 device: Test using the 'new-born' manikin and a manikin of 9 kg;
- 8.1.3.7.2. Group 0+ device: test using the new-born manikin and a manikin of 11 kg;
- 8.1.3.7.3. Group I device: Tests using a manikin of mass 9 kg and 15 kg respectively;
- 8.1.3.7.4. Group II device: Tests using a manikin of mass 15 kg and 22 kg respectively;
- 8.1.3.7.5. Group III device: Tests using a manikin of mass 22 kg and 32 kg respectively.
- 8.1.3.7.6. If the child restraint system is suitable for two or more mass groups, the tests shall be carried out using the lightest and heaviest manikins specified above for all the groups concerned. However, if the configuration of the device alters considerably from one group to the next, for instance when the configuration of the harness or the harness length is changed, the laboratory conducting the tests may, if it deems it advisable, add a test with a manikin of intermediate weight.
- 8.1.3.7.7. If the child restraint system is designed for two or more children, one test shall be carried out with the heaviest manikins occupying all seat positions. A second test with the lightest and the heaviest manikins specified above shall be carried out. The tests shall be conducted using the test seat as shown in Annex 6, Appendix 3, Figure 3. The laboratory conducting the tests may, if it deems it advisable, add a third test with any combination of manikins or empty seat positions.
- 8.1.3.7.8. If a child restraint system in group 0 or 0+ offers different configurations depending on the mass of the child, each configuration shall be tested with both manikins of the respective mass group.
- 8.1.3.7.9. If the ISOFIX child restraint system must use a top tether, one test shall be carried out with the smallest dummy with the shorter distance of the top tether (anchorage point (G1)). A second test shall be carried out with the heavier dummy with the longer distance of the top tether (anchorage point (G2)). Adjust the top tether to achieve a tension load of 50 ± 5 N.
- 8.1.3.7.10. The test specified in paragraph 7.1.4.1.10.1.2 need only be carried out with the largest manikin for which the child restraint is designed.
- 8.1.4. Restraint of booster cushions
- Place a cotton cloth on the seating surface of the test bench. Position the booster cushion on the test bench, position the lower torso body block as described in Annex 22, Figure 1, on the seating surface, fit and apply the 3-point adult safety-belt and tension as prescribed in Annex 21. With a piece of 25 mm width webbing or similar tied round the booster, apply a load of 250 ± 5 N in the direction of arrow A, see Annex 22, Figure 2, in line with the seating surface of the test bench.
- 8.2. Tests of individual components
- 8.2.1. Buckle
- 8.2.1.1. Opening test under load

- 8.2.1.1.1. A child restraint already having been subjected to the dynamic test specified in paragraph 8.1.3 shall be used for this test.
- 8.2.1.1.2. The child restraint shall be removed from the test trolley or the vehicle without opening the buckle. A tension of 200 ± 2 N shall be applied to the buckle. If the buckle is attached to a rigid part, the force shall be applied reproducing the angle formed between the buckle and that rigid part during the dynamic test.
- 8.2.1.1.3. A load shall be applied at a speed of 400 ± 20 mm/min to the geometric centre of the buckle-release button along a fixed axis running parallel to the initial direction of motion of the button; the geometric centre applies to that part of the surface of the buckle to which the release pressure is to be applied. The buckle shall be secured against a rigid support during the application of the opening force.
- 8.2.1.1.4. The buckle opening force shall be applied, using a dynamometer or similar device in the manner and direction of normal use. The contact end shall be a polished metal hemisphere with radius $2,5 \pm 0,1$ mm.
- 8.2.1.1.5. The buckle opening force shall be measured and any failure noted.
- 8.2.1.2. Opening test under zero load
 - 8.2.1.2.1. A buckle assembly which has not previously been subjected to a load shall be mounted and positioned under a 'no load' condition.
 - 8.2.1.2.2. The method of measuring the buckle opening force shall be as prescribed in paragraphs 8.2.1.1.3 and 8.2.1.1.4.
 - 8.2.1.2.3. The buckle opening force shall be measured.
- 8.2.1.3. Strength test.
 - 8.2.1.3.1. For the strength test two samples have to be used. All adjusters, except for adjusters mounted directly on a child restraint are included in the test.
 - 8.2.1.3.2. Annex 20 shows a typical device for a buckle strength test. The buckle is placed on the upper round plate (A) within the relief. All adjacent straps have a length of at least 250 mm and are arranged hanging down from the upper plate respective to their position at the buckle. The free strap ends are then wound round the lower round plate (B) until they come out at the plate's inner opening. All straps have to be vertical between A and B. The round clamping plate (C) is then lightly clamped against the lower face of (B), still allowing a certain strap movement between them. With a small force at the tensile machine the straps are tensioned and pulled between (B) and (C) until all straps are loaded respective to their arrangement. The buckle must stay free from plate (A) or any parts at (A) during this operation and the test itself. (B) and (C) are then clamped firmly together and the tensile force is increased at a traverse speed of 100 ± 20 mm/min until the required values are reached.
- 8.2.2. Adjusting device
 - 8.2.2.1. Ease of adjustment
 - 8.2.2.1.1. When testing a manual adjusting device, the strap shall be drawn steadily through the adjusting device, having regard for the normal conditions of use, at a rate of 100 ± 20 mm/min and the maximum force measured to the nearest integer value of N after the first 25 ± 5 mm of strap movement.

- 8.2.2.1.2. The test shall be carried out in both directions of strap travel through the device, the strap being subjected to the full travel cycle 10 times prior to the measurement.
- 8.2.3. Microslip test (see Annex 5, Figure 3)
- 8.2.3.1. The components or devices to be subjected to the microslip test shall be kept for a minimum of 24 hours before testing in an atmosphere having a temperature of 20 ± 5 °C and a relative humidity of 65 ± 5 per cent. The test shall be carried out at a temperature between 15 °C and 30 °C.
- 8.2.3.2. The free end of the strap shall be arranged in the same configuration as when the device is in use in the vehicle, and shall not be attached to any other part.
- 8.2.3.3. The adjusting device shall be placed on a vertical piece of strap one end of which bears a load of $50 \pm 0,5$ N (guided in a manner which prevents the load from swinging and the strap from twisting). The free end of the strap from the adjusting device shall be mounted vertically upwards or downwards as it is in the vehicle. The other end shall pass over a deflector roller with its horizontal axis parallel to the plane of the section of strap supporting the load, the section passing over the roller being horizontal.
- 8.2.3.4. The device being tested shall be arranged in such a way that its centre, in the highest position to which it can be raised, is 300 ± 5 mm from a support table, and the load of 50 N shall be 100 ± 5 mm from that support table.
- 8.2.3.5. 20 ± 2 pre-test cycles shall then be completed and $1\,000 \pm 5$ cycles shall then be completed at a frequency of 30 ± 10 cycles per minute, the total amplitude being 300 ± 20 mm or as specified in paragraph 8.2.5.2.6.2. The 50 N load shall be applied only during the time corresponding to a shift of 100 ± 20 mm for each half period. Microslip shall be measured from the position at the end of the 20 pre-test cycles.
- 8.2.4. Retractor
- 8.2.4.1. Retracting force
- 8.2.4.1.1. The retracting forces shall be measured with the safety belt assembly, fitted to a manikin as for the dynamic test prescribed in paragraph 8.1.3. The strap tension shall be measured at the point of contact with (but just clear of) the manikin while the strap is being retracted at the approximate rate of 0,6 m/min.
- 8.2.4.2. Durability of retractor mechanism
- 8.2.4.2.1. The strap shall be withdrawn and allowed to retract for the required number of cycles at a rate of not more than 30 cycles per minute. In the case of emergency-locking retractors, a jolt to lock the retractor shall be introduced at each fifth cycle. The jolts occur in equal numbers at each of five different extractions, namely, 90, 80, 75, 70 and 65 per cent of the total length of the strap on the retractor. However, where the length of the strap exceeds 900 mm the above percentages shall be related to the final 900 mm of strap which can be withdrawn from the retractor.
- 8.2.4.3. Locking of emergency-locking retractors
- 8.2.4.3.1. The retractor shall be tested once for locking, when the strap has been unwound to its full length less 300 ± 3 mm.
- 8.2.4.3.2. In the case of a retractor actuated by strap movement, the extraction shall be in the direction in which it normally occurs when the retractor is installed in a vehicle.

- 8.2.4.3.3. When retractors are being tested for sensitivity to vehicle accelerations, they shall be tested at the above extraction length in both directions along two mutually perpendicular axes which are horizontal if the retractors are to be installed in a vehicle as specified by the child restraint manufacturer. When this position is not specified, the testing authority shall consult the child restraint manufacturer. One of these test directions shall be chosen by the Technical Service conducting the approval tests to give the most adverse conditions with respect to actuation of the locking mechanism.
- 8.2.4.3.4. The design of the apparatus used shall be such that the required acceleration is given at an average rate of increase of acceleration of at least 25 g/s ⁽¹⁾.
- 8.2.4.3.5. For testing compliance with the requirements of paragraphs 7.2.3.2.1.3 and 7.2.3.2.1.4 the retractor shall be mounted on a horizontal table and the table tilted at a speed not exceeding 2° per second until locking has occurred. The test shall be repeated with tilting in other directions to ensure that the requirements are fulfilled.
- 8.2.4.4. Corrosion test
- 8.2.4.4.1. The corrosion test is described in paragraph 8.1.1 above.
- 8.2.4.5. Dust resistance test
- 8.2.4.5.1. The retractor shall be positioned in a test chamber as described in Annex 3 to this Regulation. It shall be mounted in an orientation similar to that in which it is mounted in the vehicle. The test chamber shall contain dust as specified in paragraph 8.2.4.5.2 below. A length of 500 mm of the strap shall be extracted from the retractor and kept extracted, except that it shall be subjected to 10 complete cycles of retraction and withdrawal within one or two minutes after each agitation of the dust. For a period of 5 hours, the dust shall be agitated every 20 minutes for five seconds by compressed air free of oil and moisture at a gauge pressure of $5,5 \pm 0,5$ bars entering through an orifice $1,5 \pm 0,1$ mm in diameter.
- 8.2.4.5.2. The dust used in the test described in paragraph 8.2.4.5.1 shall consist of about 1 kg of dry quartz. The particle size distribution shall be as follows:
- (a) passing 150 µm aperture, 104 µm wire diameter: 99 to 100 per cent;
 - (b) passing 105 µm aperture, 64 µm wire diameter: 76 to 86 per cent;
 - (c) passing 75 µm aperture, 52 µm wire diameter: 60 to 70 per cent.
- 8.2.5. Static test for straps
- 8.2.5.1. Strap strength test
- 8.2.5.1.1. Each test shall be carried out on two new samples of strap, conditioned as specified in paragraph 7.2.4.
- 8.2.5.1.2. Each strap shall be gripped between the clamps of a tensile strength-testing machine. The clamps shall be so designed as to avoid breakage of the strap at or near them. The speed of traverse shall be 100 ± 20 mm/min. The free length of the specimen between the clamps of the machine at the start of the test shall be $200 \text{ mm} \pm 40 \text{ mm}$.
- 8.2.5.1.3. The tension shall be increased until the strap breaks and the breaking load noted.
- 8.2.5.1.4. If the strap slips or breaks at or within 10 mm of either of the clamps, the test shall be invalid and a new test shall be carried out on another specimen.

⁽¹⁾ $g = 9,81 \text{ m/s}^2$.

- 8.2.5.2. Samples out from straps, as referred to in paragraph 3.2.3, shall be conditioned as follows:
- 8.2.5.2.1. Room conditioning
- 8.2.5.2.1.1. The strap shall be kept for 24 ± 1 hours in an atmosphere having a temperature of 23 ± 5 °C and a relative humidity of 50 ± 10 per cent. If the test is not carried out immediately after conditioning, the specimen shall be placed in a hermetically closed receptacle until the test begins. The breaking load shall be determined within five minutes after removal of the strap from the conditioning atmosphere or from the receptacle.
- 8.2.5.2.2. Light conditioning
- 8.2.5.2.2.1. The provisions of Recommendation ISO/105-B02 (1978), shall apply. The strap shall be exposed to light for the time necessary to produce fading of Standard Blue Dye No 7 to a contrast equal to Grade 4 on the grey scale.
- 8.2.5.2.2.2. After exposure, the strap shall be kept for a minimum of 24 hours in an atmosphere having a temperature of 23 ± 5 °C and a relative humidity of 50 ± 10 per cent. The breaking load shall be determined within five minutes after the removal of the strap from the conditioning installation.
- 8.2.5.2.3. Cold conditioning
- 8.2.5.2.3.1. The strap shall be kept for a minimum of 24 hours in an atmosphere having a temperature of 23 ± 5 °C and a relative humidity of 50 ± 10 per cent.
- 8.2.5.2.3.2. The strap shall then be kept for 90 ± 5 minutes on a plain surface in a low-temperature chamber in which the air temperature is -30 ± 5 °C. It shall then be folded and the fold shall be loaded with a weight of $2 \pm 0,2$ kg previously cooled to -30 ± 5 °C. When the strap has been kept under load for 30 ± 5 minutes in the same low-temperature chamber, the weight shall be removed and the breaking load shall be measured within five minutes after removal of the strap from the low-temperature chamber.
- 8.2.5.2.4. Heat conditioning
- 8.2.5.2.4.1. The strap shall be kept for 180 ± 10 minutes in a heating-cabinet atmosphere having a temperature of 60 ± 5 °C and a relative humidity 65 ± 5 per cent.
- 8.2.5.2.4.2. The breaking load shall be determined within five minutes after removal of the strap from the heating cabinet.
- 8.2.5.2.5. Exposure to water
- 8.2.5.2.5.1. The strap shall be kept fully immersed for 180 ± 10 minutes in distilled water, at a temperature of 20 ± 5 °C, to which a trace of wetting agent has been added. Any wetting agent suitable for the fibre being tested may be used.
- 8.2.5.2.5.2. The breaking load shall be determined within 10 minutes after removal of the strap from the water.
- 8.2.5.2.6. Abrasion conditioning
- 8.2.5.2.6.1. The components or devices to be submitted to the abrasion test shall be kept for a minimum of 24 hours before testing in an atmosphere having a temperature of 23 ± 5 °C and a relative humidity of 50 ± 10 per cent. The room temperature during the testing shall be between 15 °C and 30 °C.

8.2.5.2.6.2. The table below sets out the general conditions for each test:

	Load (N)	Cycles per minute	Cycles (No)
Type 1 procedure	10 ± 0,1	30 ± 10	1 000 ± 5
Type 2 procedure	5 ± 0,05	30 ± 10	5 000 ± 5

Where there is insufficient strap to test over 300 mm of shift, the test may be applied over a shorter length subject to a minimum of 100 mm.

8.2.5.2.6.3. Particular test conditions

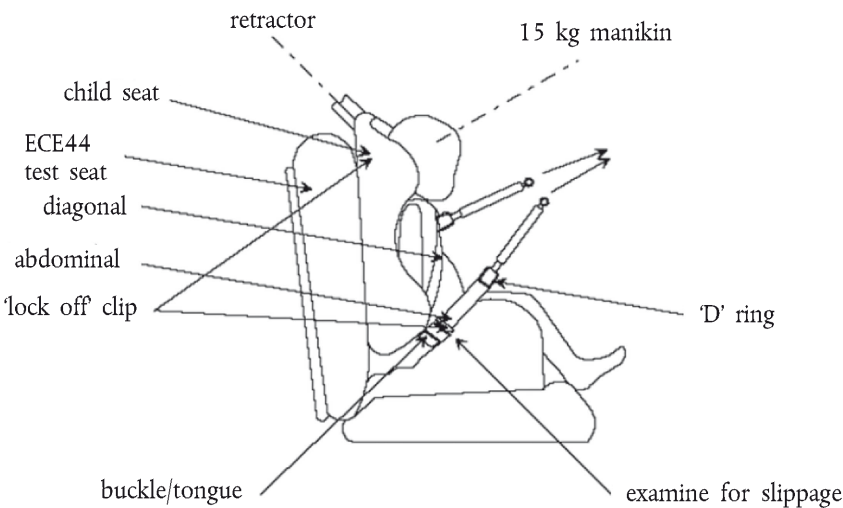
- 8.2.5.2.6.3.1. Type 1 procedure: for cases where the strap slides through the quick adjusting device. The 10 N load shall be vertically and permanently applied on one of the straps. The other strap, set horizontally, shall be attached to a device, giving the webbing a back and forth motion. The adjusting device shall be so placed that the horizontal strap of the webbing remains under tension (see Annex 5, Figure 1).
- 8.2.5.2.6.3.2. Type 2 procedure: for cases where the strap changes direction in passing through a rigid part. During this test, the angles of both webbing straps shall be as shown in Annex 5, Figure 2. The 5 N load shall be permanently applied. For cases where the strap changes direction more than once in passing through a rigid part, the load of 5 N may be increased so as to achieve the prescribed 300 mm of strap movement through that rigid part.

8.2.6. Lock-off Devices

8.2.6.1. Class A Devices

The child restraint and the largest manikin for which the child restraint is intended shall be set up as shown in Figure 5 below. The webbing used shall be as specified in Annex 13 to this Regulation. The lock-off shall be fully applied and a mark made on the belt where the belt enters the lock-off. The force gauges shall be attached to the belt via a D ring, and a force equal to twice (± 5 per cent) the mass of the heaviest dummy of group I shall be applied for at least one second. The lower position shall be used for lock-offs in position A and the upper position for lock-offs in position B. The force shall be applied for a further 9 times. A further mark shall be made on the belt where it enters the lock-off and the distance between the two marks shall be measured. During this test, the retractor must be unlocked.

Figure 5



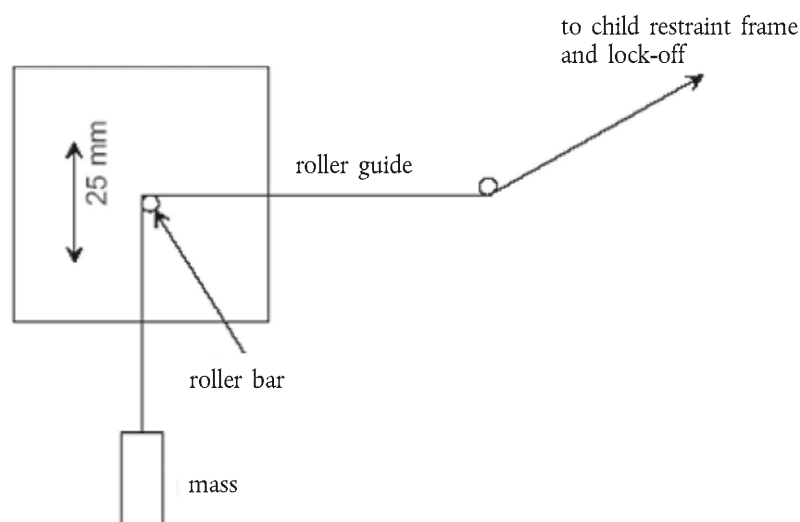
8.2.6.2. Class B Devices.

The child restraint shall be firmly secured and webbing, as specified in Annex 13 to this Regulation, shall be passed through the lock-off and frame following the routing described in the manufacturer's instructions. The belt shall pass through the testing equipment as described in Figure 6 below and be attached to a mass of $5,25 \pm 0,05$ kg. There shall be 650 ± 40 mm of free webbing between the mass and the point where the webbing leaves the frame. The lock-off shall be fully applied and a mark made on the belt where it enters the lock-off. The mass shall be raised and released so that it falls freely over a distance of 25 ± 1 mm. This shall be repeated 100 times ± 2 at a frequency of 60 ± 2 cycles per minute, to simulate the jerking action of a child restraint in a car. A further mark shall be made on the belt where it enters the lock-off and the distance between the two marks shall be measured.

The lock-off device must cover the full width of the webbing in the installed condition with 15 kg dummy installed. This test is to be conducted using the same webbing angles as those formed in normal use. The free end of the lap belt portion shall be fixed. The test shall be conducted with the child restraint system firmly attached to the test bench used in the overturning or dynamic test. The loading strap can be attached to the simulated buckle.

Figure 6

Schematic layout of Class B Lock-off test



Drop height of mass = 25 mm

Distance from roller bar to roller guide = 300 mm

Using strap of the webbing specified for the standard seat belt as defined in Annex 13.

8.2.7. Conditioning test for adjusters mounted directly on a child restraint

Install the largest dummy for which the restraint is intended, as if for the dynamic test, including the standard slack as specified in paragraph 8.1.3.6. Mark a reference line on the webbing where the free end of the webbing enters the adjuster.

Remove the dummy and place the restraint in the conditioning rig shown in Figure 1, Annex 19.

The webbing must be cycled for a total distance of not less than 150 mm through the adjuster. This movement shall be such that at least 100 mm of webbing on the side of the reference line towards the free end of the webbing and the remainder of the moving distance (approx. 50 mm) on the integral harness side of the reference line moves through the adjuster.

If the length of webbing from the reference line to the free end of the webbing is insufficient for the movement described above, the 150 mm of movement through the adjuster shall be from the fully extended harness position.

The frequency of cycling shall be 10 ± 1 cycles/minute, with a velocity on 'B' of 150 ± 10 mm/sec.

8.2.8. Temperature test

8.2.8.1. The components specified in paragraph 7.1.5.1 shall be exposed to an environment over a water surface within a closed space, the environment having a temperature of not less than 80 °C, for a continuous period of not less than 24 hours and then cooled in an environment having a temperature not exceeding 23 °C. The cooling period shall immediately be followed by three consecutive 24 hour cycles with each cycle comprising the following consecutive sequences:

- (a) an environment having a temperature of not less than 100 °C shall be maintained for a continuous period of 6 hours and this environment shall be attained within 80 minutes of commencement of the cycle; then
- (b) an environment having a temperature of not more than 0 °C shall be maintained for a continuous period of 6 hours and this environment shall be attained within 90 minutes; then
- (c) an environment having a temperature of not more than 23 °C shall be maintained during the remainder of the 24 hour cycle.

8.3. Certification of Test Bench Cushion

8.3.1. The test seat cushion shall be certified when new to establish initial values for impact penetration and peak deceleration, and then after every 50 dynamic tests or at least every month, whichever is the sooner, or before each test if the test rig is used frequently.

8.3.2. The certification and measuring procedures shall correspond to those specified in the latest version of ISO 6487; the measuring equipment shall correspond to the specification of a data channel with a channel filter class (CFC) 60.

Using the test device defined in Annex 17 to this Regulation, conduct 3 tests, 150 ± 5 mm from the front edge of the cushion on the centre line and at 150 ± 5 mm in each direction from the centre line.

Place the device vertically on a flat rigid surface. Lower the impact mass until it contacts the surface and set the penetration marker to the zero position. Place the device vertically above the test point, raise the mass 500 ± 5 mm and allow it to fall freely to make impact on the seat surface. Record the penetration and the deceleration curve.

8.3.3. The peak values recorded shall not deviate by more than 15 per cent from the initial values.

8.4. Registration of dynamic behaviour

8.4.1. In order to determine the behaviour of the manikin and its displacements, all dynamic tests shall be registered according to the following conditions:

8.4.1.1. Filming and recording conditions:

- (a) the frequency shall be at least 500 frames per second;
- (b) the test shall be recorded on cine film, video or digital data carrier;

8.4.1.2. Estimation of uncertainty:

Testing laboratories shall have and shall apply procedures for estimating uncertainty of measurement of the displacement of the manikin's head. The uncertainty shall be within + 25 mm.

Examples of international standards of such procedure are EA-4/02 of the European Accreditation Organisation or ISO 5725:1994 or the General Uncertainty Measurement (GUM) method.

8.5. The measuring procedures shall correspond to those defined in ISO 6487:2002. The channel frequency class shall be:

Type of measurement	CFC(F_H)	Cut-off frequency (F_N)
Trolley acceleration	60	see ISO 6487:2002 Annex A
Belt loads	60	see ISO 6487:2002 Annex A
Chest acceleration	180	see ISO 6487:2002 Annex A
Head acceleration	1 000	1 650

The sampling rate should be a minimum of 10 times the channel frequency class (i.e. in installations with channel frequency class of 1 000, this corresponds to a minimum sampling rate of 10 000 samples per second per channel).

9. TEST REPORTS OF TYPE APPROVAL AND OF PRODUCTION QUALIFICATION

9.1. The test report shall record the results of all tests and measurements including the following test data:

- (a) the type of device used for the test (acceleration or deceleration device);
- (b) the total velocity change;
- (c) the trolley speed immediately before impact only for deceleration sleds;
- (d) the acceleration or deceleration curve during all the velocity change of the trolley and at least 300 ms;
- (e) the time (in ms) when the head of the manikin reaches its maximum displacement during the performance of the dynamic test;
- (f) the place occupied by the buckle during the tests, if it can be varied; and
- (g) and any failure or breakage.

9.2. If provisions relating to anchorages contained in Annex 6, Appendix 3, to this Regulation have not been respected, the test report shall describe how the child restraint is installed and shall specify important angles and dimensions.

- 9.3. When the child restraint is tested in a vehicle or vehicle structure, the test report shall specify the manner of attaching the vehicle structure to the trolley, the position of the child restraint and vehicle seat and the inclination of the vehicle seat-back.
- 9.4. The test reports of type approval and of production qualification shall record the verification of markings and of instructions on installation and use.
10. MODIFICATIONS AND EXTENSION OF APPROVAL OF A TYPE OF CHILD RESTRAINT SYSTEM
- 10.1. Every modification of a child restraint shall be notified to the administrative department which approved the child restraint. The department may then either:
- 10.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the child restraint still complies with the requirements; or
- 10.1.2. require a further test report from the Technical Service responsible for conducting the tests.
- 10.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.3 above to the Parties to the Agreement applying this Regulation.
- 10.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
11. PRODUCTION QUALIFICATION
- 11.1. In order to make sure that the manufacturer's production system is satisfactory, the Technical Service, which conducted the type approval tests, must carry out tests to qualify production in accordance with paragraph 11.2.
- 11.2. Qualifying the production of child restraint systems
- The production of each new approved type of child restraint system of categories 'universal', 'semi-universal', and 'restricted' must be subjected to production qualification tests.
- For this purpose, a random sample of 5 child restraint systems will be taken from the first production batch.
- The first production batch is considered to be the production of the first block containing a minimum of 50 child restraint systems and a maximum of 5 000 child restraint systems.
- 11.2.1. Dynamic tests
- 11.2.1.1. Five child restraint systems must be subjected to the dynamic test described in paragraph 8.1.3. The Technical Service that conducted the type approval tests shall choose the conditions that produced the maximum horizontal head excursion during the type approval dynamic tests, excluding the conditions described in paragraph 7.1.4.1.10.1.2 above. All the five child restraint systems shall be tested under the same conditions.
- 11.2.1.2. For each test described in 11.2.1.1 the horizontal head excursion and chest accelerations shall be measured.

- 11.2.1.3. (a) The maximum horizontal head excursion results shall comply with the following two conditions:

No value shall exceed 1,05 L, and

$X + S$ shall not exceed L,

Where: L = the limit value prescribed

X = the mean of the values

S = the standard deviation of the values

- (b) The chest acceleration results shall comply with the requirements of paragraph 7.1.4.2.1 and, in addition, the $X + S$ condition in 11.2.1.3(a) shall be applied to the 3 ms clipped resultant chest acceleration results (as defined in paragraph 7.1.4.2.1) and recorded for information only.

11.2.2. Control of Markings

- 11.2.2.1. The Technical Service that conducted the approval tests shall verify that the markings conform to the requirements of paragraph 4.

11.2.3. Control of Instructions on Installation and the Instructions for Use.

- 11.2.3.1. The Technical Service that conducted the approval tests shall verify that the instructions on installation and the instructions for use conform to paragraph 15.

12. CONFORMITY OF PRODUCTION AND ROUTINE TESTS

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

- 12.1. Any child restraint system approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 6 to 8 above.

- 12.2. The minimum requirements for conformity of production control procedures set forth in Annex 16 to this Regulation shall be complied with.

- 12.3. The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be twice a year.

13. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 13.1. The approval granted in respect of a child restraint pursuant to this Regulation may be withdrawn if a child restraint bearing the particulars referred to in paragraph 5.4 fails to pass the random checks described in paragraph 11 or does not conform to the type approved.

- 13.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

14. PRODUCTION DEFINITELY DISCONTINUED

- 14.1. If the holder of the approval completely ceases to manufacture a specific type of child restraint under this Regulation, he shall inform thereof the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform the other Parties to the Agreement which apply this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

15. INSTRUCTIONS
- 15.1. Each child restraint shall be accompanied by instructions in the language of the country where the device is sold with the following content:
- 15.2. Instructions on installation shall include the following points:
- 15.2.1. For 'universal' category child restraints the following label shall be clearly visible at the point of sale without removing the packing:

NOTICE

This is a 'Universal' child restraint. It is approved to Regulation No 44, 04 series of amendments, for general use in vehicles and it will fit most, but not all, car seats.

A correct fit is likely if the vehicle manufacturer has declared in the vehicle handbook that the vehicle is capable of accepting a 'Universal' child restraint for this age group.

This child restraint has been classified as 'Universal' under more stringent conditions than those which applied to earlier designs which do not carry this notice.

If in doubt, consult either the child restraint manufacturer or the retailer.

- 15.2.2. For 'restricted' and 'semi-universal' category child restraints the following information shall be clearly visible at the point of sale without removing the packing:

This Child Restraint is classified for '(Restricted/Semi-universal)' use and is suitable for fixing into the seat positions of the following cars:

CAR	FRONT	REAR	
	Outer	Centre	
(Model)	Yes	Yes	No

Seat positions in other cars may also be suitable to accept this child restraint. If in doubt, consult either the child restraint manufacturer or the retailer.

- 15.2.3. For 'Specific vehicle' category child restraints information on the applicable vehicle shall be clearly visible at the point of sale without removing the packing.
- 15.2.4. If the device requires an adult safety-belt, the following wording should also be clearly visible at the point of sale without removing the packing:

'Only suitable if the approved vehicles are fitted with lap/3 point/static/with retractor safety-belts, approved to UN/ECE Regulation No 16 or other equivalent standards.' (Strike out what does not apply)

In the case of carry-cot restraints a list of carry cots for which the device is suited should be included.

- 15.2.5. The child restraint manufacturer shall provide information on the packing box as to the address to which the customer can write to obtain further information on fitting the child restraint in specific cars;

- 15.2.6. the method of installation illustrated by photographs and/or very clear drawings;
- 15.2.7. the user shall be advised that the rigid items and plastic parts of a child restraint must be so located and installed that they are not liable, during everyday use of the vehicle, to become trapped by a movable seat or in a door of the vehicle;
- 15.2.8. the user should be advised to use carry cots perpendicular to the longitudinal axis of the vehicle;
- 15.2.9. in the case of rearward facing systems the customer shall be advised not to use them in seating positions where there is an airbag installed. This information shall be clearly visible at the point of sale without removing the packaging;
- 15.2.10. for 'Special Needs Restraints' the following information shall be clearly visible at the point of sale without removing the packing:

This 'Special Needs Restraint' is designed to give extra support to children who have difficulty in sitting correctly in conventional seats. Always consult your doctor to make sure that this restraint system is suitable for your child.

- 15.2.11. For an ISOFIX child restraint system, the following label shall be clearly visible at the point of sale without removing the packing:

NOTICE

1. This is an ISOFIX CHILD RESTRAINT SYSTEM. It is approved to Regulation No 44, 04 series of amendments for general use in vehicles fitted with ISOFIX anchorages systems.
2. It will fit vehicles with positions approved as ISOFIX positions (as detailed in the vehicle handbook), depending on the category of the child seat and of the fixture.
3. The mass group and the ISOFIX size class for which this device is intended is:

- 15.3. The instructions for use shall include the following points:
- 15.3.1. the mass group and the fixture for which the device is intended:
- 15.3.2. when the device is used in combination with an adult safety-belt to be used by means of the following wording: Only suitable for use in the listed vehicles fitted with lap/3 point/static/with retractor safety-belts, approved to ECE Regulation No 16 or other equivalent standards; (Strike out what does not apply)
- 15.3.3. the method of use shall be shown by photographs and/or very clear drawings. In the case of seats that can be used both forward and rear-facing, clear warning must be given to keep the restraint rear-facing until the child's mass is greater than a stated limit, or some other dimensional criterion is exceeded;
- 15.3.4. the operation of the buckle and adjusting devices shall be explained clearly;
- 15.3.5. it shall be recommended that any straps holding the restraint to the vehicle should be tight, that any straps restraining the child should be adjusted to the child's body, and that straps should not be twisted;

- 15.3.6. the importance of ensuring that any lap strap is worn low down, so that the pelvis is firmly engaged, shall be stressed;
- 15.3.7. it shall be recommended that the device should be changed when it has been subject to violent stresses in an accident;
- 15.3.8. instructions for cleaning shall be given;
- 15.3.9. a general warning shall be given to the user concerning the danger of making any alterations or additions to the device without the approval of the competent authority, and a danger of not following closely the installation instructions provided by the child restraint manufacturer;
- 15.3.10. when the chair is not provided with a textile cover, it shall be recommended that the chair should be kept away from sunlight, otherwise it may be too hot for the child's skin;
- 15.3.11. it shall be recommended that children are not left in their child restraint system unattended;
- 15.3.12. it shall be recommended that any luggage or other objects liable to cause injuries in the event of a collision shall be properly secured.
- 15.3.13. It shall be recommended that:
- (a) the child restraint must not be used without the cover;
 - (b) the seat cover should not be replaced with any other than the one recommended by the manufacturer, because the cover constitutes an integral part of the restraint performance.
- 15.3.14. There shall be a text or a diagram indicating how a user can identify an unsatisfactory position of the adult safety-belt buckle relative to the main load bearing contact points on the restraint. The user shall be advised to contact the child restraint manufacturer if in doubt about this point.
- 15.3.15. If the child restraint offers an alternative load bearing contact point, its use shall be described clearly. The user shall be informed about how to judge if use of this alternative route is satisfactory. The user shall be advised to contact the child restraint manufacturer if in doubt about this point. The user shall be clearly advised to begin the child restraint installation, in vehicle seating positions categorised as 'Universal' in the vehicle owner's manual, by using the primary belt route.
- 15.3.16. There shall be provisions made so that the instructions can be retained on the child restraint for its life period or in the vehicle handbook in the case of built-in restraints.
- 15.3.17. There shall be explicit warning not to use any load bearing contact points other than those described in the instructions and marked in the child restraint.
- 15.3.18. For an ISOFIX child restraint system, the instruction for use must be given to read the car manufacturer's handbook.
16. NAMES AND ADDRESS OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- 16.1. The Parties to the Agreement which apply this Regulation shall communicate to the United Nations secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

17. TRANSITIONAL PROVISIONS

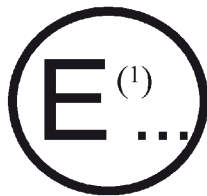
- 17.1. As from the official date of entry into force of the 03 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 03 series of amendments.
- 17.2. As from 12 months after the date of entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only if the child restraint system type to be approved meets the requirements of this Regulation as amended by the 03 series of amendments.
- 17.3. During the 12-month period which follows the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation can continue to grant type approvals to those child restraint systems which comply with the requirements of this Regulation as amended by the 02 series of amendments.
- 17.4. In the same period of 12 months, Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to the preceding series of amendments to this Regulation.
- 17.5. As from the date of entry into force of the 03 series of amendments, the provisions of Annex 16 to this Regulation shall apply also to child restraint devices already type approved to the 02 series of amendments.
- 17.6. Starting from the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation may refuse the sale of a type of child restraint which does not meet the requirements of paragraphs 6.2.2 and 6.2.14 of the 03 series of amendments.
- 17.7. Starting 36 months after the entry into force of the 03 series of amendments, Contracting Parties applying this Regulation may refuse the sale of child restraint systems which do not meet the requirements of the 03 series of amendments to this Regulation.
- 17.8. As from the date of entry into force of supplement 2 to the 03 series of amendments, the label required by paragraph 4.5 of this Regulation shall be affixed to all new child restraints manufactured in conformity with this Regulation.
- 17.9. As from the official date of entry into force of the 04 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 04 series of amendments.
- 17.10. As from 12-months after the date of entry into force of the 04 series of amendments, Contracting Parties applying this Regulation shall grant ECE approvals only if the child restraint system type to be approved meets the requirements of this Regulation as amended by the 04 series of amendments.
- 17.11. During the 12-month period which follows the date of entry into force of the 04 series of amendments, Contracting Parties applying this Regulation can continue to grant type approvals to those child restraint systems which comply with the requirements of this Regulation as amended by the 03 series of amendments.
- 17.12. During the 36-month period which follows the date of entry into force of the 04 series of amendments, Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to the preceding series of amendments to this Regulation.
- 17.13. Starting 48 months after the entry into force of the 04 series of amendments, Contracting Parties applying this Regulation may refuse the sale of child restraint systems which do not meet the requirements of the 04 series of amendments to this Regulation.

- 17.14. As from 6 months from the date of entry into force of Supplement 04 to the 04 series of Amendments approvals granted in accordance with the 03 or 04 series of amendments for child restraint systems belonging to groups 0, 0+ and I which do not comply with paragraph 6.1.11 or 6.1.12 shall cease to be valid.
- 17.15. From the date of entry into force of Supplement 4 to the 04 series of Amendments of this Regulation, by way of derogation to the obligations of Contracting Parties during the transitional period set out in paragraph 17.14 and based on the declaration made by the European Community at the time of its accession to the 1958 Agreement (Depositary Notification C.N.60.1998.TREATIES-28), Member States of the European Community may prohibit the placing on the market of child restraint systems which do not meet the requirements of Supplement 4 to the 04 series of Amendments of this Regulation.
-

ANNEX I

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

concerning: ⁽²⁾ APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of restraining devices for child occupants of power-driven vehicles, pursuant to Regulation No 44.

Approval No:

Extension No:

1.1. Forward-facing child restraint/rearward-facing child restraint/carry cot;

1.2. Integral/non-integral/partial/booster cushion;

1.3. Belt type: (adult) three-point belt
 (adult) lap belt/
 special type belt/retractor;

1.4. Other features: chair assembly/impact shield

2. Trade name or mark

3. Manufacturer's designation of the child restraint

4. Manufacturer's name

5. If applicable, name of his representative

6. Address

7. Submitted for approval on

8. Technical Service conducting approval tests

9. Type of device: deceleration/acceleration ⁽²⁾

10. Date of test report issued by that service

11. Number of test report issued by that service

12. Approval granted/extended/refused/withdrawn ⁽²⁾ for use in groups 0, 0+, I, II or III and for universal/semi-universal/restricted use or use in a specific vehicle or for use as a 'special needs restraint', position in vehicle

13. Position and nature of the marking

14. Place

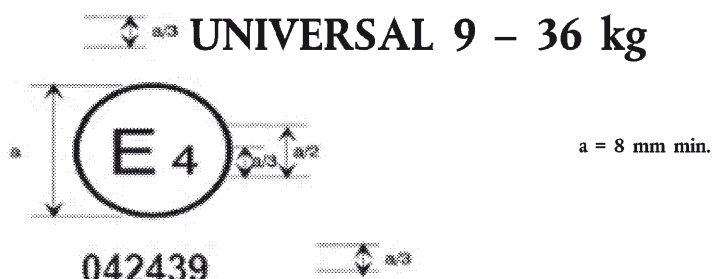
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

15. Date
16. Signature
17. The following documents, bearing the approval number shown above, are attached to this communication:
- (a) drawings, diagrams and plans of the child restraint, including any retractor, chair assembly, impact shield fitted;
 - (b) drawings, diagrams and plans of the vehicle structure and the seat structure, as well as of the adjustment system and the attachments, including any energy absorber fitted;
 - (c) photographs of the child restraint and/or vehicle structure and seat structure;
 - (d) instructions for fitting and use;
 - (e) list of vehicle models for which the restraint is intended.
- _____

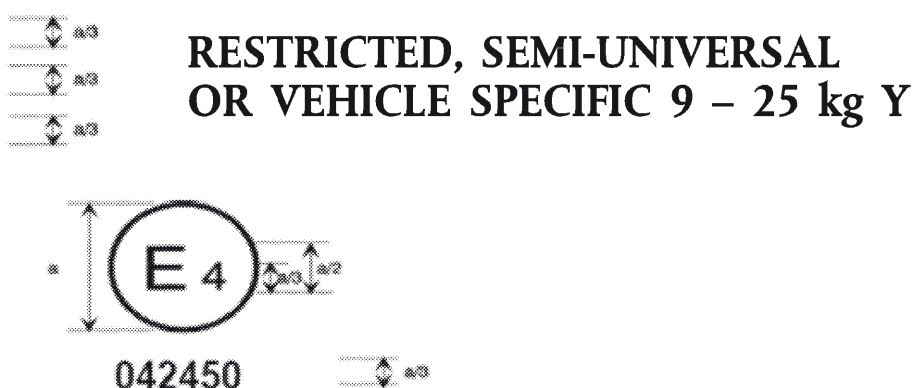
ANNEX 2

ARRANGEMENTS OF THE APPROVAL MARK



a = 8 mm min.

The child restraint system bearing the above approval mark is a device capable of being fitted in any vehicle and of being used for the 9 kg-36 kg mass range (groups I to III); it is approved in the Netherlands (E4) under the number 042439. The approval number indicates that the approval was granted in accordance with the requirements of the Regulation concerning the approval of restraining devices for child occupants of power-driven vehicles ('child restraint system') as amended by the 04 series of amendments.



a = 8 mm min.

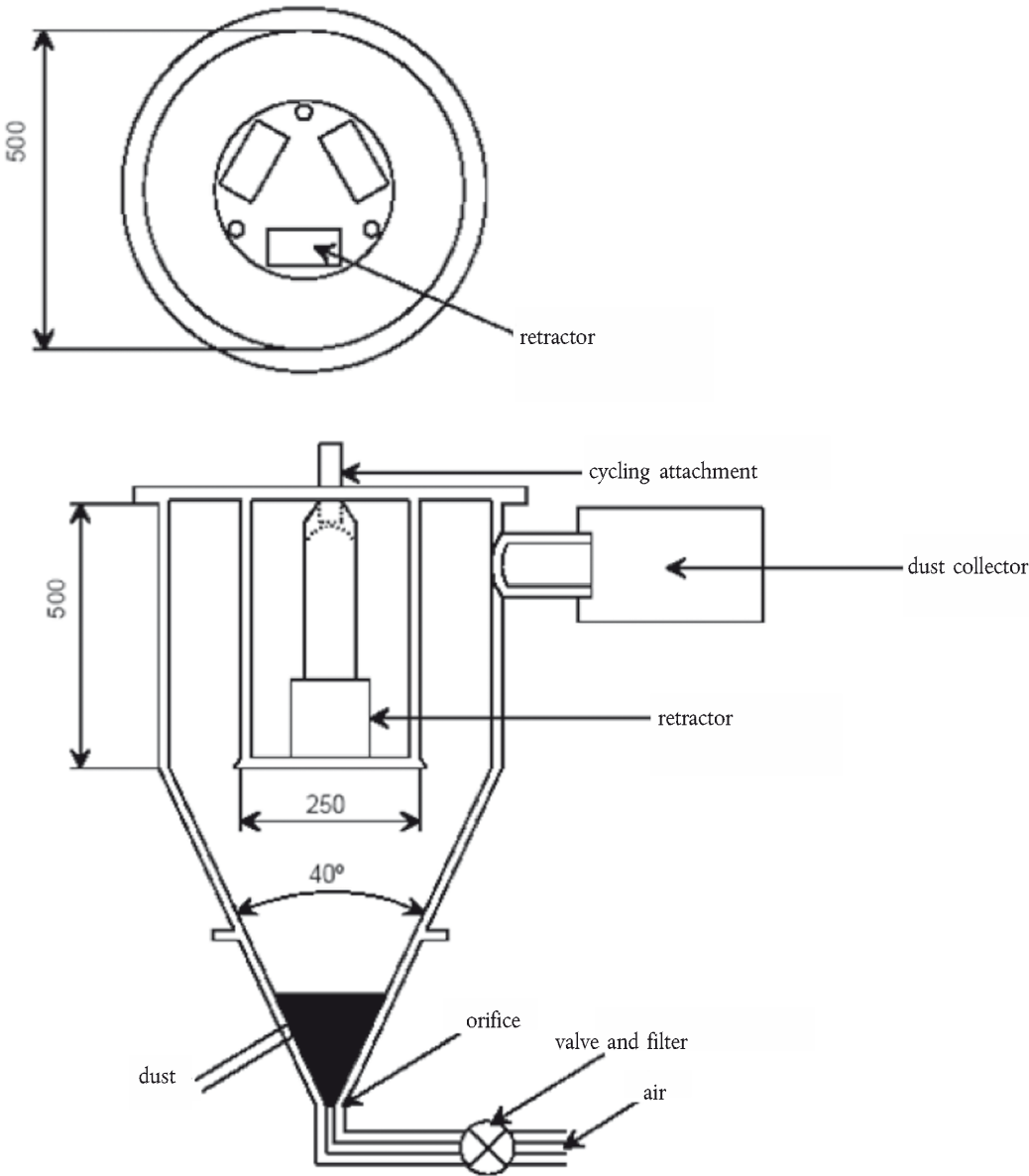
The child restraint system bearing the above approval mark is a device not capable of being fitted in every vehicle and of being used for the 9 kg-25 kg mass range (groups I and II); it is approved in the Netherlands (E4) under the number 042450. The approval number indicates that the approval was granted in accordance with the requirements of the Regulation concerning the approval of restraining devices for child occupants of power-driven vehicles ('child restraint system') as amended by the 04 series of amendments. The symbol 'Y' indicates that the system contains a crotch strap.

Note: The approval number and additional symbol(s) must be placed close to the circle and either above or below the 'E' or to left or right of it. The digits of the approval number must be on the same side of the 'E' and oriented in the same direction. The additional symbol(s) must be diametrically opposite the approval number. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

ANNEX 3

ARRANGEMENT OF APPARATUS FOR DUST RESISTANCE TEST

(dimensions in millimetres)



ANNEX 4

CORROSION TEST

1. Test apparatus

- 1.1. The apparatus shall consist of a mist chamber, a salt solution reservoir, a supply of suitably conditioned compressed air, one or more atomising nozzles, sample supports, provision for heating the chamber, and necessary means of control. The size and detailed construction of the apparatus shall be optional, provided that the test conditions are met.
- 1.2. It is important to ensure that drops of solution accumulated on the ceiling or cover of the chamber do not fall on test samples.
- 1.3. Drops of solution which fall from test samples shall not be returned to the reservoir for respraying.
- 1.4. The apparatus shall not be constructed of materials that will affect the corrosiveness of the mist.

2. Location of test samples in the mist cabinet

- 2.1. Samples, except retractors, shall be supported or suspended between 15° and 30° from the vertical and preferably parallel to the principal direction of horizontal flow of mist through the chamber, based upon the dominant surface being tested.
- 2.2. Retractors shall be supported or suspended so that the axes of the reel for storing the strap shall be perpendicular to the principal direction of horizontal flow of mist through the chamber. The strap opening in the retractor shall also be facing in this principal direction.
- 2.3. Each sample shall be so placed as to permit free settling of mist on all samples.
- 2.4. Each sample shall be so placed as to prevent salt solution from one sample dripping on to any other sample.

3. Salt solution

- 3.1. The salt solution shall be prepared by dissolving 5 ± 1 parts by mass of sodium chloride in 95 parts of distilled water. The salt shall be sodium chloride substantially free of nickel and copper and containing not more than 0,1 per cent of sodium iodide and not more than 0,3 per cent of total impurities in the dry state.
- 3.2. The solution shall be such that, when atomised at 35 °C, the collected solution is in the pH range of 6,5 to 7,2.

4. Compressed air

- 4.1. The compressed air supply to the nozzle or nozzles for atomising the salt solution shall be free of oil and dirt, and maintained at a pressure between 70 kN/m² and 170 kN/m².

5. Conditions in the mist chamber

- 5.1. The exposure zone of the mist chamber shall be maintained at 35 ± 5 °C. At least two clean mist collectors shall be placed within the exposure zone, so that no drops of solution from the test samples or any other sources are collected. The collectors shall be placed near the test samples, one as near as possible to any nozzle and one as far as possible from all nozzles. The mist shall be such that, for each 80 cm² of horizontal collecting area, from 1,0 to 2,0 ml of solution per hour, when measured over an average of at least 16 hours, is collected in each collector.
 - 5.2. The nozzle or nozzles shall be directed or baffled, so that the spray does not impinge directly on the test samples.
-

ANNEX 5

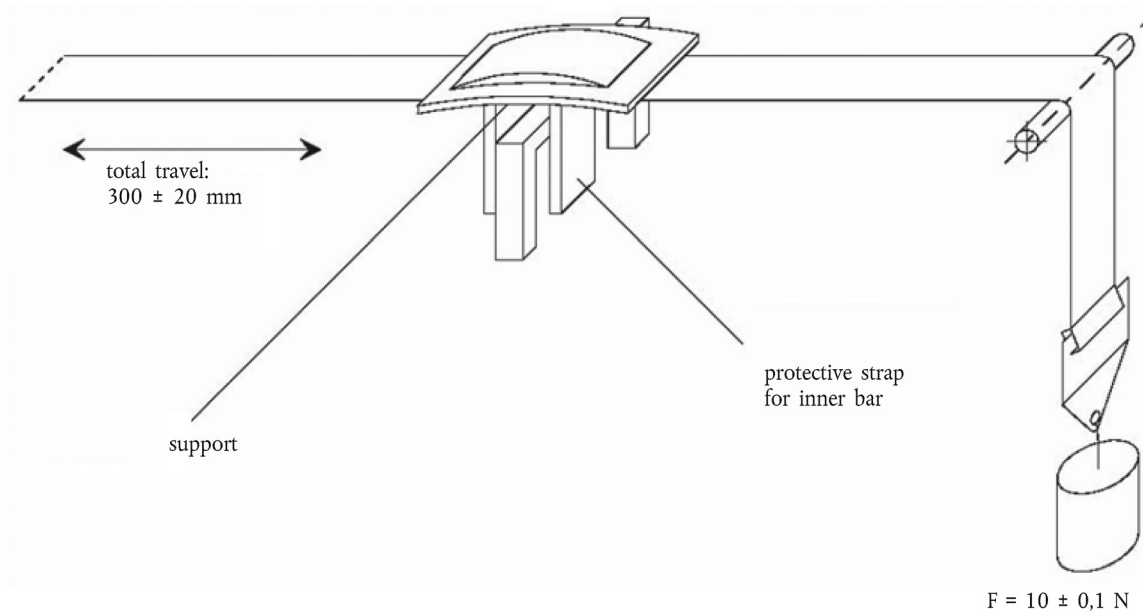
ABRASION AND MICROSLIP TEST

Figure 1

Procedure type 1

Examples of test arrangements corresponding to the type of adjusting device

Example a



Example b

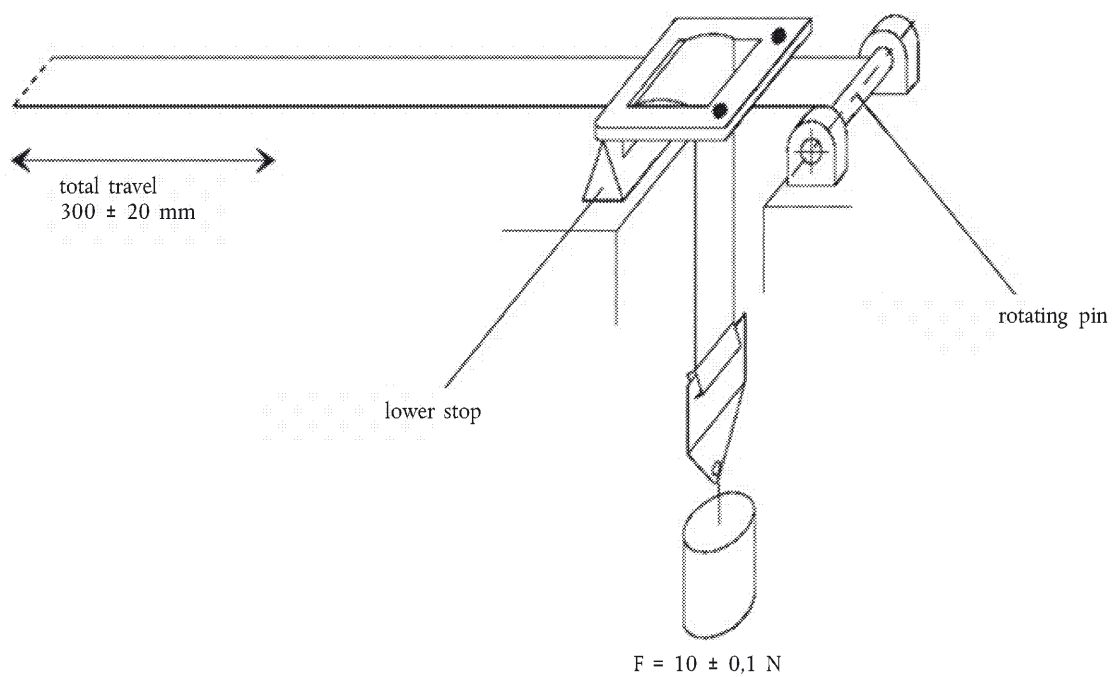


Figure 2

Procedure type 2

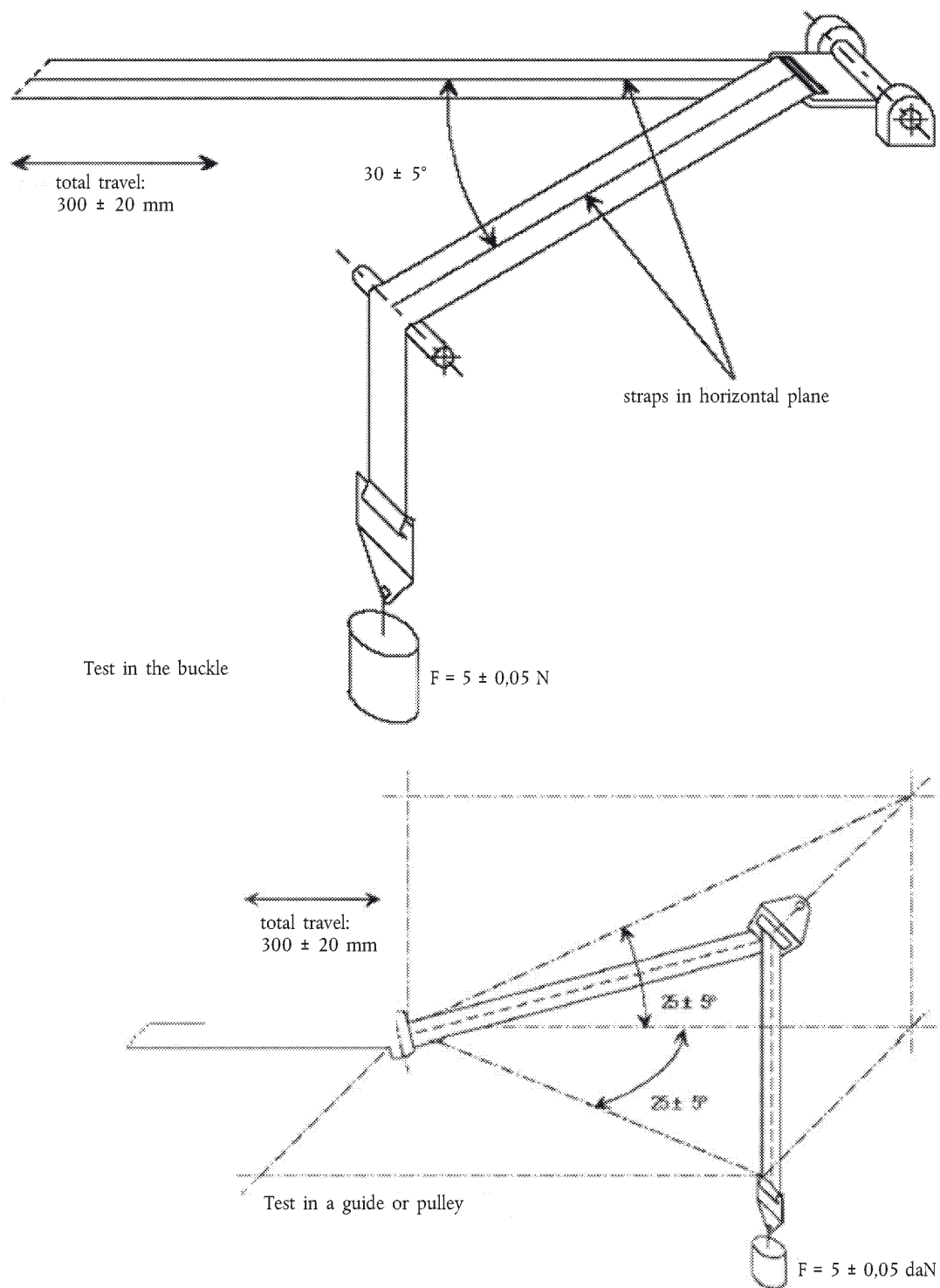
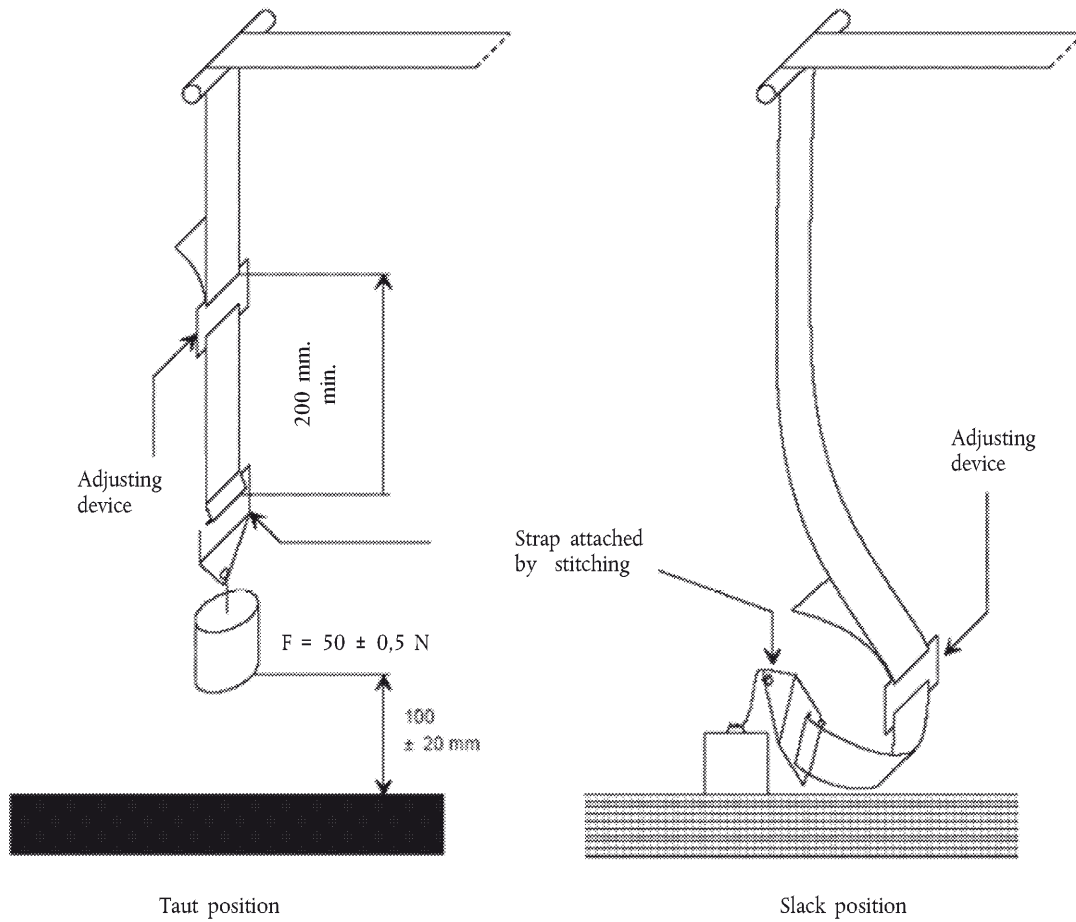


Figure 3

Microslip testTotal travel: 300 ± 20 mm

The load of 50 N on the testing device shall be vertically guided in such a way as to prevent load-swing and twisting of the strap.

The attaching device shall be fixed to the load of 50 N in the same manner as in the vehicle.

ANNEX 6

DESCRIPTION OF TROLLEY

1. Trolley
 - 1.1. For tests on child restraints, the trolley, carrying the seat only, shall have a mass greater than 380 kg. For tests on child restraint systems in the vehicle specific category, the trolley with the attached vehicle structure shall have a mass greater than 800 kg.
2. Calibration screen
 - 2.1. A calibration screen shall be attached firmly to the trolley with a movement limit line plainly marked on it to enable compliance with forward movement criteria to be determined from photographic records.
3. Seat
 - 3.1. The seat shall be constructed as follows:
 - 3.1.1. a rigid back, fixed, dimensions of which are given in Appendix 1 to this Annex. The lower part and the upper part is made of a 20 mm diameter tube;
 - 3.1.2. rigid seating, dimensions of which are given in Appendix 1 to this Annex. The rear part of the seating is made from a rigid sheet metal, the upper edge of which is a 20 mm diameter tube. The front part of the seating is also made of a 20 mm diameter tube;
 - 3.1.3. for access to the anchor brackets, openings shall be made at the rear of the cushion of the seat, as prescribed in Appendix 1 to this Annex;
 - 3.1.4. the width of the seat shall be 800 mm;
 - 3.1.5. the back and the seating shall be covered with polyurethane foam, the characteristics of which are given in Table 1. The dimensions of the cushion are given in Appendix 1 to this Annex;

Table 1

Density according to ISO 485 (kg/m ³)	43
Bearing strength according to ISO 2439B (N)	
p — 25 per cent	125
p — 40 per cent	155
Bearing strength factor according to ISO 3386 (kPa)	4
Elongation at rupture according to ISO 1798 (per cent)	180
Breaking strength according to ISO 1798 (kPa)	100
Compression set according to ISO 1856 (per cent)	3

- 3.1.6. the polyurethane foam shall be covered with a sun shade cloth, made of poly-acrylate fibre, the characteristics of which are given in Table 2.

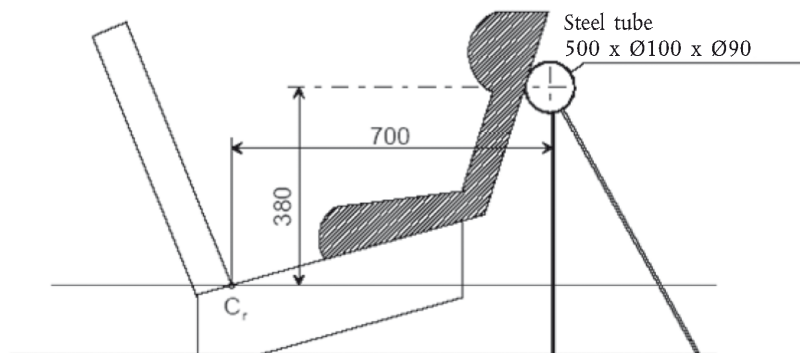
Table 2

Specific mass (g/m ²)	290
Breaking strength according to DIN 53587 on test specimen 50 mm wide:	
lengthwise (kg):	120
breadthwise (kg):	80

- 3.1.7. Covering the seat and the seat back ⁽¹⁾
- 3.1.7.1. The seat foam cushion is produced out of a square foam block (800 × 575 × 135 mm) in such a way (see Figure 1 of Appendix 1 to this Annex) that its shape resembles the shape of the aluminium bottom-plate specified in Figure 2 of Appendix 1 to this Annex.
- 3.1.7.2. Six holes are drilled in the bottom-plate in order to fasten it to the trolley with bolts. The holes are drilled alongside the longest side of the plate, three on each side, their position being dependent on the construction of the trolley. Six bolts are put through the holes. It is recommended to glue the bolts on the plate with an appropriate adhesive. Afterwards, the bolts are fastened with nuts.
- 3.1.7.3. The cover material (1 250 × 1 200 mm, see Figure 3 of Appendix 1 to this Annex) is cut across the width in such a way that it is not possible for the material to overlap after covering. There should be a gap of about 100 mm between the edges of the cover material. Therefore the material has to be cut at about 1 200 mm.
- 3.1.7.4. The cover material is marked with two lines which run across the width. They are drawn 375 mm from the centreline of the cover material. (See Figure 3 of Appendix 1 to this Annex)
- 3.1.7.5. The seat foam cushion is placed upside down on the cover material with the aluminium bottom-plate on top.
- 3.1.7.6. On both sides the cover material is stretched until the lines drawn on it match the edges of the aluminium bottom-plate. At each bolt position, small incisions are made and the cover material is pulled over the bolts.
- 3.1.7.7. At the position of the grooves in the bottom-plate and in the foam, the cover material should be incised.
- 3.1.7.8. The cover is glued to the aluminium plate with a flexible glue. The nuts have to be removed before gluing.
- 3.1.7.9. The flaps on the side are folded onto the plate and are glued as well.
- 3.1.7.10. The flaps in the grooves are folded inside and taped with a strong tape.
- 3.1.7.11. The flexible glue has to dry for at least 12 hours.
- 3.1.7.12. The seat back cushion is covered in exactly the same way as the seat, only the lines on the cover material (1 250 × 850 mm) are drawn 320 mm apart from the centreline of the material.
- 3.1.8. Line Cr is coincident with the intersection line between the top plane of the seat and the front lane of the seat back.
- 3.2. Test of rearward-facing devices
- 3.2.1. A special frame shall be fitted on the trolley in order to support the child restraint as shown in Figure 1.
- 3.2.2. A steel tube shall be attached firmly to the trolley in such a way that a load of 5 000 ± 50 N applied horizontally to the centre of the tube does not cause a movement greater than 2 mm.
- 3.2.3. The dimensions of the tube shall be: 500 × 100 × 90 mm.

⁽¹⁾ Details of materials used in this process can be obtained from TNO (Research Institute for Road Vehicles), Schoemakerstraat 97, 2628 VK Delft, The Netherlands.

Figure 1

Arrangement for testing a rearward-facing device

Dimension in mm

3.3. Trolley floor pan

3.3.1. The floor pan of the trolley shall be constructed of a flat sheet of metal of uniform thickness and material, see Figure 2 of Appendix 3 to this Annex.

3.3.1.1. The floor pan shall be rigidly mounted on the trolley. The height of the floor pan relative to the C_r axis projection point, dimension X ⁽¹⁾ in Figure 2, shall be adjusted to meet the requirements of paragraph 7.1.4.1.9.

3.3.1.2. The floor pan shall be designed so that the surface hardness should not be below 120 HB, according to EN ISO 6506-1:1999.

3.3.1.3. The floor pan shall withstand an applied vertical concentrated load of 5 kN without causing a vertical movement greater than 2 mm referring to C_r axis and without any permanent deformation occurring.

3.3.1.4. The floor pan shall have a surface roughness not exceeding R_a 6,3 according to ISO 4287:1997.

3.3.1.5. The floor pan shall be designed so that no permanent deformation is occurring after a dynamic test of a child restraint system, according to this Regulation.

4. Stopping device

4.1. The device consists of two identical absorbers mounted in parallel.

4.2. If necessary, an additional absorber shall be used for each 200 kg increase in nominal mass. Each absorber shall comprise:

4.2.1. an outer casing formed from a steel tube;

4.2.2. a polyurethane energy-absorber tube;

4.2.3. a polished-steel olive-shaped knob penetrating into the absorber; and

4.2.4. a shaft and an impact plate.

4.3. The dimensions of the various parts of this absorber are shown in the diagram reproduced in Appendix 2 to this Annex.

4.4. The characteristics of the absorbing material are given in table 3 and table 4 of this Annex.

4.5. The stopping device assembly shall be maintained for at least 12 hours at a temperature between 15 °C and 25 °C before being used for the calibration tests described in Annex 7 to this Regulation. The stopping device shall, for each type of test, meet the performance requirements laid down in Annex 7, Appendices 1 and 2. For dynamic tests of a child restraint, the stopping device assembly shall be maintained for at least 12 hours at the same temperature, to within ± 2 °C, as that of the calibration test. Any other device giving equivalent results can be accepted.

⁽¹⁾ The dimension X shall be of 210 mm with an adjustment range of ± 70 mm.

Table 3

Characteristics of the absorbing material 'A' ⁽¹⁾

(ASTM Method D 735 unless otherwise stated)

Shore hardness A:	95 ± 2 at 20 ± 5 °C temperature
Breaking strength:	$R_o \geq 350 \text{ kg/cm}^2$
Minimum elongation:	$A_o \geq 400$ per cent
Module at 100 per cent elongation:	$\geq 110 \text{ kg/cm}^2$
at 300 per cent elongation:	$\geq 240 \text{ kg/cm}^2$
Low temperature brittleness (ASTM Method D 736):	5 hours at – 55 °C
Compression set (Method B):	22 hours at 70 °C ≤ 45 per cent
Density at 25 °C:	1,05 to 1,10
Ageing in air (ASTM Method D 573):	
70 hours at 100 °C:	Shore hardness: max. variation ± 3 breaking strength: decrease < 10 per cent of R_o elongation: decrease < 10 per cent of A_o weight: decrease < 1 per cent
Immersion in oil (ASTM Method No 1 Oil):	
70 hours at 100 °C:	Shore hardness: max. variation ± 4 breaking strength: decrease < 15 per cent of R_o elongation: decrease < 10 per cent of A_o volume: swelling < 5 per cent
Immersion in oil (ASTM Method No 3 Oil):	
70 hours at 100 °C:	breaking strength: decrease < 15 per cent of R_o elongation: decrease < 15 per cent of A_o volume: swelling < 20 per cent
Immersion in distilled water:	
1 week at 70 °C:	breaking strength: decrease < 35 per cent of R_o elongation: increase < 20 per cent of A_o

⁽¹⁾ The address to obtain the relevant ASTM standards is: ASTM, 1916 Race Street, Philadelphia, USA PA 19 103.

Table 4

Characteristics of the absorbing material 'B'

(ASTM Method 2000 (1980) unless otherwise stated)

Shore hardness A:	88 ± 2 at 20 ± 5 °C temperature
Breaking strength:	$R_o \geq 300 \text{ kg/cm}^2$
Minimum elongation:	$A_o \geq 400$ per cent
Module at 100 per cent elongation:	$\geq 70 \text{ kg/cm}^2$
at 300 per cent elongation:	$\geq 130 \text{ kg/cm}^2$
Low temperature brittleness (ASTM Method D 736):	5 hours at – 55 °C
Compression set (Method B):	22 hours at 70 °C ≤ 45 per cent
Density at 25 °C:	1,08 to 1,12
Ageing in air (ASTM Method D 573 (1981)):	
70 hours at 100 °C:	Shore hardness: max. variation ± 3 breaking strength: decrease < 10 per cent of R_o elongation: decrease < 10 per cent of A_o weight: decrease < 1 per cent

Immersion in oil (ASTM Method D 471 (1979) Oil No 1):

70 hours at 100 °C:

Shore hardness: max. variation ± 4
breaking strength: decrease < 15 per cent of R_0
elongation: decrease < 10 per cent of A_0
volume: swelling < 5 per cent

Immersion in oil (ASTM Method D 471 (1979) Oil No 3):

70 hours at 100 °C:

breaking strength: decrease < 15 per cent of R_0
elongation: decrease < 15 per cent of A_0
volume: swelling < 20 per cent

Immersion in distilled water:

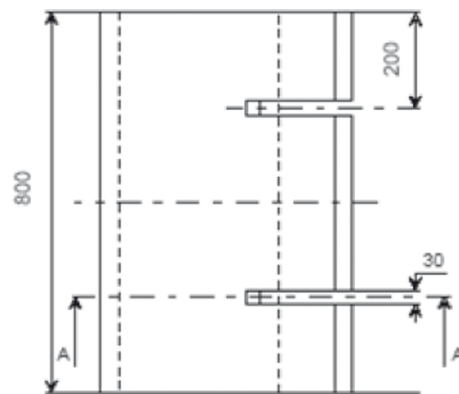
1 week at 70 °C:

breaking strength: decrease < 35 per cent of R_0
elongation: increase < 20 per cent of A_0

Appendix 1

Figure 1

Dimensions of the seat and the seat cushions



Square foam block, section A-A
Dimensions: 800 × 575 × 135

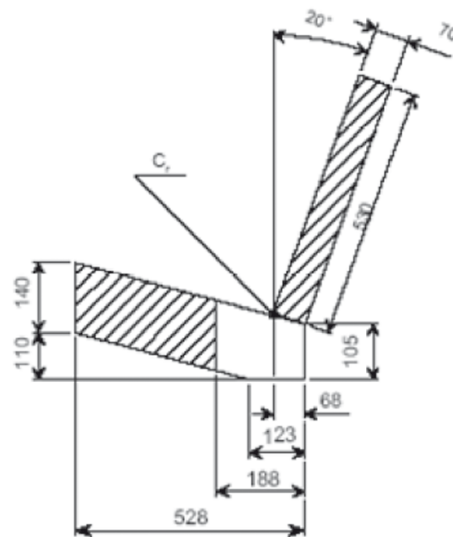
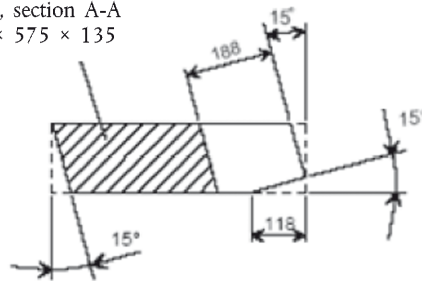
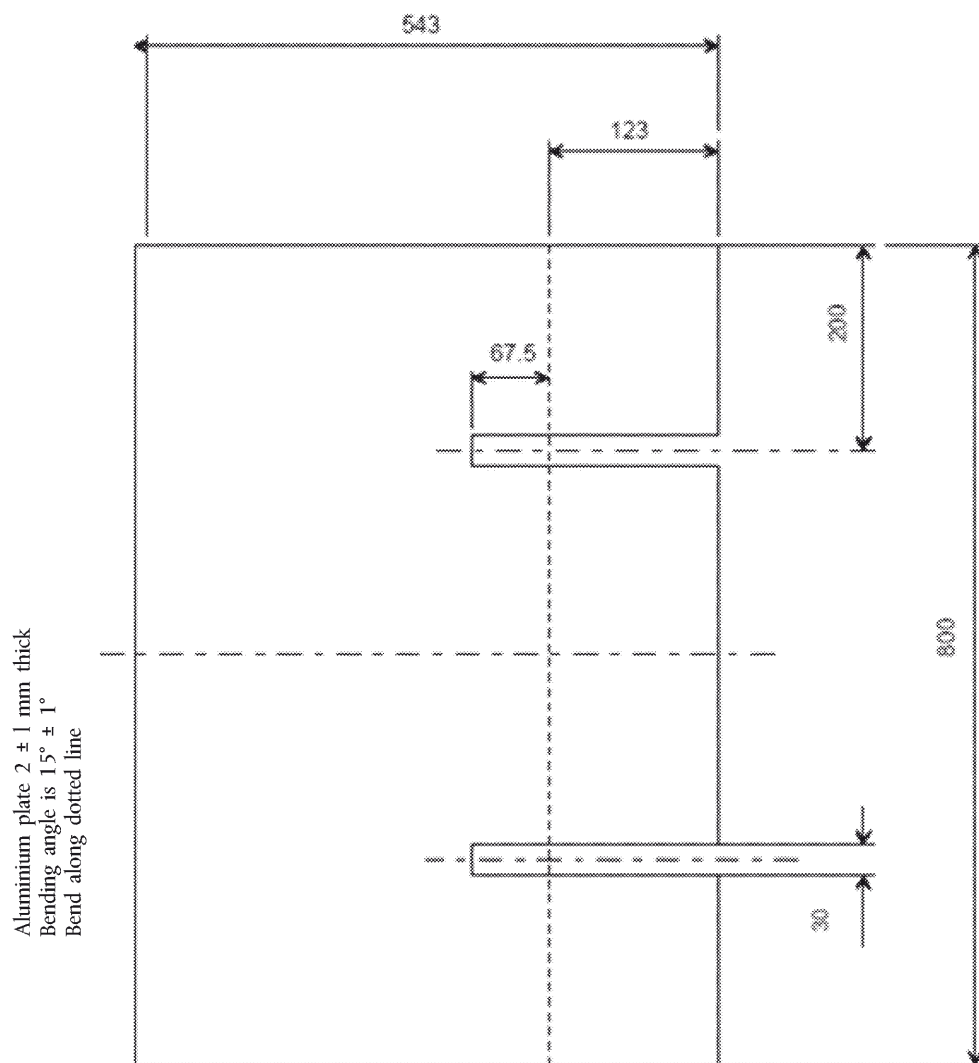


Figure 2

Dimensions of the aluminium bottom-plate

Aluminium plate before bending

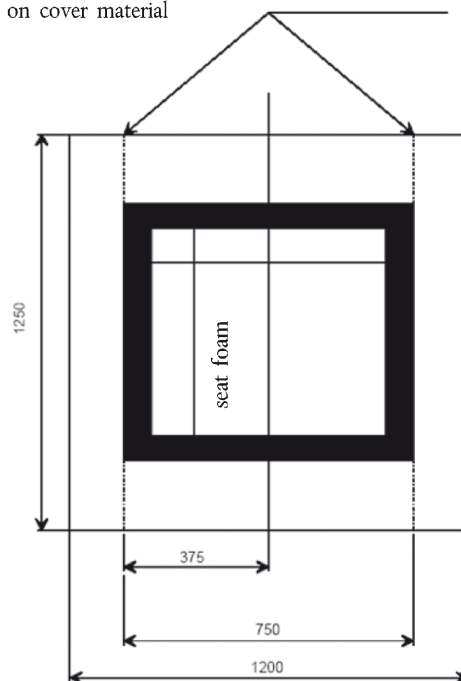


Dimensions in mm

Figure 3

Dimensions of the cover material

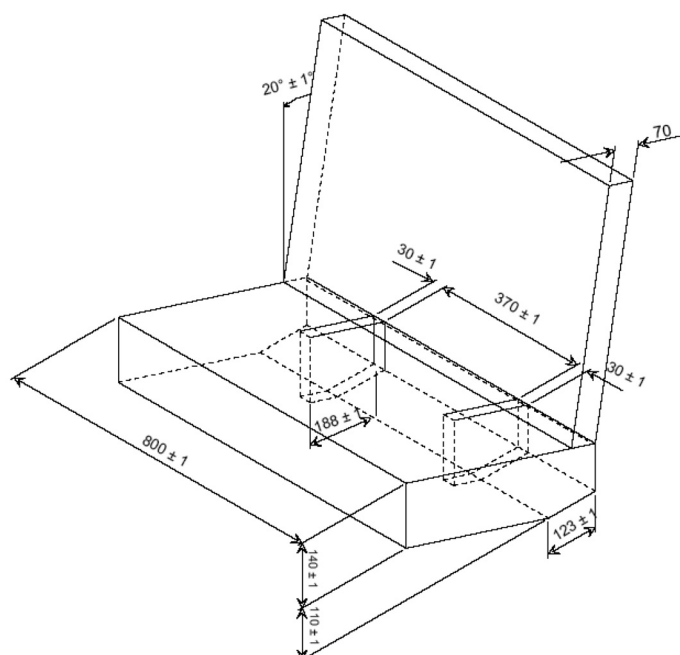
Draw lines
on cover material



Dimensions in mm

Figure 4

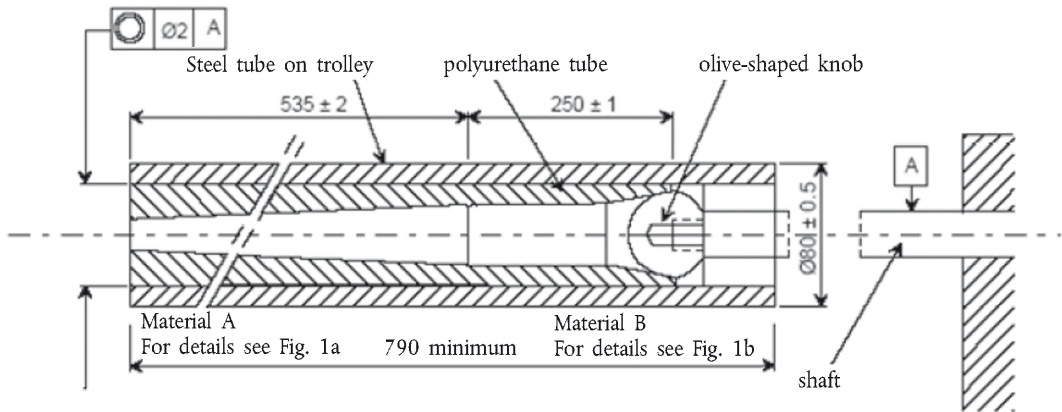
3-Dimensional view of seat



Appendix 2

Stopping device
Frontal impact
dimensions (in mm)

Figure 1



Play defined according to external diameter of polyurethane tube (light push fit)

3.2 surface finish

Figure 1a

Material A

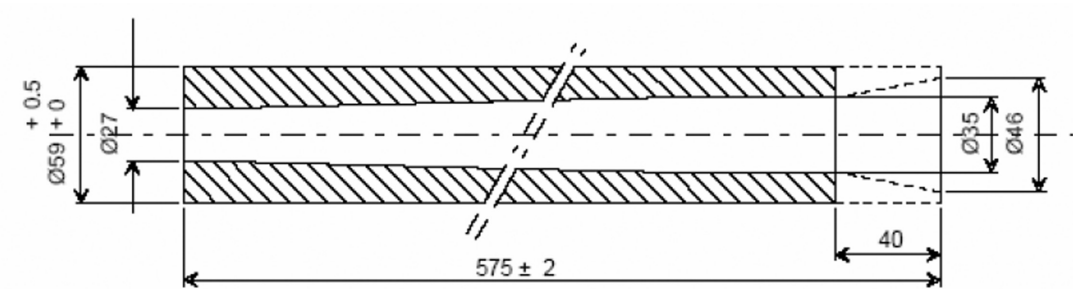


Figure 1b

Material B

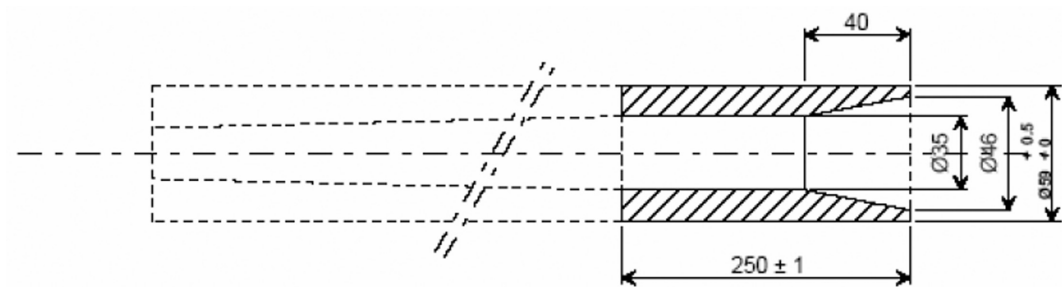
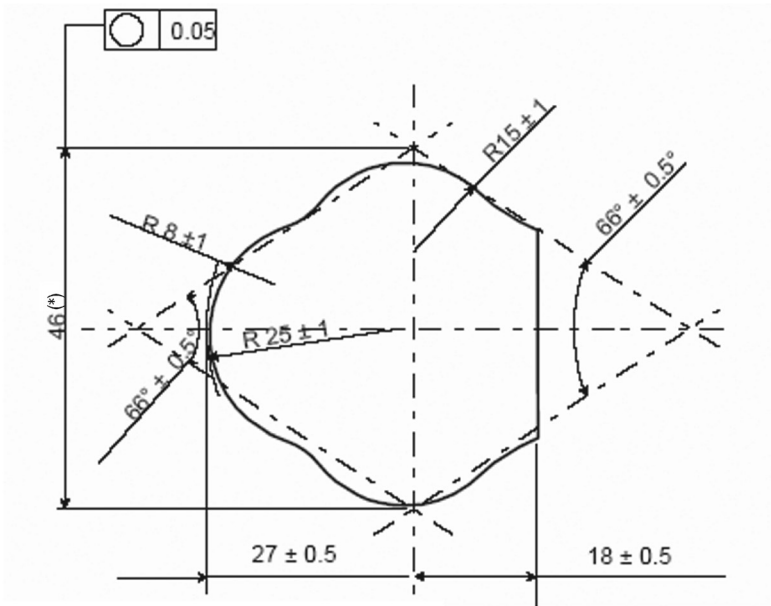


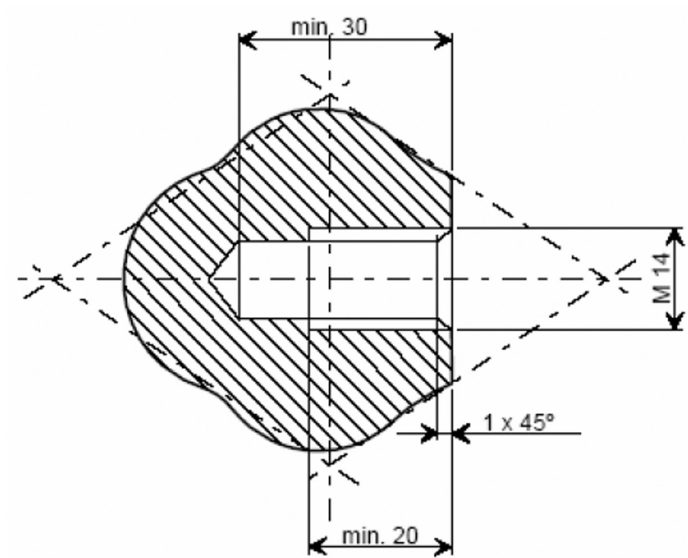
Figure 2
Stopping device olive-shaped knob



(*) This dimension can vary between 43 and 49 mm

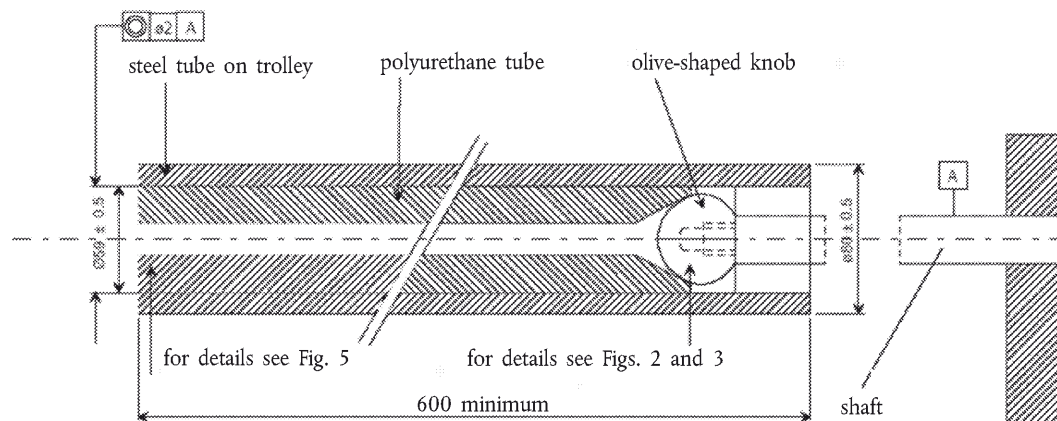
Dimensions in mm

Figure 3
Stopping device olive-shaped knob



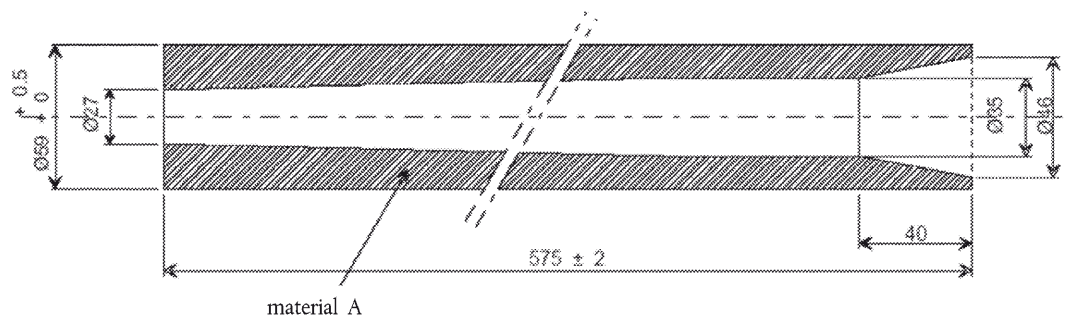
Dimensions in mm

Figure 4

Stopping device (assembled)**Rear impact****dimensions (in mm)**

Play defined according to external diameter of the polyurethane tube (light push fit)

Figure 5

Stopping device polyurethane tube**Rear impact****dimensions in mm**

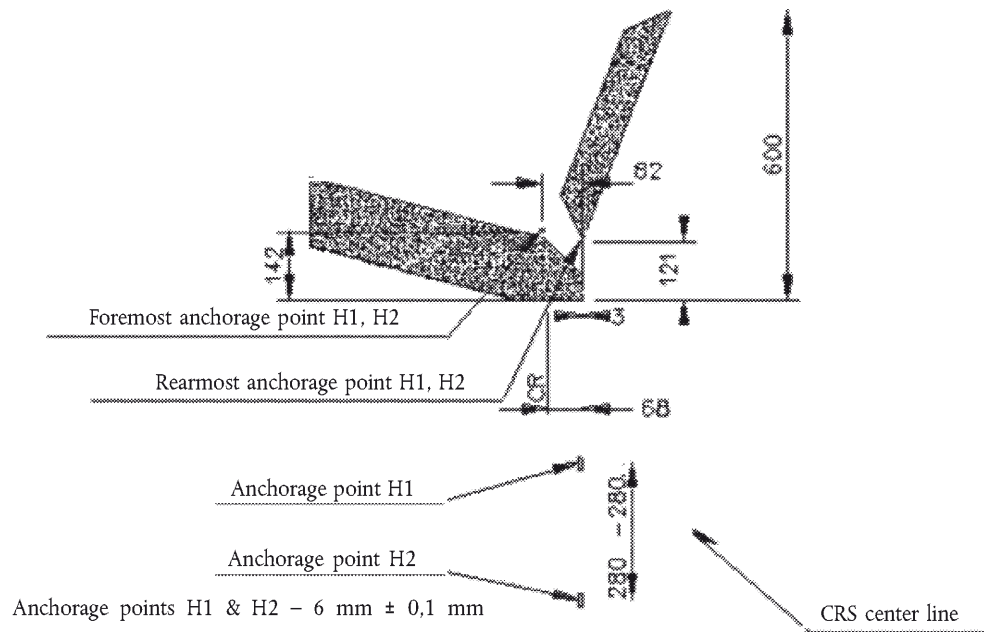
*Appendix 3***ARRANGEMENT AND USE OF ANCHORAGES ON THE TEST TROLLEY**

1. The anchorages shall be positioned as shown in the figure below.

When attaching the standard anchorage plate to the anchorage points A and B or B0 the plates shall be mounted with the bolt in the transverse horizontal direction with the angled surface facing inboard and shall be free to rotate about the axis.

2. Child restraints in the 'universal' and 'restricted' categories shall use the following anchorage points:
 - 2.1. for child restraint using lap belts, points A and B;
 - 2.2. for child restraint using lap and diagonal belts, points A, B0 and C;
 - 2.3. for child restraints using ISOFIX attachment, rearmost point H1 and H2.
3. Anchorages A, B and/or (rearmost) H1 H2 and D shall be used for child restraints in the 'semi-universal' category having only one additional upper anchorage.
4. Anchorages A, B and/or (rearmost) H1 H2, E and F shall be used for child restraints in the 'semi-universal' category having only one additional upper anchorages.
5. Anchorage points R1, R2, R3, R4 and R5 are the additional anchorage points for rearward-facing child restraint systems in the 'semi-universal' category having one or more additional anchorages (see paragraph 8.1.3.5.3).
6. Except in the case of point C, (which represents the pillar loop position) the points, which correspond to the arrangement of the anchorages show where the ends of the belt are to be connected to the trolley or to the load transducer, as the case may be. The structure carrying the anchorages shall be rigid. The upper anchorages must not be displaced by more than 0,2 mm in the longitudinal direction when a load of 980 N is applied to them in that direction. The trolley shall be so constructed that no permanent deformation shall occur in the parts bearing the anchorages during the test.
7. For carry cots in group 0, the points A1 and/or B1 can be used alternatively, as specified by the manufacturer of the restraint systems. A1 and B1 are located on a transverse line through R1 at a distance of 350 mm from R1.
8. For testing of child restraints in the 'universal' and 'restricted' categories, a standard retractor belt, as specified in Annex 13, shall be fitted to the test seat. The webbing used between the retractor and the anchorage plate A1 of the standard safety belt shall be renewed for each dynamic test.
9. For testing of child restraints with top tether, the anchorage G1 or G2 shall be used.
10. In the case of child restraints utilising a support leg, the Technical Service shall select the anchorages to be used according to paragraphs 2, 3, 4 or 5 above and with the support leg adjusted as specified in paragraph 7.1.4.1.9.

Figure 3



ANNEX 7

CURVE OF TROLLEY'S DECELERATION OR ACCELERATION, AS FUNCTION OF TIME

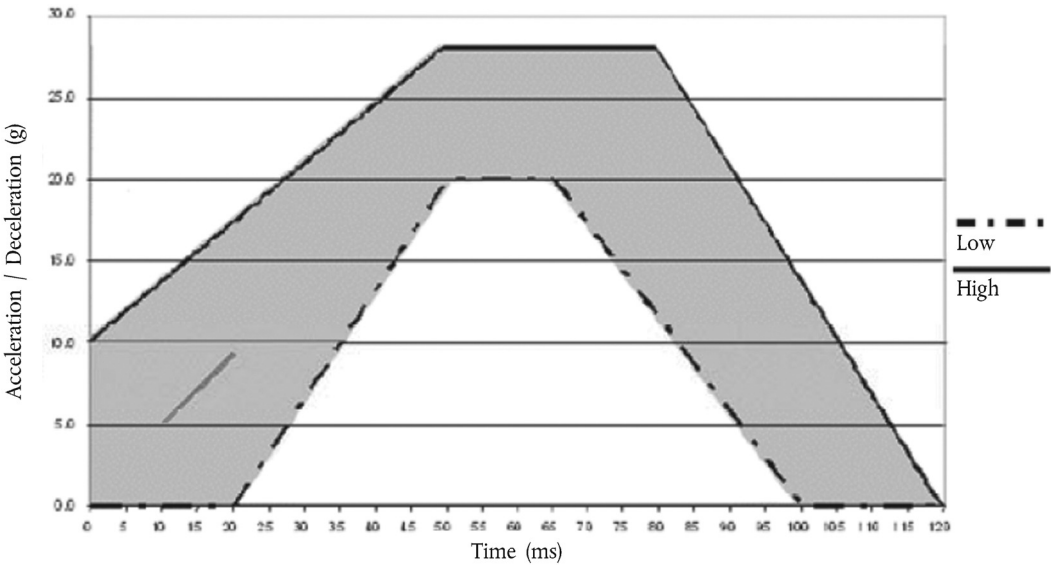
In all cases the calibration and measuring procedures shall correspond to those defined in the International Standard ISO 6487:2002; the measuring equipment shall correspond to the specification of a data channel with a channel frequency class (CFC) 60.

Appendix 1

Curve of trolley's deceleration or acceleration, as function of time
Frontal impact

Definition of the different curves

Time (ms)	Acceleration (g) Low corridor	Acceleration (g) High corridor
0	—	10
20	0	—
50	20	28
65	20	—
80	—	28
100	0	—
120	—	0



The additional segment (see paragraph 8.1.3.1.1.3.2) applies only for the acceleration sled

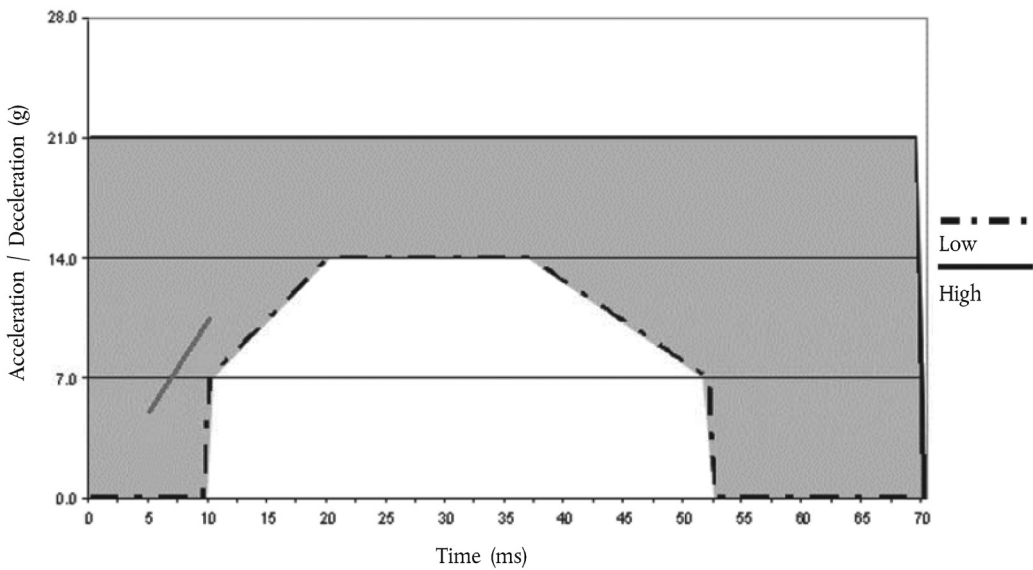
—

Appendix 2

Curves of trolley’s deceleration or acceleration, as function of time
Rear impact

Definition of the different curves

Time (ms)	Acceleration (g) Low corridor	Acceleration (g) High corridor
0	—	21
10	0	
10	7	—
20	14	—
37	14	—
52	7	—
52	0	
70	—	21
70	—	0



The additional segment (see paragraph 8.1.3.1.1.3.2) applies only for the acceleration sled

ANNEX 8

DESCRIPTION OF MANIKINS

1. General
 - 1.1. The manikins prescribed in this Regulation are described in Appendices 1 to 3 to this Annex, and in technical drawings produced by the TNO (Research Institute for Road Vehicles), Schoemakerstraat 97, 2628 VK Delft, The Netherlands.
 - 1.2. Alternative manikins may be used provided that:
 - 1.2.1. their equivalence can be demonstrated to the satisfaction of the competent authority; and
 - 1.2.2. their use is recorded in the test report, and in the communication form described in Annex 1 to this Regulation.
-

*Appendix 1***DESCRIPTION OF THE 9 MONTHS AND 3, 6 AND 10-YEAR MANIKINS**

1. General
 - 1.1. The dimensions and masses of the manikins described below are based on the anthropometry of 50th percentile children aged 9 months and 3, 6 and 10 years respectively.
 - 1.2. The manikins consist of a metal and polyester skeleton with cast polyurethane body components.
 - 1.3. For an exploded view of the manikin, see Figure 9.
2. Construction
 - 2.1. Head
 - 2.1.1. The head is made of polyurethane and reinforced by metal strips. Inside the head it is possible to install measuring equipment on a polyamide block at the centre of gravity.
 - 2.2. Vertebrae
 - 2.2.1. Neck vertebrae
 - 2.2.1.1. The neck is made of 5 rings of polyurethane containing a core of polyamide elements. The Atlas-Axis block is made of polyamide.
 - 2.2.2. Lumbar vertebrae
 - 2.2.2.1. The five lumbar vertebrae are made of polyamide.
 - 2.3. Chest
 - 2.3.1. The skeleton of the chest consists of a tubular steel frame on which the arm joints are mounted. The spine consists of a steel cable with four threaded terminals.
 - 2.3.2. The skeleton is coated with polyurethane. Measuring equipment can be housed in the chest cavity.
 - 2.4. Limbs
 - 2.4.1. The arms and legs are also made of polyurethane, reinforced by metal elements in the form of square tubes, strips and plates. The knees and elbows are provided with adjustable hinge joints. The joints of the upper arm and upper leg consist of adjustable ball and socket joints.
 - 2.5. Pelvis
 - 2.5.1. The pelvis is made of glass reinforced polyester also coated with polyurethane.
 - 2.5.2. The shape of the upper side of the pelvis, which is important for determining sensitivity to abdominal loading, is simulated as far as possible from the shape of a child's pelvis.
 - 2.5.3. The hip joints are situated just below the pelvis.
 - 2.6. Assembly of the manikin
 - 2.6.1. Neck-chest-pelvis
 - 2.6.1.1. The lumbar vertebrae and the pelvis are threaded on to the steel cable and their tension is adjusted by a nut. The neck vertebrae are mounted and adjusted in the same way. Since the steel cable must not be free to move through the chest, it must not be possible to adjust the tension of lumbar vertebrae from the neck or vice-versa.
 - 2.6.2. Head-neck
 - 2.6.2.1. The head may be mounted and adjusted by means of a bolt and nut through the Atlas-Axis block.
 - 2.6.3. Torso-limbs
 - 2.6.3.1. The arms and legs may be mounted and adjusted to the torso by means of ball and socket joints.
 - 2.6.3.2. For the arm joints the balls are connected to the torso; in the case of the leg joints, they are connected to the legs.

- 3. Main characteristics
- 3.1. Mass

Table 1

Component	Mass in kg by age group			
	9 months	3 years	6 years	10 years
Head + neck	2,20 ± 0,10	2,70 ± 0,10	3,45 ± 0,10	3,60 ± 0,10
Torso	3,40 ± 0,10	5,80 ± 0,15	8,45 ± 0,20	12,30 ± 0,30
Upper arm (2x)	0,70 ± 0,05	1,10 ± 0,05	1,85 ± 0,10	2,00 ± 0,10
Lower arm (2x)	0,45 ± 0,05	0,70 ± 0,05	1,15 ± 0,05	1,60 ± 0,10
Upper leg (2x)	1,40 ± 0,05	3,00 ± 0,10	4,10 ± 0,15	7,50 ± 0,15
Lower leg (2x)	0,85 ± 0,05	1,70 ± 0,10	3,00 ± 0,10	5,00 ± 0,15
Total	9,00 ± 0,20	15,00 ± 0,30	22,00 ± 0,50	32,00 ± 0,70

- 3.2. Principal dimensions
- 3.2.1. The principal dimensions, based on Figure 1 of this Annex, are given in Table 2.

Figure 1
Principal dimensions of manikin

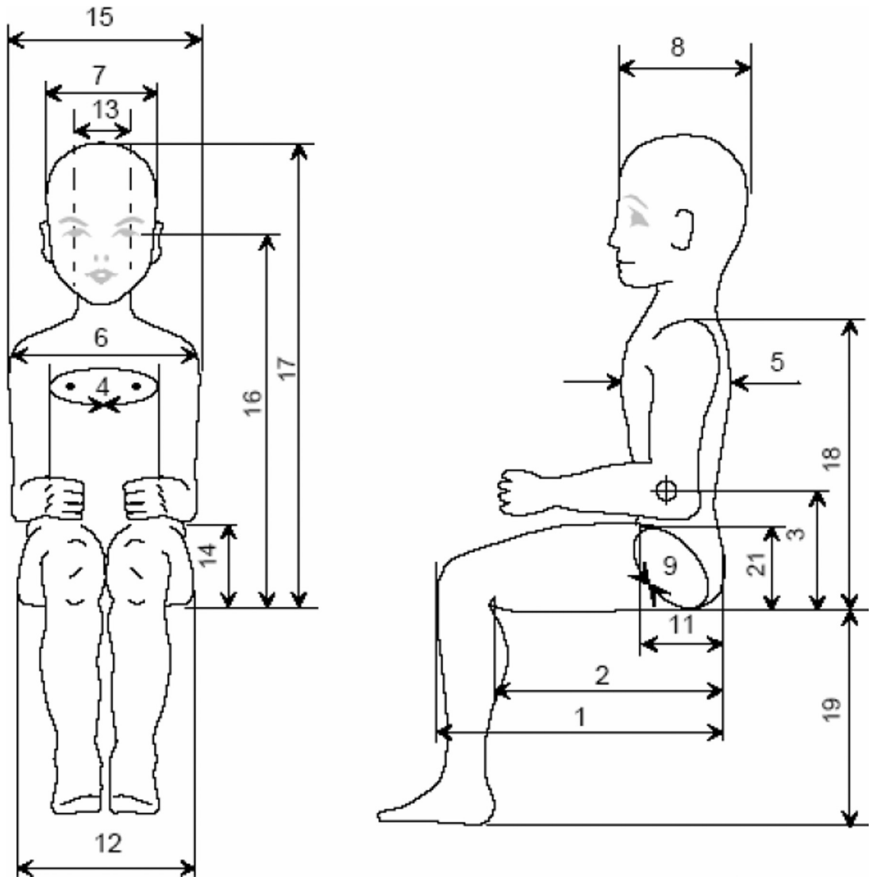


Table 2

No	Dimensions	Dimensions in mm by age group			
		9 months	3 years	6 years	10 years
1	Back of buttocks to front knee	195	334	378	456
2	Back of buttocks to popliteus, sitting	145	262	312	376
3	Centre of gravity to seat	180	190	190	200
4	Chest circumference	440	510	580	660
5	Chest depth	102	125	135	142
6	Distance between shoulder blades	170	215	250	295
7	Head width	125	137	141	141
8	Head length	166	174	175	181
9	Hip circumference, sitting	510	590	668	780
10	Hip circumference, standing (not shown)	470	550	628	740
11	Hip depth, sitting	125	147	168	180
12	Hip width, sitting	166	206	229	255
13	Neck width	60	71	79	89
14	Seat to elbow	135	153	155	186
15	Shoulder width	216	249	295	345
16	Eye height sitting	350	460	536	625
17	Height, sitting	450	560	636	725
18	Shoulder height, sitting	280	335	403	483
19	Sole to popliteus, sitting	125	205	283	355
20	Stature (not shown)	708	980	1 166	1 376
21	Thigh height, sitting	70	85	95	106

4. Adjustment of joints

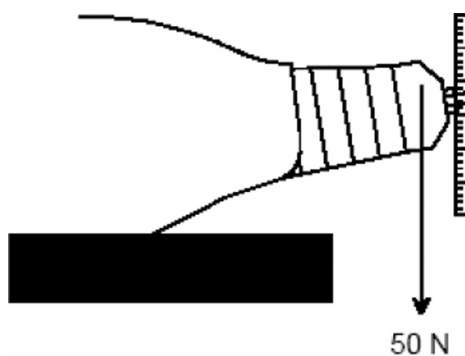
4.1. General

- 4.1.1. In order to achieve reproducible results using the manikins, it is essential to specify and adjust the friction in the various joints, the tension in the neck and lumbar cables, and the stiffness of the abdominal insert.

4.2. Adjustment of the neck cable

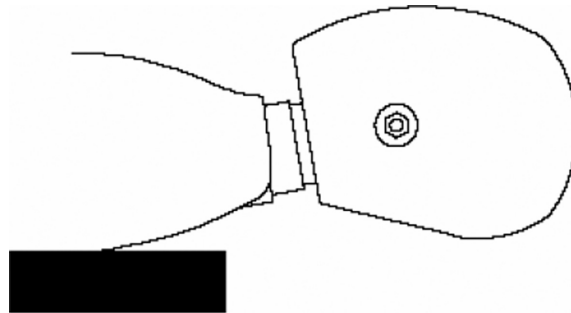
- 4.2.1. Place the torso on its back in a horizontal plane.
- 4.2.2. Mount the complete neck assembly without the head.
- 4.2.3. Tighten the tensioner nut on the Atlas-Axis block.
- 4.2.4. Place a suitable bar or bolt through the Atlas-Axis block.
- 4.2.5. Loosen the tensioner nut until the Atlas-Axis block is lowered by 10 ± 1 mm when a load of 50 N directed downwards is applied to the bar or bolt through the Atlas-Axis block (see Figure 2).

Figure 2



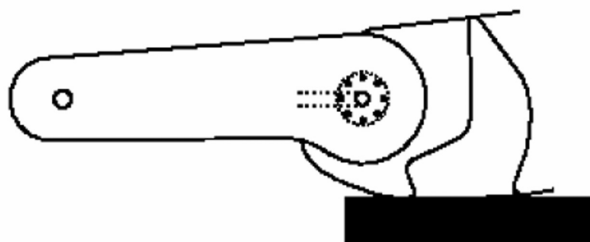
- 4.3. Atlas-Axis joint
- 4.3.1. Place the torso on its back in a horizontal plane.
- 4.3.2. Mount the complete neck and head assembly.
- 4.3.3. Tighten the bolt and adjustment nut through the head and the Atlas-Axis block with the head in a horizontal position.
- 4.3.4. Loosen the adjustment nut until the head starts moving (see Figure 3).

Figure 3



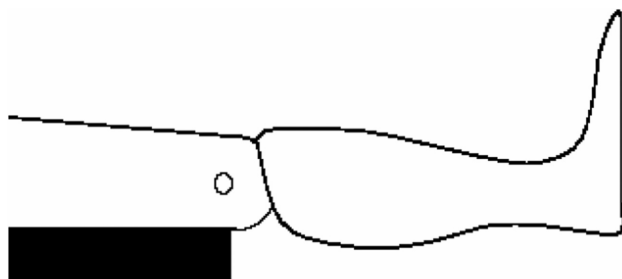
- 4.4. Hip joint
- 4.4.1. Place the pelvis on its front in a horizontal plane.
- 4.4.2. Mount the upper leg without the lower leg.
- 4.4.3. Tighten the adjustment nut with the upper leg in a horizontal position.
- 4.4.4. Loosen the adjustment nut until the upper leg starts moving.
- 4.4.5. The hip joint should be checked frequently in the initial stages because of 'running-in' problems (see Figure 4).

Figure 4



- 4.5. Knee joint
- 4.5.1. Place the upper leg in a horizontal position.
- 4.5.2. Mount the lower leg.
- 4.5.3. Tighten the adjustment nut of the knee joint with the lower leg in a horizontal position.
- 4.5.4. Loosen the adjustment nut until the lower leg starts moving (see Figure 5).

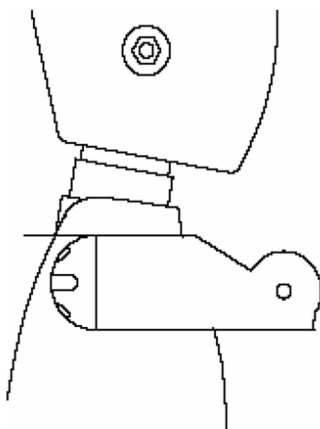
Figure 5



4.6. Shoulder joint

- 4.6.1. Place the torso upright.
- 4.6.2. Mount the upper arm without the lower arm.
- 4.6.3. Tighten the adjustment nuts of the shoulder with the upper arm in a horizontal position.
- 4.6.4. Loosen the adjustment nuts until the upper arm starts moving (see Figure 6).
- 4.6.5. The shoulder joints should be checked frequently in the initial stages because of 'running-in' problems.

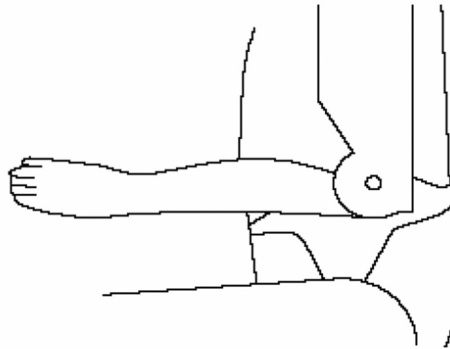
Figure 6



4.7. Elbow joint

- 4.7.1. Place the upper arm in a vertical position.
- 4.7.2. Mount the lower arm.
- 4.7.3. Tighten the adjustment nut of the elbow with the lower arm in a horizontal position.
- 4.7.4. Loosen the adjustment nut until the lower arm starts moving (see Figure 7).

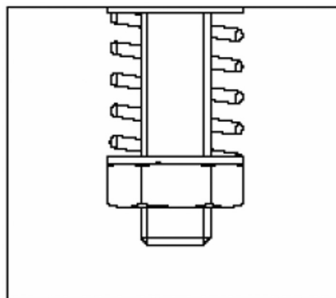
Figure 7



4.8. Lumbar cable

- 4.8.1. Assemble the upper torso, lumbar vertebrae, lower torso, abdominal insert, cable and spring.
- 4.8.2. Tighten the cable adjustment nut in the lower torso until the spring is compressed to $\frac{2}{3}$ of its unloaded length (see Figure 8).

Figure 8



4.9. Calibration of the abdominal insert

4.9.1. General

- 4.9.1.1. The test shall be carried out by means of a suitable tension-producing machine.

- 4.9.2. Place the abdominal insert on a rigid block with the same length and width as the lumbar spinal column. The thickness of this block shall be at least twice the thickness of the lumbar spinal column (see Figure 9).

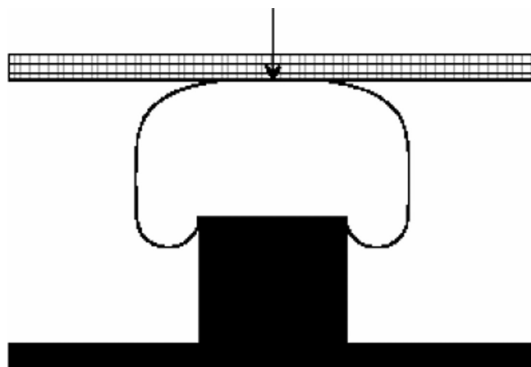
- 4.9.3. An initial load of 20 N shall be applied.

- 4.9.4. A constant load of 50 N shall be applied.

- 4.9.5. The deflection of the abdominal insert after 2 minutes shall be:

for the 9 months dummy:	$11,5 \pm 2,0$ mm
3 years dummy:	$11,5 \pm 2,0$ mm
6 years dummy:	$13,0 \pm 2,0$ mm
10 years dummy:	$13,0 \pm 2,0$ mm

Figure 9



5. Instrumentation

5.1. General

5.1.1. The calibration and measuring procedures shall be based upon the international standards ISO 6487 (1980).

5.2. Installation of the accelerometer in the chest

The accelerometer shall be mounted in the protected cavity in the chest.

5.3. Indication of abdominal penetration

5.3.1. A sample of modelling clay shall be vertically connected to the front of the lumbar vertebrae by means of thin adhesive tape.

5.3.2. A deflection of the modelling clay does not necessarily mean that penetration has taken place.

5.3.3. The modelling clay samples shall be of the same length and width as the lumbar spinal column; the thickness of the samples shall be 25 ± 2 mm.

5.3.4. Only the modelling clay supplied with the manikins shall be used.

5.3.5. The temperature of the modelling clay during the test shall be 30 ± 5 °C.

Appendix 2

DESCRIPTION OF THE 'NEW-BORN' MANIKIN

The manikin comprises a head, torso, arms and legs as a single unit. The torso, arms and legs are a single moulding of Sorbothane covered with a PVC skin and containing a steel spring spine. The head is a polyurethane foam moulding covered by a PVC skin and is permanently attached to the torso. The manikin is provided with a close fitting stretch cotton/polyester suit.

The dimensions and mass distribution of the dummy are based on those of a 50th percentile new-born baby and are given in Tables 1 and 2 and in Figure 1.

Table 1

Principal dimensions of the 'new-born' manikin

Dimension		mm	Dimension		mm
A	Rump-Crown	345	F	Chest width	105
B	Rump-Sole (with straight leg)	250	G	Chest depth	100
C	Head width	105	H	Hip width	105
D	Head depth	125	I	C of G from top of head	235
E	Shoulder width	150			

Table 2

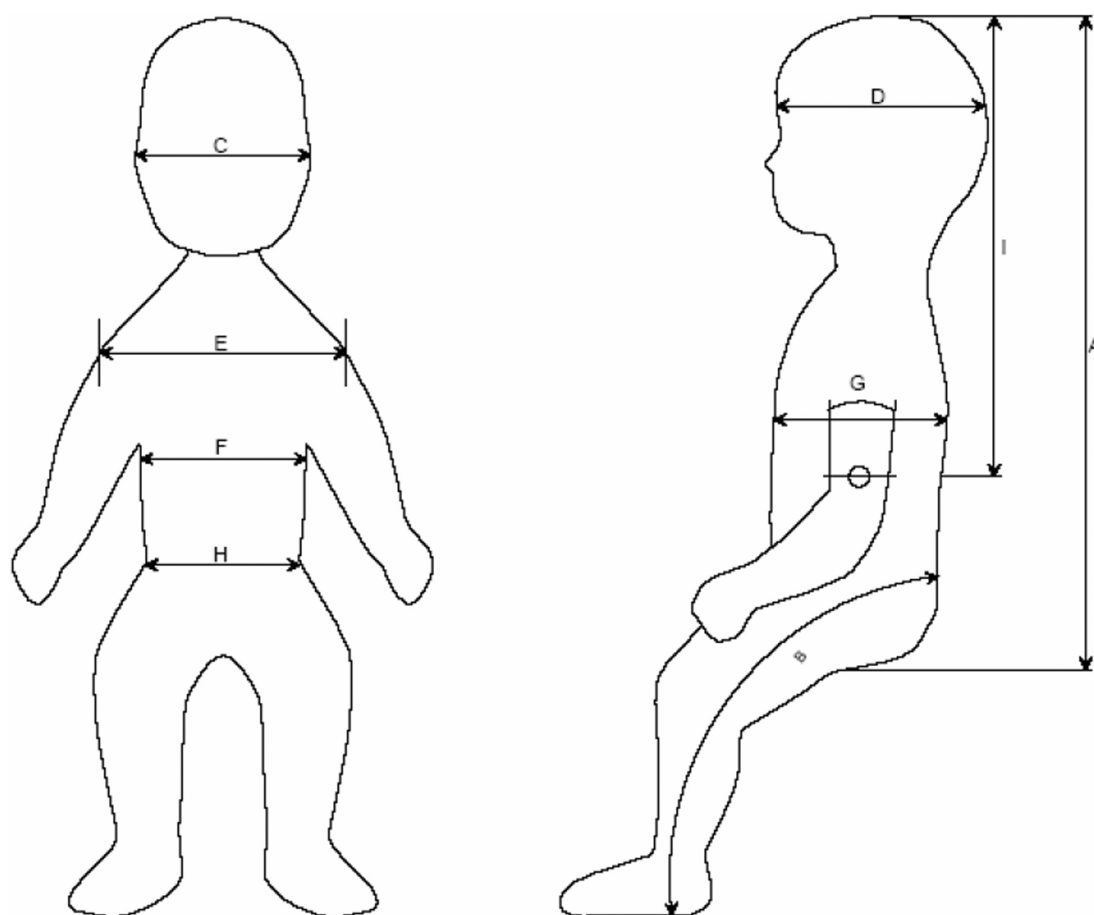
Mass distribution of the 'new-born' manikin (*)

Head and neck	0,7 kg
Torso	1,1 kg
Arms	0,5 kg
Legs	1,1 kg
Total mass	3,4 kg

(*) The thickness of the PVC skin should be $1 + 0,5 \text{ mm}$
 $- 0$

The specific gravity should be $0,865 \pm 0,1$.

Figure 1

Calibration of infant manikin**1. SHOULDER STIFFNESS**

- 1.1. Place manikin on its back on a horizontal surface and support torso on one side, to prevent movement. (Figure 2)
- 1.2. Apply a load of 150 N, on a 40 mm diameter flat faced plunger, horizontally, in a direction perpendicular to the manikin's superior-inferior axis. The axis of the plunger should be in the centre of the manikin's shoulder and adjacent to point A on the shoulder (see Figure 2). The lateral deflection of the plunger from the point of first contact with the arm should be between 30 mm and 50 mm.
- 1.3. Repeat on the opposite shoulder — reversing the support.

2. LEG JOINT STIFFNESS

- 2.1. Place manikin on its back on a horizontal plane (Figure 3) and strap the two lower legs together, bringing the inside of the knee into contact.
- 2.2. Apply a vertical load over the knees with a 35 mm × 95 mm flat faced plunger with the centre line of the plunger over the highest point of the knees.
- 2.3. Apply sufficient force to the plunger to bend the hips until the face of the plunger is 85 mm above the support plane. This force should be between 30 N and 70 N. Ensure lower limbs do not contact any surface during the test.

3. TEMPERATURE

Calibration should be carried out of a temperature between 15 °C and 30 °C.

Figure 2

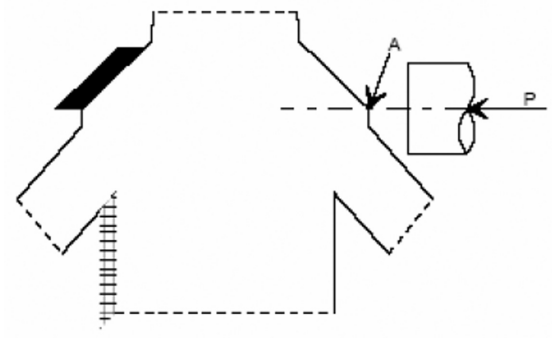
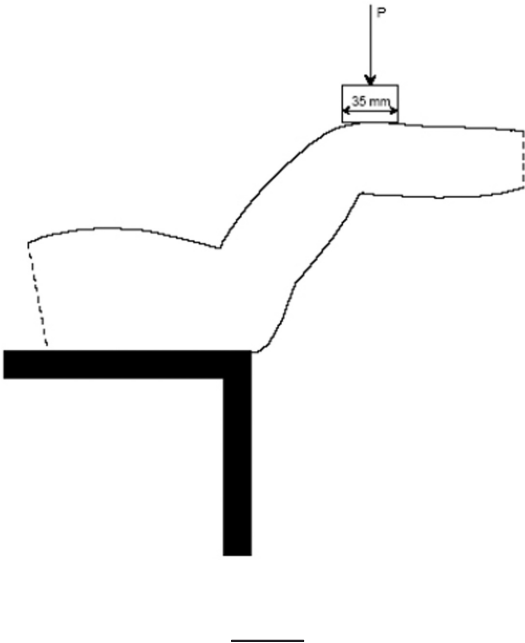


Figure 3



*Appendix 3***DESCRIPTION OF THE 18 MONTHS MANIKIN**

1. GENERAL
 - 1.1. The dimensions and masses of the manikin are based on the anthropometry of 50th percentile child, 18 months old.
2. CONSTRUCTION
 - 2.1. Head
 - 2.1.1. The head consists of a semi-rigid plastic skull covered with a head skin. The skull has a cavity which allows for the mounting of (optional) instrumentation.
 - 2.2. Neck
 - 2.2.1. The neck consists of three parts:
 - 2.2.2. a solid rubber column;
 - 2.2.3. an adjustable OC joint at the top of the rubber column, allowing rotation under adjustable friction around the lateral axis;
 - 2.2.4. a non-adjustable spherical joint at the base of the neck.
 - 2.3. Torso
 - 2.3.1. The torso consists of a plastic skeleton, covered with a flesh/skin system. The torso has a cavity in front of the skeleton and accepts a foam filling to achieve the correct stiffness of the thorax. The torso has a cavity at the back which allows for the mounting of instrumentation.
 - 2.4. Abdomen
 - 2.4.1. The abdomen of the dummy is a one part deformable element which is inserted into the opening between the thorax and the pelvis.
 - 2.5. Lumbar spine
 - 2.5.1. The lumbar spine consists of a rubber column which is mounted between the thoracic skeleton and the pelvis. The stiffness of the lumbar spine is pre-set using a metal cable which runs through the hollow core of the rubber column.
 - 2.6. Pelvis
 - 2.6.1. The pelvis is made of a semi-rigid plastic, and is moulded in the shape of a child's pelvis. It is covered with a flesh skin system, simulating the flesh/skin around the pelvis and buttocks.
 - 2.7. Hip joint
 - 2.7.1. The hip joints mount to the lower part of the pelvis. The joint allows for rotation around a lateral axis as well as rotation around an axis at a right angle to the lateral axis using a gimbal joint. Adjustable friction applies to both axes.
 - 2.8. Knee joint
 - 2.8.1. The knee joint allows flexion and extension of the lower leg under adjustable friction.
 - 2.9. Shoulder joint
 - 2.9.1. The shoulder joint mounts to the thoracic skeleton. Click-stops allow the positioning of the arm in two initial positions.
 - 2.10. Elbow joint
 - 2.10.1. The elbow joint allows flexion and extension of the lower arm. Click-stops allow the positioning of the lower arm in two initial positions.

2.11. Assembly of the manikin

2.11.1. The spine cable is mounted in the lumbar spine.

2.11.2. The lumbar spine is mounted in the skeleton between the pelvis and the thoracic spine.

2.11.3. The abdominal insert is fitted between the thorax and the pelvis.

2.11.4. The neck is mounted on the top of the thorax.

2.11.5. The head is mounted on top of the neck using the interface plate.

2.11.6. The arms and legs are mounted.

3. MAIN CHARACTERISTICS

3.1. Mass

Table 1

Mass distribution of the 18 months manikin

Component	Mass (kg)
Head + neck	2,73
Torso	5,06
Upper arm	0,27
Lower arm	0,25
Upper leg	0,61
Lower leg	0,48
Total mass	11,01

3.2. Principal dimensions

3.2.1. The principal dimensions, based on Figure 1 of this Annex (reproduced below), are given in table 2.

Figure 1

Principal dimensions of manikin

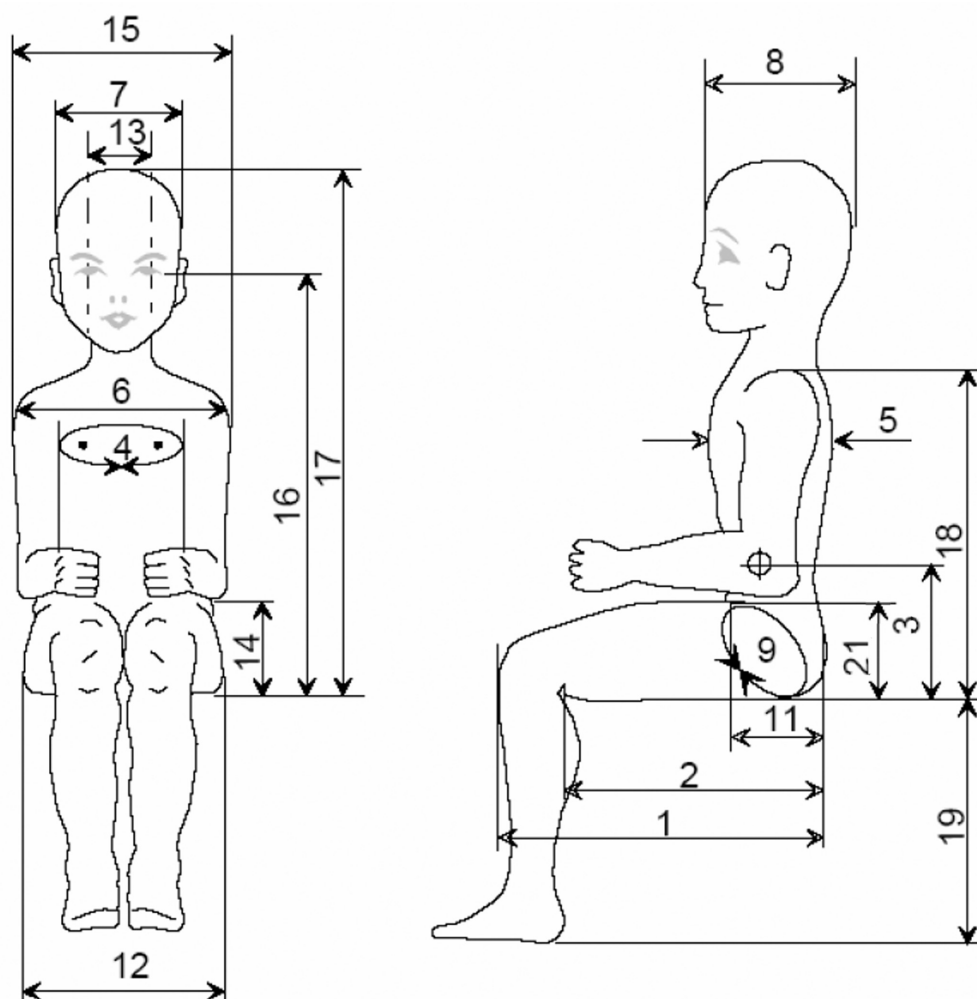


Table 2

No	Dimension	Value (mm)
1	Back of buttocks to front of knee	239
2	Back of buttocks to popliteus, sitting	201
3	Centre of gravity to seat	193
4	Chest circumference	474
5	Chest depth	113
7	Head width	124
8	Head length	160
9	Hip circumference, sitting	510
10	Hip circumference, standing (not shown)	471
11	Hip depth, sitting	125
12	Hip width, sitting	174

No	Dimension	Value (mm)
13	Neck width	65
14	Seat to elbow	125
15	Shoulder width	224
17	Height, sitting	495 (*)
18	Shoulder height, sitting	305
19	Sole to popliteus, sitting	173
20	Stature (not shown)	820 (*)
21	Thigh height, sitting	66

(*) Manikin's buttocks, back and head resting against a vertical surface.

4. ADJUSTMENT OF JOINTS

4.1. General

- 4.1.1. In order to achieve reproducible results using the manikins, it is essential to adjust the friction in various joints, the tension in the lumbar spine, and the stiffness of the abdominal insert.

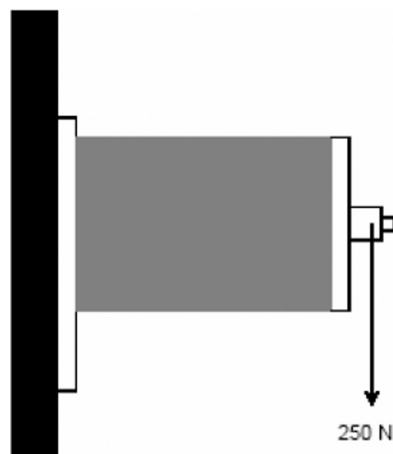
All parts must be checked for damage prior to these instructions.

4.2. Lumbar spine

- 4.2.1. The lumbar spine is calibrated before it is mounted in the dummy.

- 4.2.2. Attach the lower mounting plate of the lumbar spine to a setup such that the frontal side of the lumbar spine is located at the bottom (Figure 2).

Figure 2



- 4.2.3. Apply a downward force of 250 N to the upper mounting plate. The resulting downward displacement should be recorded between 1 and 2 seconds after the onset of force application, and should be between 9 and 12 mm.

4.3. Abdomen

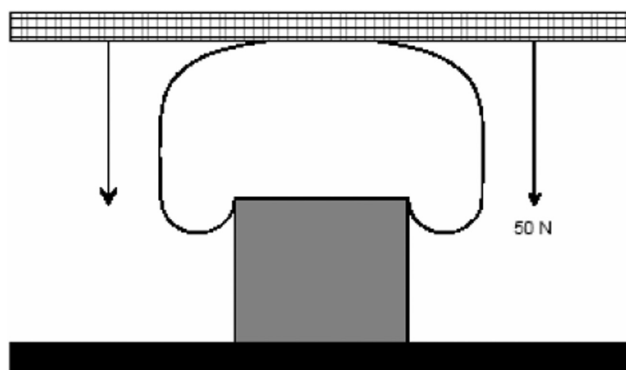
- 4.3.1. Mount the abdominal insert on a rigid block with the same length and width as the lumbar spine column. The thickness of this block shall be at least twice the thickness of the lumbar spine column (Figure 3).

- 4.3.2. An initial load of 20 N shall be applied.

4.3.3. A constant load of 50 N shall be applied.

4.3.4. The deflection of the abdominal insert after two minutes shall be 12 ± 2 mm.

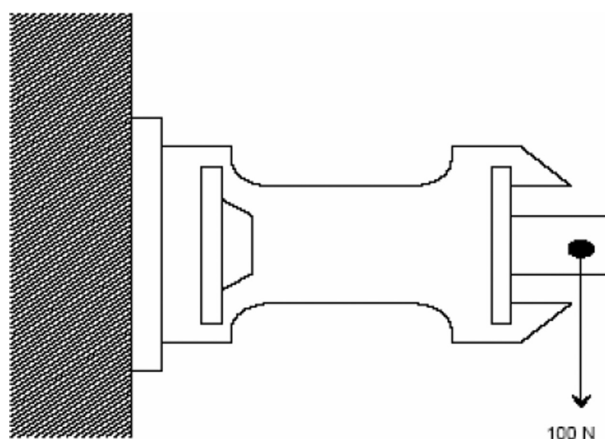
Figure 3



4.4. Adjustment of the neck

4.4.1. Mount the complete neck, consisting of the rubber column, spherical base joint and OC joint against a vertical surface such that the frontal side is facing downward (Figure 4).

Figure 4



4.4.2. Apply a vertically directed force of 100 N on the axis of the OC joint. The position of the OC joint should display a downward displacement between 22 ± 2 mm.

4.5. OC Joint

4.5.1. Mount the complete neck and head assembly.

4.5.2. Place the torso on its back in a horizontal plane.

4.5.3. Tighten the bolt and adjustment nut through the head and the OC joint using a torque wrench until the head is unable to move due to gravity.

4.6. Hip

4.6.1. Mount the upper leg, without the lower leg, to the pelvis.

4.6.2. Place the upper leg in a horizontal position.

4.6.3. Increase friction exerted on the lateral axis until the leg cannot move due to gravity.

- 4.6.4. Place the upper leg in a horizontal position, in the direction of the lateral axis.
 - 4.6.5. Increase friction at the gimbal joint until the upper leg does not move due to gravity.
 - 4.7. Knee
 - 4.7.1. Mount the lower leg to the upper leg.
 - 4.7.2. Place the upper and lower legs in a horizontal position, with the upper leg supported.
 - 4.7.3. Tighten the adjustment nut at the knee until the lower leg cannot move due to gravity.
 - 4.8. Shoulders
 - 4.8.1. Extend the lower arm and place the upper arm in the highest position it will click into.
 - 4.8.2. The click-stops in the shoulder should be serviced or replaced if the arm does not remain in this position.
 - 4.9. Elbow
 - 4.9.1. Place the upper arm in the lowest position it will click into, and the lower arm in the upper click stop position.
 - 4.9.2. The click-stops in the elbow should be serviced or replaced if the lower arm does not remain in this position.
 - 5. INSTRUMENTATION
 - 5.1. General
 - 5.1.1. Although provisions have been made to equip the 18 months manikin with a number of transducers, it is standard equipped with replacements of equal size and weight.
 - 5.1.2. The calibration and measuring procedures shall be based upon the international standard ISO 6487:1980.
 - 5.2. Installation of the accelerometer in the chest
 - 5.2.1. The accelerometer shall be mounted in the cavity in the chest. This is done from the rear of the dummy.
 - 5.3. Indication of abdominal penetration
 - 5.3.1. The occurrence or absence of abdominal penetration must be assessed using high speed photography.
-

ANNEX 9

FRONTAL IMPACT TEST AGAINST A BARRIER**1. Installations, procedure and measuring instruments****1.1. Testing ground**

The test area shall be large enough to accommodate the run-up track, barrier and technical installations necessary for the test. The last part of the track, for at least 5 m before the barrier, must be horizontal, flat and smooth.

1.2. Barrier

The barrier consists of a block of reinforced concrete not less than 3 m wide at the front and not less than 1,5 m high. The barrier must be of such thickness that it weighs at least 70 tonnes. The front face must be vertical, perpendicular to the axis of the run-up track, and covered with plywood boards 20 ± 1 mm thick in good condition. The barrier shall be either anchored in the ground or placed on the ground with, if necessary, additional arresting devices to limit its displacement. A barrier with different characteristics, but giving results at least equally conclusive, may likewise be used.

1.3. Propulsion of the vehicle

At the moment of impact, the vehicle must no longer be subjected to the action of any additional steering or propelling device or devices. It must reach the obstacle on a course perpendicular to the collision wall; the maximum lateral disalignment permitted between the vertical median line of the front of the vehicle and the vertical median line of the collision wall is ± 30 cm.

1.4. State of the vehicle

1.4.1. The vehicle under test must either be fitted with all the normal components and equipment included in its unladen service weight or be in such a condition as to fulfil this requirement in so far as the components and equipment of concern to the passenger compartment and the distribution of the service weight of the vehicle as a whole are concerned.

1.4.2. If the vehicle is driven by external means, the fuel installation must be filled to at least 90 per cent of its capacity, either with fuel or with a non-inflammable liquid, having a density and a viscosity close to those of the fuel normally used. All other systems (brake-fluid containers, radiator, etc.) must be empty.

1.4.3. If the vehicle is driven by its own engine, the fuel tank must be at least 90 per cent full. All other liquid-holding tanks must be filled to capacity.

1.4.4. If the manufacturer so requests, the Technical Service responsible for conducting the tests may allow the same vehicle as is used for tests prescribed by other Regulations (including tests capable of affecting its structure) to be used also for the tests prescribed by this Regulation.

1.5. Impact velocity

The impact velocity must be $50 + 0/- 2$ km/h. However, if the test has been carried out at a higher impact velocity and the vehicle has satisfied the conditions prescribed, the test is considered satisfactory.

1.6. Measuring instruments

The instrument used to record the speed referred to in paragraph 1.5 above shall be accurate within 1 per cent.

ANNEX 10

REAR IMPACT TEST PROCEDURE

1. Installations, procedures and measuring instruments
 - 1.1. Testing ground

The test area shall be large enough to accommodate the propulsion system of the impactor and to permit after-impact displacement of the vehicle impacted and installation of the test equipment. The part in which vehicle impact and displacement occur shall be horizontal. (The slope shall be less than 3 per cent measured over any length of 1 metre.)
 - 1.2. Impactor
 - 1.2.1. The impactor shall be of steel and of rigid construction.
 - 1.2.2. The impacting surface shall be flat and at least 2 500 mm wide and 800 mm high. Its edges shall be rounded to a radius of curvature of between 40 and 50 mm. It shall be clad with a layer of plywood 20 ± 1 mm thick.
 - 1.2.3. At the moment of impact the following requirements shall be met:
 - 1.2.3.1. the impacting surface shall be vertical and perpendicular to the median longitudinal plane of the impacted vehicle;
 - 1.2.3.2. the direction of movement of the impactor shall be substantially horizontal and parallel to the median longitudinal plane of the impacted vehicle;
 - 1.2.3.3. the maximum lateral deviation permitted between the median vertical line of the surface of the impactor and the median longitudinal plane of the impacted vehicle shall be 300 mm. In addition, the impacting surface shall extend over the entire width of the impacted vehicle;
 - 1.2.3.4. the ground clearance of the lower edge of the impacting surface shall be 175 ± 25 mm.
 - 1.3. Propulsion of the impactor

The impactor may either be secured to a carriage (moving barrier) or form part of a pendulum.
 - 1.4. Special provisions applicable where a moving barrier is used
 - 1.4.1. If the impactor is secured to a carriage (moving barrier) by a restraining element, the latter must be rigid and be incapable of being deformed by the impact; the carriage shall, at the moment of impact, be capable of moving freely and no longer be subject to the action of the propelling device.
 - 1.4.2. The combined mass of carriage and impactor shall be $1\,100 \pm 20$ kg.
 - 1.5. Special provisions applicable where a pendulum is used
 - 1.5.1. The distance between the centre of the impacting surface and the axis of rotation of the pendulum shall be not less than 5 m.
 - 1.5.2. The impactor shall be freely suspended by rigid arms, rigidly secured to it. The pendulum so constituted shall be substantially incapable of being deformed by the impact.
 - 1.5.3. A stopping device shall be incorporated in the pendulum to prevent any secondary impact by the impactor on the test vehicle.
 - 1.5.4. At the moment of impact, the velocity of the centre of percussion of the pendulum shall be between 30 and 32 km/h.
 - 1.5.5. The reduced mass ' m_r ' at the centre of percussion of the pendulum is defined as a function of the total mass ' m ', of the distance ' a ' (*) between the centre of percussion and the axis of rotation, and of the distance ' l ' between the centre of gravity and the axis of rotation, by the following equation:

(*) The distance ' a ' is equal to the length of the synchronous pendulum under consideration.

$$m_r = m \cdot \frac{1}{a}$$

1.5.6. The reduced mass 'm_r' shall be 1 100 ± 20 kg.

1.6. General provisions relating to the mass and velocity of the impactor

If the test has been conducted at an impact velocity higher than those prescribed in paragraph 1.5.4 and/or with a mass greater than those prescribed in paragraph 1.5.3 or 1.5.6, and the vehicle has met the requirements prescribed, the test shall be considered satisfactory.

1.7. State of the vehicle during the test

The vehicle being tested shall either be fitted with all the normal components and equipment included in its unladen service weight or be in such condition as to fulfil this requirement in so far as the distribution of the service weight of the vehicle as a whole is concerned.

1.8. The complete vehicle with the child restraint installed in accordance with the fitting instructions shall be placed on a hard, flat and level surface, with the handbrake off and in neutral gear. More than one child restraint may be tested in the same impact test.

ANNEX 11

Additional anchorages required for attaching child restraints in the semi-universal category to motor vehicles

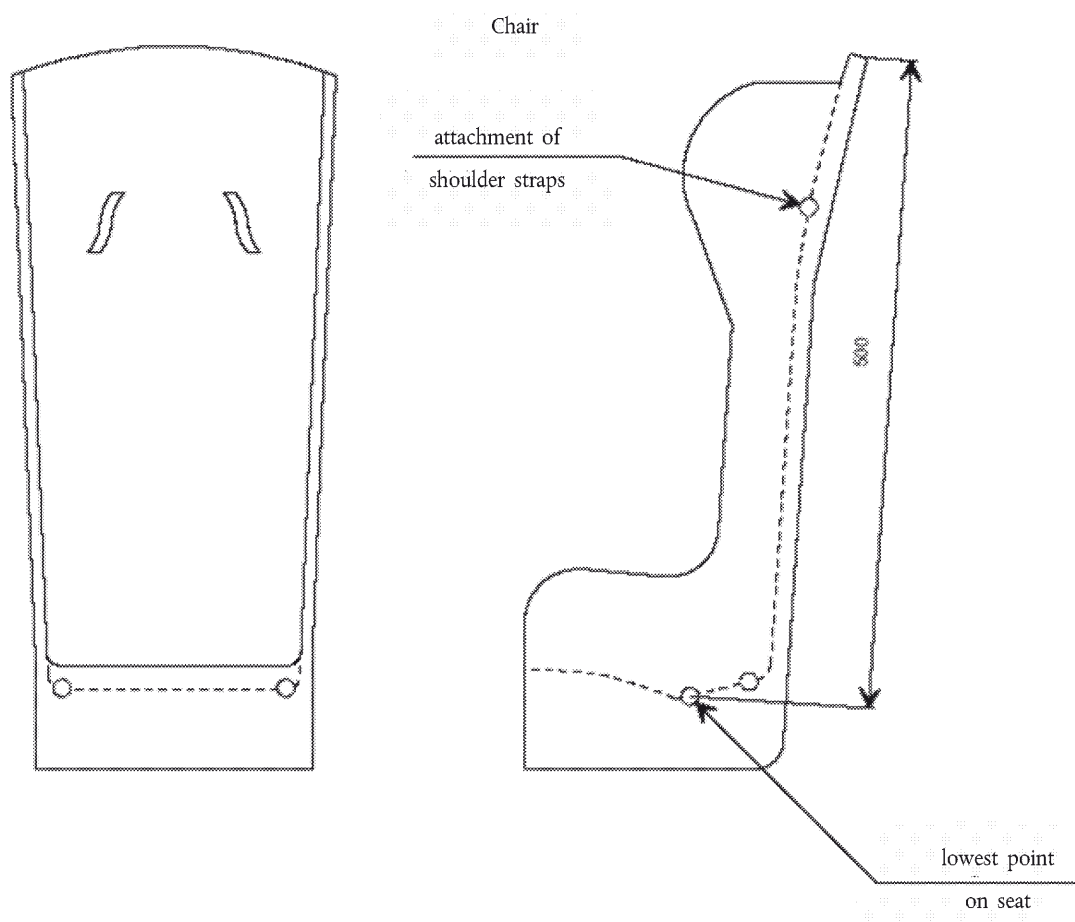
1. This Annex applies only to the additional anchorages for attaching child restraints in the 'semi-universal' category or to bars or other special items used to secure child restraining devices to the bodywork, whether or not they make use of the Regulation No 14 anchorages.
2. The anchorages shall be determined by the manufacturer of the child restraint and details shall be submitted for approval to the Technical Service conducting the tests.

The Technical Services may take into account information obtained from the vehicle manufacturer.

3. The manufacturer of the child restraint shall provide the necessary parts for fitting the anchorages and a special plan for each vehicle showing their exact location.
4. The child restraint manufacturer shall indicate if the anchorages required for attaching the restraint to the car structure are in accordance with the position and strength requirements of paragraph 3 onwards in the recommendation given to Governments intending to adopt specific requirements relating to anchorages for child restraints used in passenger cars ⁽¹⁾.

⁽¹⁾ See text of Regulation No 16.

ANNEX 12



Dimensions in mm

ANNEX 13

STANDARD SAFETY-BELT

1. The safety-belt for the dynamic test and for the maximum length requirement shall be made to one of the two configurations shown in Figure 1. These are a three-point retracting belt and a two-point static belt.
2. The three-point retracting belt has the following rigid parts: a retractor (R), a pillar loop (P), two anchorage points (A1 and A2) (see Figure 1), and a central part (N, in detail in Figure 3). The retractor shall comply with the requirements of Regulation No 16 for retraction force. The retractor spool diameter is $33 \pm 0,5$ mm.
3. The retracting belt shall be fitted to the anchorages on the test seat, described in Annex 6, Appendices 1 and 4, as follows:

Belt anchorage A1 shall be fitted to trolley anchorage B0 (outboard)

Belt anchorage A2 shall be fitted to trolley anchorage A (inboard)

Belt pillar loop P shall be fitted to trolley anchorage C.

Belt retractor R shall be fitted to trolley anchorage such that the spool centre-line is positioned on Re.

The value of X in Figure 1 below is 200 ± 5 mm. The effective strap length between A1 and the centre-line of the retractor spool Re (when the webbing is fully extracted including the minimum length of 150 mm for testing of universal and semi-universal categories shall be $2\,820 \pm 5$ mm when measured in a straight line without load and on a horizontal surface; this length may be increased for testing of restricted category; for all categories with the child restraint installed there shall be a minimum of 150 mm of strap length on the retractor spool.

4. The strap requirements for the belt are as follows:

Material: polyester spinnblack — width: 48 ± 2 mm at 10 000 N
— thickness: $1,0 \pm 0,2$ mm
— elongation: 8 ± 2 per cent at 10 000 N

5. The two-point static belt as shown in Figure 1 consists of two standard anchorage plates as shown in Figure 2 and a strap fulfilling the requirements of paragraph 4 above.
6. The two-point belt anchorage plates shall be fitted to trolley anchorages A and B. The value of Y in Figure 1 is $1\,300 \pm 5$ mm. This is the maximum length requirement for the approval of universal child restraints with two-point belts (see paragraph 6.1.9).

Figure 3
Central part of the standard belt configuration
Dimensions in mm

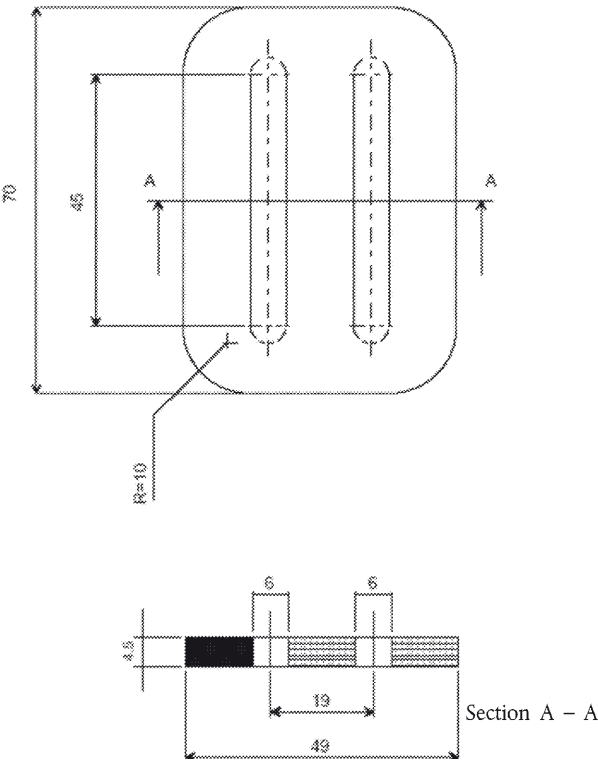
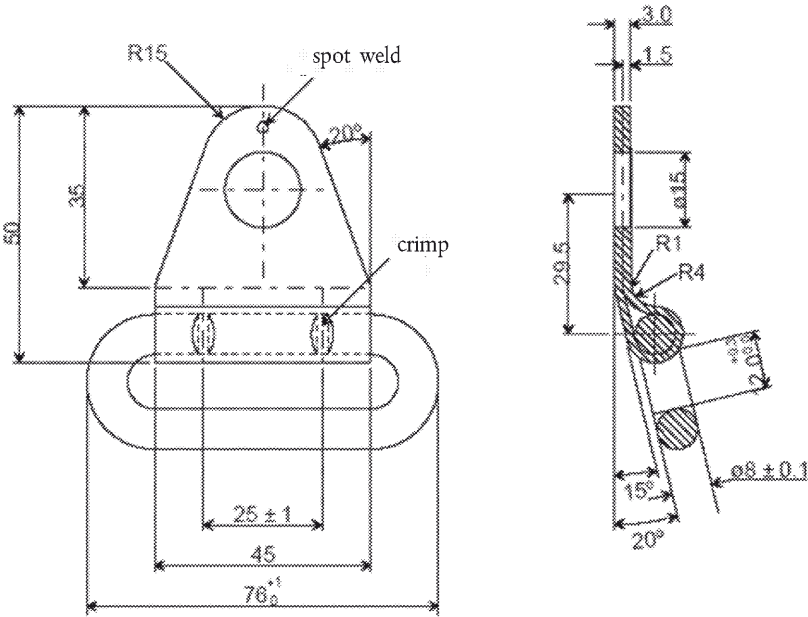


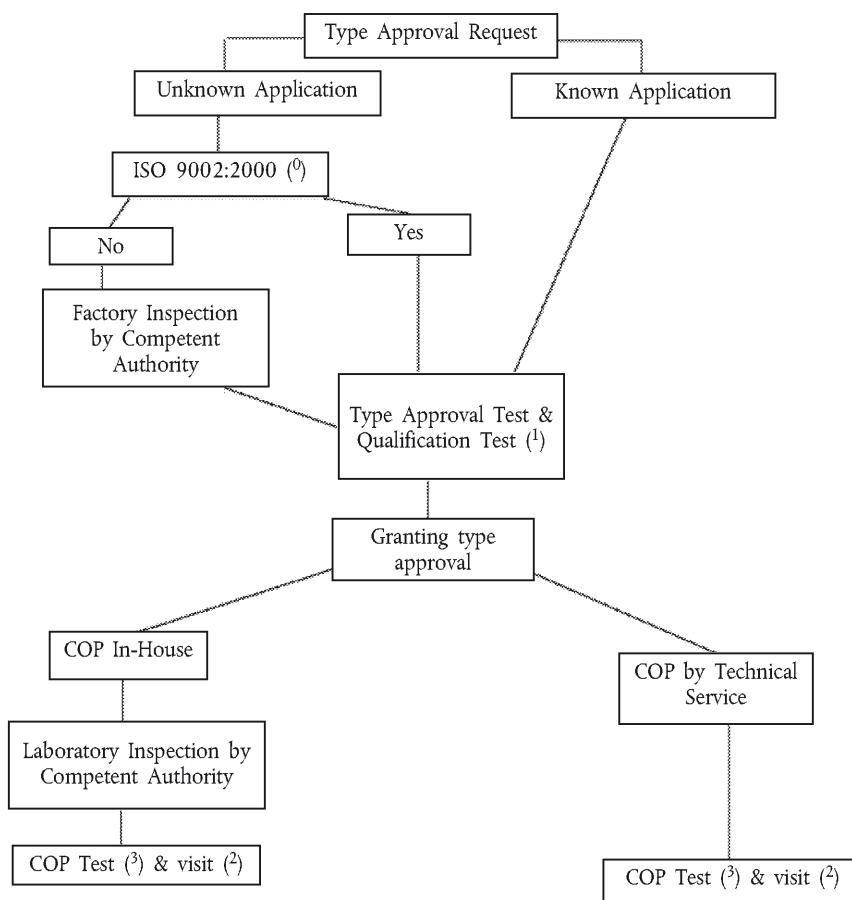
Figure 4
Pillar loop

Finish: Chromium plated



ANNEX 14

TYPE APPROVAL SCHEME (FLOW CHART ISO 9002:2000)



Notes:

⁽⁰⁾ Or an equivalent standard to this one with the permissible exclusion of the requirements related to the concepts of design and development, point 7.3 'Customer satisfaction and continual improvement'.

⁽¹⁾ These tests shall be done by Technical Service.

⁽²⁾ Visit to the manufacturer for inspection and random sampling by the Authority or Technical Service:

- (a) if there is no ISO 9002:2000: 2 times a year;
- (b) if there is an ISO 9002:2000: 1 times a year.

⁽³⁾ Tests in accordance with Annex 16:

- (a) if there is no ISO 9002:2000:
 - (i) of the Authority or Technical Service during the visit of footnote 2a;
 - (ii) of the manufacturer between the visits of footnote 2b;
- (b) if there is an ISO 9002:2000: taken by the manufacturer, procedure checked during visit of footnote 2b.

ANNEX 15

EXPLANATORY NOTES

The explanatory notes given in this Annex concern interpretation difficulties with the Regulation. They are meant as a guide for the Technical Services performing the tests.

Paragraph 2.10.1.

A quick adjuster can also be a device with a rotation shaft and spring similar to a retractor with a manual release. The adjuster should be tested to the requirements of paragraphs 7.2.2.5 and 7.2.3.1.3.

Paragraph 2.19.2.

A semi-universal restraint specified for fitting to the rear seat in both a saloon and an estate type vehicle in which the whole belt assembly is identical is one 'type'.

Paragraph 2.19.3.

The significance of changes in the dimensions and/or mass of the seat, padding or impact shield and the energy-absorbing characteristics or colour of the material are to be considered when deciding whether a new type has been created.

Paragraphs 2.19.4 and 2.19.5.

These paragraphs shall not apply to any safety belts separately approved in accordance with Regulation No 16 which is necessary to anchor the child restraint to the vehicle or to restrain the child.

Paragraph 6.1.2.

For rearward-facing child restraints the correct position of the top of the restraint relative to the child dummy head is ensured by installing the largest dummy, for which the device was specified, in the most reclined configuration, and making sure that a horizontal line at the eye height passes below the top of the seat.

Paragraph 6.1.8.

The 150 mm requirement also applies to carry cots.

Paragraph 6.2.4.

The limit of acceptable movement of the shoulder belt is that the lower edge of the shoulder portion of the standard safety-belt shall not be lower than the dummy's elbow at the point of maximum excursion of the dummy.

Paragraph 6.2.9.

Common understanding is that it applies also to devices that have such a lock-off even if they are not required for that group. Thus the test would be applied to a group 2 only device, but at the prescribed force, i.e. twice the mass of group 1 dummy.

Paragraph 7.1.3.

The overturning test will be conducted using the same installation procedure and parameters as those defined for the dynamic test.

Paragraph 7.1.3.1.

Stopping of the rig during the overturning is not allowed.

Paragraph 7.1.4.2.2.

The wording of this paragraph refers to accelerations representing tensile loads in the spine of the dummy.

Paragraph 7.1.4.3.1.

Visible signs of penetration means penetration of the clay by the abdominal insert (under pressure from the restraint) but not bending of the clay without compression in a horizontal direction as for instance is brought about by simple bending of the spine. See also interpretation of paragraph 6.2.4.

Paragraph 7.2.1.5.

The first sentence is complied with if the hand of the dummy could reach the buckle.

Paragraph 7.2.2.1.

This shall be used to ensure that separately approved guide-straps shall be easily attached and detached.

Paragraph 7.2.4.1.1.

Two straps are required. Measure the breaking load of the first strap. Measure the width of the second strap at 75 per cent of this load.

Paragraph 7.2.4.4.

Items which may be disassembled or unthreaded and where incorrect reassembly is probable for an untrained user and could result in a dangerous configuration shall not be allowed.

Paragraph 8.1.2.2.

'Fastened to the seat' means the test seat as prescribed in Annex 6. 'Specific devices may' means that a 'specific' restraint would normally be tested for overturning when installed in the test seat, but that testing in the vehicle seat was allowed.

Paragraph 8.2.2.1.1.

'Having regard to normal conditions of use' means that this test should be performed with the restraint mounted on the test or vehicle seat but without the dummy.

The dummy shall be used only to position the adjusting device. In the first instance the straps should be adjusted in accordance with paragraph 8.1.3.6.3.2 or 8.1.3.6.3.3 (whichever is appropriate). The test should then be conducted after removal of the dummy.

Paragraph 8.2.5.2.6.

This paragraph shall not apply to guide straps which are approved separately under this Regulation.

ANNEX 16

CONTROL OF CONFORMITY OF PRODUCTION**1. Tests**

Child restraint systems shall be required to demonstrate compliance with the requirements on which the following tests are based:

1.1. Verification of the locking threshold and durability of emergency locking retractors

According to the provisions of paragraph 8.2.4.3 in the most unfavourable direction as appropriate after having undergone the durability testing detailed in paragraphs 8.2.4.2, 8.2.4.4 and 8.2.4.5 as a requirement of paragraph 7.2.3.2.6.

1.2. Verification of the durability of automatically locking retractors

According to the provisions of paragraph 8.2.4.2 supplemented by the tests in paragraphs 8.2.4.4 and 8.2.4.5 as a requirement of paragraph 7.2.3.1.3.

1.3. Test for strength of straps after conditioning

According to the procedure described in paragraph 7.2.4.2 after conditioning according to the requirements of paragraphs 8.2.5.2.1 to 8.2.5.2.5.

1.3.1. Test for strength of straps after abrasion

According to the procedure described in paragraph 7.2.4.2 after conditioning according to the requirements described in paragraph 8.2.5.2.6.

1.4. Microslip test

According to the procedure described in paragraph 8.2.3 of this Regulation.

1.5. Energy absorption

According to the provisions of paragraph 7.1.2 of this Regulation.

1.6. Verification of the performance requirements of the child restraint system when subjected to the appropriate dynamic test

According to the provisions set out in paragraph 8.1.3 with any buckle having been pre-conditioned according to the requirements of paragraph 7.2.1.7 such that the appropriate requirements of paragraph 7.1.4 (for the overall performance of the child restraint) and paragraph 7.2.1.8.1 (for the performance of any buckle under load) are complied with.

1.7. Temperature test

According to the provisions of paragraph 7.1.5 of this Regulation.

2. Test frequency and results**2.1. The frequency of testing to the requirements of paragraphs 1.1 to 1.5 and 1.7 shall be on a statistically controlled and random basis in accordance with one of the regular quality assurance procedure, and must be conducted at least once per year.****2.2. Minimum conditions for the control of conformity of child restraint systems of categories 'Universal', 'Semi Universal' and 'Restricted', in relation to the dynamic tests according to paragraph 1.6.**

In accordance with the relevant authorities, the holder of an approval will supervise the control of conformity following the method of batch control (paragraph 2.2.1) or following the method of continuous control (paragraph 2.2.2).

2.2.1. Batch control for the child restraint systems

2.2.1.1. The holder of an approval must divide the child restraint systems into batches which are as uniform as possible in regard to raw material or intermediate products involved in their manufacture (different colour of shell, different manufacture of harness) and in regard to production conditions. The numbers in a batch must not exceed 5 000 units.

In agreement with the relevant authorities the tests can be carried out by the Technical Service authorities or under the responsibility of the holder of an approval.

2.2.1.2. A sample must be taken in each batch in accordance with the provisions of paragraph 2.2.1.4 from a minimum of 20 per cent of the batch quantity, which has to be produced of the actual batch.

2.2.1.3. The characteristics of the child restraint systems and the number of dynamic tests to be conducted are given in paragraph 2.2.1.4.

2.2.1.4. In order to be accepted, a batch of child restraint systems must satisfy the following conditions:

Number in the batch	Number of samples/ child restraint systems characteristics	Combined number of samples	Acceptance criteria	Rejection criteria	Degree of control rigour
N < 500	1st = 1MH	1	0	—	Normal
	2nd = 1MH	2	1	2	
500 < N < 5 000	1st = 1MH+1LH	2	0	2	Normal
	2nd = 1MH+1LH	4	1	2	
N < 500	1st = 2MH	2	0	2	Strengthened
	2nd = 2MH	4	1	2	
500 < N < 5 000	1st = 2MH+2LH	4	0	2	Strengthened
	2nd = 2MH+2LH	8	1	2	

Note:

MH signifies harder configuration (the least good results obtained in approval or extension of approval)

LH signifies a less hard configuration

This dual sampling plan functions as follows:

For a normal control, if the first sample does not contain any defective units the batch is accepted without testing a second sample. If it contains two defective units the batch is rejected. Finally, if it contains one defective unit a second sample is extracted and it is the cumulative number, which must satisfy the condition of column 5 of the table above.

There is a change from normal control to strengthened control if, out of 5 consecutive batches, two are rejected. Normal control is resumed if 5 consecutive batches are accepted.

If any batch is rejected, the production is considered to be non-conforming and the batch shall not be released.

If two consecutive batches subjected to the strengthened control are rejected, the provisions of paragraph 13 are applied.

2.2.1.5. The control of child restraint systems conformity is undertaken starting with the batch manufactured after the first batch which was subjected to production qualification.

2.2.1.6. The test results described in paragraph 2.2.1.4 shall not exceed L, where L is the limit value prescribed for each approval test.

2.2.2. Continuous control

2.2.2.1. The holder of an approval shall be obliged to carry out continuous quality control of his manufacturing process on a statistical basis and by sampling. In agreement with the relevant authorities, the tests can be carried out by the Technical Service authorities or under the responsibility of the holder of an approval which is responsible for the traceability of the product.

2.2.2.2. The samples must be taken in accordance with the provisions of paragraph 2.2.2.4.

2.2.2.3. The characteristic of the child restraint systems is taken at random and the tests to be carried out are described in paragraph 2.2.2.4.

2.2.2.4. Control shall meet the following requirements.

Child restraint systems taken	Degree of control rigour
0,02 per cent means one child restraint system taken from every 5 000 manufactured	Normal
0,05 per cent means one child restraint system taken from every 2 000 manufactured	Strengthened

This dual sampling plan functions as follows:

If the child restraint system is considered to conform, the production conforms.

If the child restraint system does not meet the requirements, a second child restraint system shall be taken.

If the second child restraint system meet the requirements, the production conforms.

If both (the first and the second) child restraint systems do not meet the requirements, the production does not conform and child restraint systems that are likely to present the same failure shall be withdrawn and necessary steps shall be taken to re-establish the conformity of the production.

Strengthened control will replace normal control if, out of 10 000 child restraint systems manufactured consecutively, the production has to be withdrawn twice.

Normal control is resumed if 10 000 child restraint systems manufactured consecutively are considered to conform.

If production subjected to the strengthened control has been withdrawn on two consecutive occasions, the provisions of paragraph 13 are applied.

2.2.2.5. The continuous control of child restraint systems is undertaken starting after the production qualification.

2.2.2.6. The test results described in paragraph 2.2.2.4 shall not exceed L, where L is the limit value prescribed for each approval test.

2.3. For 'built-in' vehicle specific devices, the following test frequencies shall apply:

Child restraints, except booster cushions: once every 8 weeks

Booster cushions: once every 12 weeks.

At each test all requirements according to paragraphs 7.1.4 and 7.2.1.8.1 must be fulfilled. If all tests during 1 year show satisfactory results, the manufacturer may, after agreement with the competent authority, reduce the frequencies as follows:

Child restraints, except booster cushions: once every 16 weeks

Booster cushions: once every 24 weeks.

However, a minimum frequency of one test per year shall be permitted where annual production is 1 000 child restraint systems or less.

- 2.3.1. For vehicle-specific devices according to paragraph 2.1.2.4.1, the child restraint manufacturer may choose Conformity of Production procedures according to either paragraph 2.2, on a test seat, or paragraph 2.3, in a vehicle body shell.
 - 2.3.2. Where a test sample fails a particular test to which it has been subjected, a further test to the same requirement shall be carried out on at least three other samples. In the case of dynamic tests if one of the latter fails, the production is considered to be non-conforming and the frequency shall be raised to the higher one if the lower one was used according to paragraph 2.3 and necessary steps shall be taken to re-establish the conformity of the production.
 - 2.4. When production is found to be non-conforming according to paragraphs 2.2.1.4, 2.2.2.4 or 2.3.2, the holder of the approval or his duly accredited representative shall:
 - 2.4.1. Notify the Competent Authority which has granted type approval indicating what steps have been taken to re-establish the conformity of production.
 - 2.5. The manufacturer must advise the competent authority on a quarterly basis, the volume of products produced against each approval number, providing a means of identifying which products correspond to that approval number.
-

ANNEX 17

TEST OF ENERGY ABSORBING MATERIAL

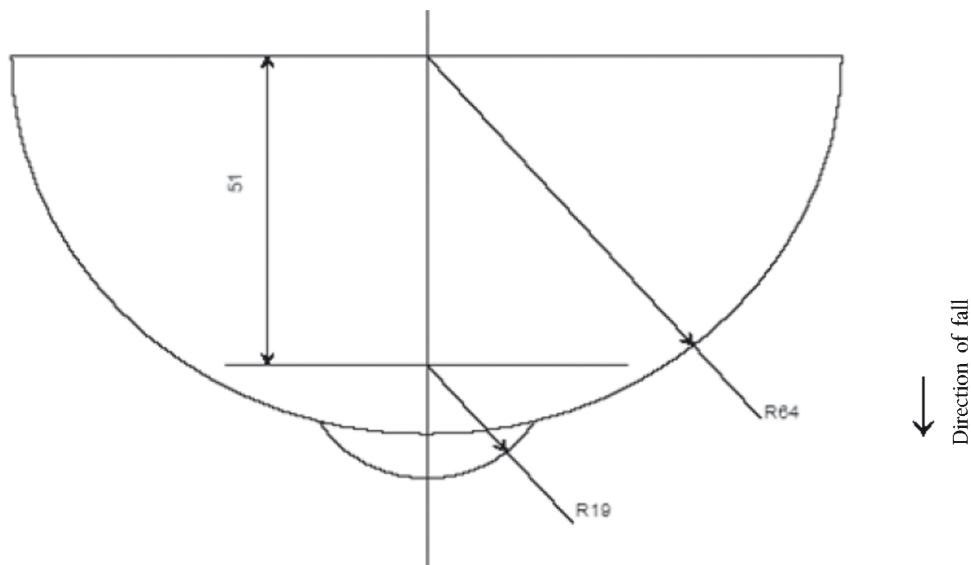
1. Headform

1.1. The headform shall consist of a solid wooden hemisphere with an added smaller spherical segment as shown in Figure A below. It shall be constructed so that it can be dropped freely along the axis marked and it shall have provision for mounting an accelerometer in order to measure the acceleration along the direction of fall.

1.2. The headform shall have a total mass, including the accelerometer of $2,75 \pm 0,05$ kg.

Figure A

Headform



Dimensions in mm

2. Instrumentation

The acceleration shall be recorded during the test, using equipment in accordance with channel frequency class 1 000 as specified in the latest version of ISO 6487.

3. Procedure

3.1. The assembled child restraint shall be placed in the region of impact on a rigid flat surface, whose minimum dimensions are 500×500 mm, so that the direction of impact is perpendicular to the inner surface of the child restraint system in the area of impact.

3.2. Raise the headform to a height of $100 - 0/+5$ mm from the respective upper surfaces of the assembled child restraint to the lowest point on the headform, and allow it to fall. Record the acceleration experienced by the headform during impact.

ANNEX 18

METHOD OF DEFINING HEAD IMPACT AREA OF DEVICES WITH BACKRESTS AND FOR REARWARD-FACING DEVICES DEFINING THE MINIMUM SIZE OF SIDE WINGS

1. Place the device on the test seat described in Annex 6. Reclinable devices shall be set in the most upright position. Place the smallest manikin in the device in accordance with the manufacturer's instructions. Mark a point 'A' on the backrest on the same horizontal level as the shoulder of the smallest manikin at a point 2 cm inside the outer edge of the arm. All internal surfaces above the horizontal plane passing through point A, shall be tested in accordance with Annex 17. This area shall include the backrest and side wings, including the inner edges (zone of radius) of the side wings. In the case of carrycot devices where a symmetrical installation of the dummy is not possible according to the device and manufacturer instructions, the area complying with Annex 17 shall be all internal surfaces above a point 'A', as previously defined, in the head direction, when measured with this dummy in the carrycot in its worst position consistent with the manufacturer instructions and the carrycot positioned on the test bench.

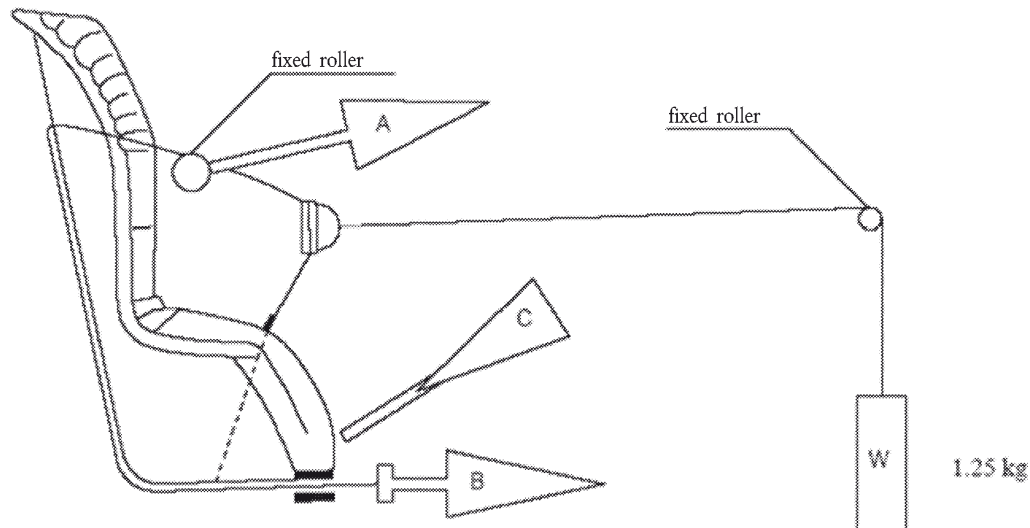
If a symmetrical installation of the dummy in the carrycot may be possible, the whole inner area shall comply with Annex 17.

2. For rearward-facing devices there shall be side wings with a depth of minimum 90 mm measured from the median of the surface of the backrest. These side wings shall start at the horizontal plane passing through point 'A' and continue to the top of the seat back. Starting from a point 90 mm below the top of the seat back, the depth of the side wing may be gradually reduced.
 3. The requirement in paragraph 2 above for a minimum size of side wings does not apply to child restraints of mass groups II and III in the specific vehicle category to be used in the luggage area according to paragraph 6.1.2 of this Regulation.
-

ANNEX 19

DESCRIPTION OF CONDITIONING OF ADJUSTERS MOUNTED DIRECTLY ON CHILD RESTRAINTS

Figure 1



1. Method

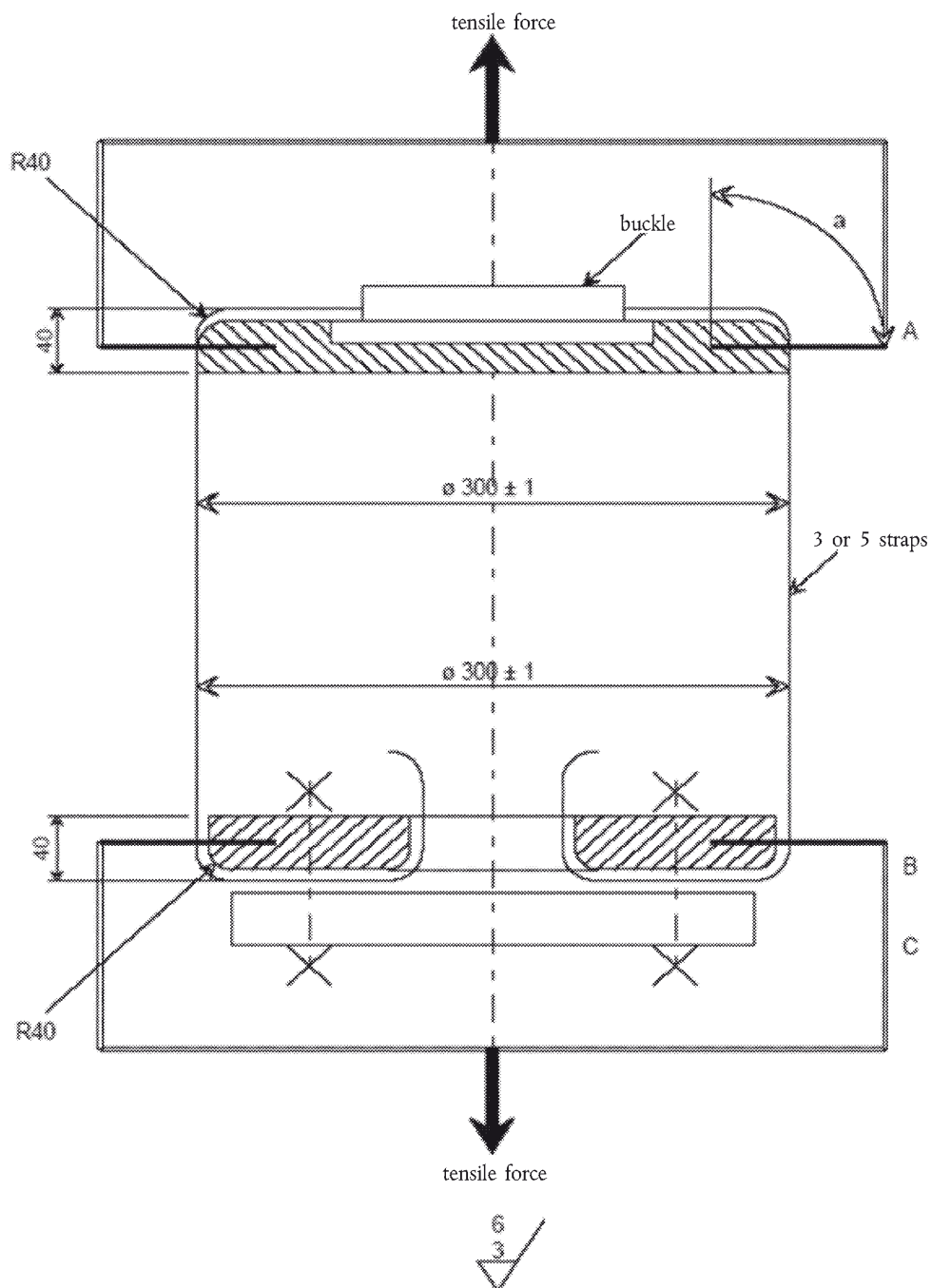
- 1.1. With the webbing set at the reference position described in paragraph 8.2.7, withdraw at least 50 mm of webbing from the integral harness by pulling on the free end of the webbing.
- 1.2. Attach the adjusted part of the integral harness to the pulling device A.
- 1.3. Activate the adjuster and pull at least 150 mm of webbing into the integral harness. This represents half of one cycle and puts pulling device A to the maximum webbing extraction position.
- 1.4. Connect free end of webbing to pulling device B.

2. The cycle is:

- 2.1. Pull B at least 150 mm whilst A exerts no tension on the integral harness.
- 2.2. Activate the adjusters and pull A whilst B exerts no tension on the free end of the webbing.
- 2.3. At the end of stroke, de-activate the adjuster.
- 2.4. Repeat cycle as specified in paragraph 7.2.2.7.

ANNEX 20

TYPICAL BUCKLE STRENGTH TEST DEVICE

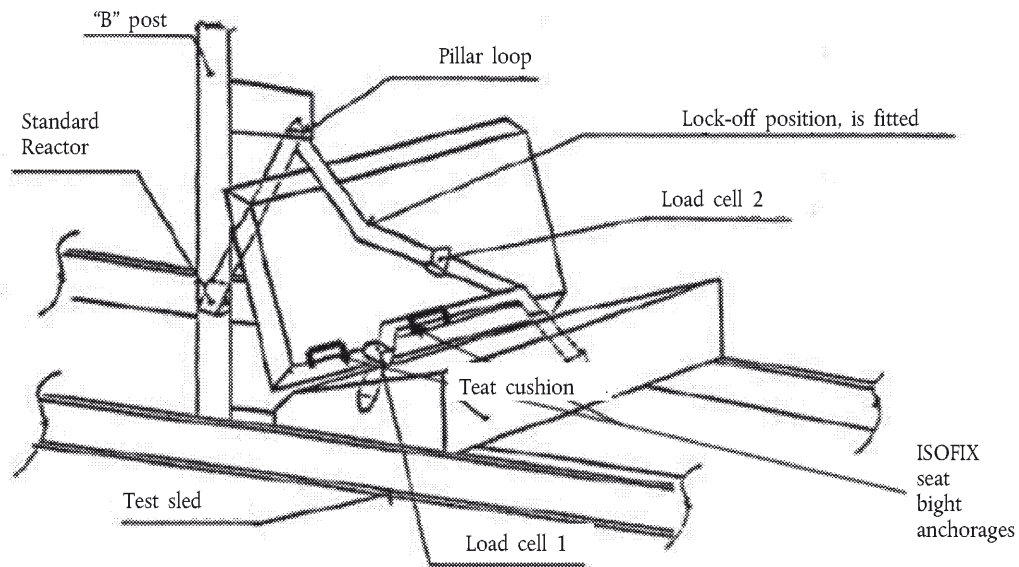


dimensions in mm

a = surface at A:

ANNEX 21

DYNAMIC CRASH TEST INSTALLATION



1. Method

1.1. Lap belt only

Fit load cell 1 to the outboard position as shown above. Install the child restraint and tension the reference belt at the outboard position to achieve a load of $75 \text{ N} \pm 5 \text{ N}$ at the outboard position.

1.2. Lap and diagonal belt

1.2.1. Fit load cell 1 to the outboard position as shown above. Install the child restraint into the correct position. If a lock-off device is fitted to the child restraint and acts upon the diagonal belt, place load cell 2 at a convenient position behind the child restraint between the lock-off device and the buckle as shown above. If no lock-off device is fitted or if the lock-off device is fitted at the buckle, position load cell at a convenient position between the pillar loop and the child restraint.

1.2.2. Adjust the lap portion of the reference belt to achieve a tension load of $50 \text{ N} \pm 5 \text{ N}$ at load cell 1. Make a chalk mark on the webbing where it passes through the simulated buckle. Whilst maintaining the belt at this position adjust the diagonal to achieve a tension of $50 \text{ N} \pm 5 \text{ N}$ at load cell 2 by either locking the webbing at the child restraint webbing locker or by pulling the belt close to the standard retractor.

1.2.3. Extract all webbing from the retractor spool and rewind with a tension in the belt of $4 \pm 3 \text{ N}$ between the retractor and pillar loop. The spool shall be locked before the dynamic test. Conduct the dynamic crash test.

1.2.4. Before commencing the set-up, check the child restraint to determine compliance with paragraph 6.2.1.3. If there is a change in installation tension due to the change of angle function, then test for the condition which creates the slackest installation, conduct the set-up and tension in the tightest position and then reposition the child restraint to the worst case without re-tensioning the adult belt. Conduct the dynamic test.

1.3. ISOFIX attachment

For an ISOFIX child restraint system with adjustable position seat bight ISOFix anchorages. Attach the unladen ISOFIX child restraint system onto the seat bight anchorages H1-H2 in the appropriate test position. Allow the ISOFIX child restraint latch mechanisms to pull the unladen ISOFIX child restraint system towards the seat bight. Apply an additional force of $135 \pm 15 \text{ N}$ in a plane parallel to the test bench seat cushion surface in the direction of the seat bight to overcome frictional forces between the ISOFIX child restraint system and the seat cushion, assisting the self-tensioning effects of the latch mechanism. The force shall be applied on or equally about

the centreline of the ISOFIX child restraint and at a height not more than 100 mm above the test bench cushion surface. If needed, adjust the top tether to achieve a tension load of 50 ± 5 N (*). Place appropriate test dummy in child restraint when the ISOFIX child restraint system has been so adjusted.

Note

1. Installation is conducted after fitting the manikin into the restraint, for paragraphs 1.1 and 1.2.
2. Because the foam test cushion will compress after installation of the child restraint, the dynamic test must be conducted no more than 10 minutes after installation as possible. To allow the cushion to recover, the minimum period between two tests using the same cushion shall be 20 minutes.
3. Load cells fitted directly onto the belt webbing may be disconnected electrically, but must be left in place during the dynamic test. The mass of each cell is not to exceed 250 grams. Alternatively the lap belt webbing load cell may be replaced by a load cell fixed at the anchorage point.
4. In the case of restraints fitted with devices intended to increase the adult safety-belt tension, the test method shall be:

Install the child restraint system as required in this Annex and then apply the tensioner device as stated in the manufacturers instructions. If the device cannot be applied due to excess tension then it is deemed to be an unacceptable device.
5. No additional force shall be applied to the child restraint system other than the minimum required to achieve the correct installation forces as specified in paragraphs 1.1 and 1.2.2.
6. In case of carrycot installed as described in paragraph 8.1.3.5.6, the connection between the adult safety belt and the restraint shall be simulated. A 500 mm free end length adult safety belt (measured as described in Annex 13) is connected by the anchoring plate described in Annex 13 to the prescribed anchoring points. The restraint is then connected to the free end adult safety belts. The tension on the adult safety belt, measured between the anchoring point and the restraint shall be 50 ± 5 N.

(*) In the case of restraints fitted with devices intended to increase the top tether tension, the test method shall be:
Install the ISOFIX child restraint system as required in this Annex and then apply the tensioner device as stated in the manufacturers instructions. If the device cannot be applied due to excess tension then it is deemed to be an unacceptable device.

ANNEX 22

LOWER TORSO BODY BLOCK TEST

Figure 1

Truncated P10 manikin block

Material: EPS (40 to 45 g/l)

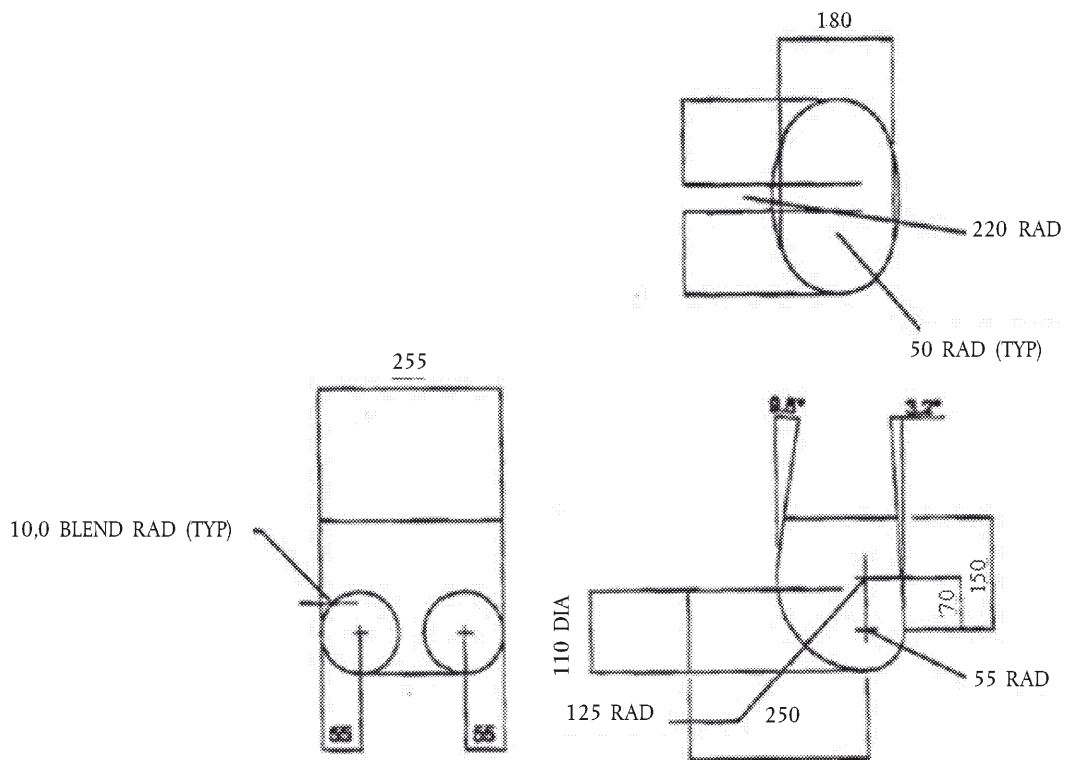
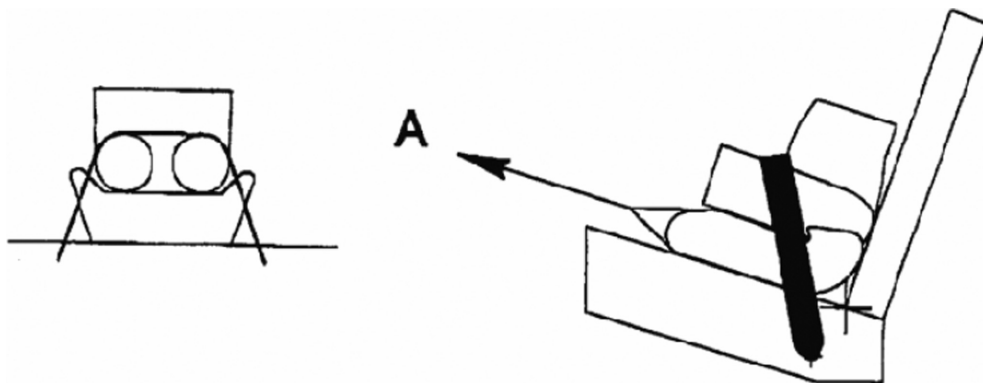


Figure 2

Booster pull test using manikin block



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