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Contents

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- ★ **Regulation No 17 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of vehicles with regard to the seats, their anchorages and any head restraints** 1
- ★ **Regulation No 55 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles** 50
- ★ **Regulation No 107 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of category M₂ or M₃ vehicles with regard to their general construction** 133
- ★ **Regulation No 114 of the Economic Commission for Europe of the United Nations (UN/ECE). Uniform provisions concerning the approval of: I. An Airbag Module for a Replacement Airbag System; II. A Replacement Steering Wheel equipped with an Airbag Module of an Approved Type; III. A Replacement Airbag System other than that installed in a Steering Wheel.** 272

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(Acts whose publication is obligatory)

**Regulation No 17 of the Economic Commission for Europe of the United Nations (UN/ECE)
— Uniform provisions concerning the approval of vehicles with
regard to the seats, their anchorages and any head restraints**

Revision 4**Incorporating all valid text up to:**

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TREATIES-1 dated 4 March 2004

Corrigendum 2 to Revision 4 of the Regulation, subject of Depositary Notification C.N. 1035.2004.

TREATIES-1 dated 4 October 2004

1. SCOPE

This Regulation applies to the strength of seats, to their anchorages and to their head restraints, of vehicles of categories M1 and N, and to the strength of seats, to their anchorages and to their head restraints, of vehicles of categories M2 and M3, not covered by Regulation No. 80, 01 series of amendments. 1/ 2/

It also applies to the design of the rear parts of seat-backs 2/ and to devices intended to protect the occupants from the danger resulting from the displacement of luggage in a frontal impact, of vehicles of category M1.

It does not apply to folding, side-facing or rearward-facing seats, or to any head restraint fitted to these seats.

2. DEFINITIONS

For the purposes of this Regulation

- 2.1. "Approval of a vehicle" means the approval of a vehicle type with regard to the strength of the seats and their anchorages, the design of the rear parts of the seat-backs and the characteristics of their head restraints;
- 2.2. "Vehicle type" means a category of motor vehicles which do not differ in such essential respects as:
 - 2.2.1. the structure, shape, dimensions, materials and the mass of the seats, although the seats may differ in covering and colour; differences not exceeding 5 per cent in the mass of the approved seat type shall not be considered significant;
 - 2.2.2. the type and dimensions of the adjustment, displacement and locking systems of the seat-back and seats and their parts;
 - 2.2.3. the type and dimensions of the seat anchorages;
 - 2.2.4. the dimensions, frame, materials and padding of head restraints, although they may differ in colour and covering;
 - 2.2.5. the type and dimensions of the attachments of the head restraint and the characteristics of the part of the vehicle to which the head restraint is attached, in the case of a separate head restraint;
- 2.3. "Seat" means 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;

1/ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), annex 7 (document TRANS/WP.29/78/Rev.1/Amend.2).

2/ The rear parts of seat-backs of vehicles of category M1 are considered to comply with the provisions of paragraphs 5.1.3. and 5.1.4. of this Regulation provided they comply with the provisions of Regulation No. 21 "Uniform Provisions concerning the Approval of Vehicles with regard to their Interior Fittings" (E/ECE/324-E/ECE/TRANS/505/Rev.1/Add.20/Rev.2).

- 2.4. "Bench seat" means a structure complete with trim, intended to seat more than one adult person;
- 2.5. "Anchorage" means the system by which the seat assembly is secured to the vehicle structure, including the affected parts of the vehicle structure;
- 2.6. "Adjustment system" means the 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:
- 2.6.1. longitudinal displacement;
- 2.6.2. vertical displacement;
- 2.6.3. angular displacement;
- 2.7. "Displacement system" means a device by which the seat or one of its parts can be displaced and/or rotated, without a fixed intermediate position, to permit easy access of occupants to the space behind the seat concerned;
- 2.8. "Locking system" means a device ensuring that the seat and its parts are maintained in the position of use;
- 2.9. "Folding seat" means an auxiliary seat intended for occasional use and normally folded;
- 2.10. "Transverse plane" means a vertical plane perpendicular to the median longitudinal plane of the vehicle;
- 2.11. "Longitudinal plane" means a plane parallel to the median longitudinal plane of the vehicle;
- 2.12. "Head restraint" means a device whose purpose is to limit the rearward displacement of an adult occupant's head in relation to his torso in order to reduce the danger of injury to the cervical vertebrae in the event of an accident;
- 2.12.1. "Integrated head restraint" means a head restraint formed by the upper part of the seat-back. Head restraints meeting the definitions of paragraphs 2.12.2. or 2.12.3. below but which can only be detached from the seat or the vehicle structure by the use of tools or by partial or complete removal of the seat covering, meet the present definition;
- 2.12.2. "Detachable head restraint" means a head restraint consisting of a component separable from the seat designed for insertion and positive retention in the seat-back structure;
- 2.12.3. "Separate head restraint" means a head restraint consisting of a component separate from the seat, designed for insertion and/or positive retention in the structure of the vehicle;
- 2.13. "R point" means the seating reference point as defined in annex 3 to this Regulation;
- 2.14. "Reference line" means the line on the manikin reproduced in annex 3, appendix 1, figure 1, to this Regulation.
- 2.15. "Partitioning system" means parts or devices which, in addition to the seat-backs, are intended to protect the occupants from displaced luggage; in particular, a partitioning system may be constituted by netting or wire mesh located above the level of the seat-backs in their

upright or folded down position. Head restraints fitted as standard equipment for vehicles equipped with such parts or devices shall be considered as part of the partitioning system. However, a seat equipped with a head restraint shall not be considered as being on its own a partitioning system.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a vehicle type shall be submitted by the vehicle manufacturer or by his duly accredited representative.

3.2. It shall be accompanied by the following documents in triplicate and the following particulars:

3.2.1. a detailed description of the vehicle type with regard to the design of the seats, their anchorages, and their adjustment, displacement and locking systems;

3.2.1.1. A detailed description and/or drawings of the partitioning system, if applicable.

3.2.2. drawings, on an appropriate scale and in sufficient detail, of the seats, their anchorages on the vehicle, and their adjustment, displacement and locking systems.

3.2.3. In the case of a seat with a detachable head restraint:

3.2.3.1. a detailed description of the head restraint, specifying in particular the nature of the padding material or materials;

3.2.3.2. a detailed description of the location, the type of support and the attachments for mounting the head restraint on the seat.

3.2.4. In the case of a separate head restraint:

3.2.4.1. a detailed description of the head restraint, specifying in particular the nature of the padding material or materials;

3.2.4.2. a detailed description of the location, and the attachments for fitting the head restraint to the structure of the vehicle.

3.3. The following shall be submitted to the technical service responsible for the approval tests:

3.3.1. a vehicle representative of the vehicle type to be approved or the parts of the vehicle which the technical service deems necessary for approval tests;

3.3.2. an additional set of the seats with which the vehicle is equipped, with their anchorages.

3.3.3. For vehicles with seats fitted or capable of being fitted with head restraints, in addition to the requirements set out in paragraphs 3.3.1. and 3.3.2.:

3.3.3.1. in the case of detachable head restraints: an additional set of seats, fitted with head restraints, with which the vehicle is equipped, together with their anchorages.

3.3.3.2. In the case of separate head restraints: an additional set of the seats with which the vehicle is equipped, with their anchorages, an additional set of the corresponding head restraints and the part of the vehicle structure to which the head restraint is fitted, or a complete structure.

4. APPROVAL

- 4.1. If the vehicle submitted for approval pursuant to this Regulation meets the relevant requirements (seats fitted with head restraints or capable of being fitted with head restraints), approval of the vehicle type shall be granted.
- 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 07, corresponding to the 07 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 either to the same vehicle type equipped with other types of seats or head restraints or with seats anchored differently on the vehicle (this applies both to seats with and to those without head restraints) or to another vehicle type.
- 4.3. Notice of approval or extension or refusal of approval of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation by means of a form conforming to the model in annex 1 to this Regulation.
- 4.4. 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:

- 4.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval; 3/
- 4.4.2. 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 4.4.1.
- 4.4.3. However, if the vehicle is equipped with one or more seats fitted or capable of being fitted with head restraints, approved as meeting the requirements under paragraphs 5.1. and 5.2. below, the number of this Regulation shall be followed by the letters "RA". The form conforming to the model in annex 1 to this Regulation shall indicate which seat(s) of the vehicle is (are) fitted or capable of being fitted with head restraints. The marking shall also indicate that any remaining seats in the vehicle, not fitted or capable of being fitted with head restraints, are approved and meet the requirements of paragraph 5.1. below of this Regulation.
- 4.5. 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 4.4.1. need not be repeated; in such a case the Regulation and approval numbers and the additional 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 4.4.1.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.8. Examples of arrangements of approval marks are given in annex 2 to this Regulation.
5. REQUIREMENTS
- 5.1. General requirements applicable to all seats of vehicles of category M1 4/
- 5.1.1. Every adjustment and displacement system provided shall incorporate a locking system, which shall operate automatically. Locking systems for armrests or other comfort devices

3/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (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 and 48 for New Zealand. 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.

4/ Vehicles of category M2, which are approved to this Regulation as an alternative to Regulation No. 80 (in line with paragraph 1.2. to that Regulation) shall also meet the requirements of this paragraph.

are not necessary unless the presence of such devices will cause additional risk of injury to the occupants of a vehicle in the event of a collision.

- 5.1.2. The unlocking control for a device as referred to in paragraph 2.7. shall be placed on the outside of the seat close to the door. It shall be easily accessible, even to the occupant of the seat immediately behind the seat concerned.
- 5.1.3. The rear parts of seats situated in area 1, defined in paragraph 6.8.1.1. shall pass the energy dissipation test in accordance with the requirements of annex 6 to this Regulation.
- 5.1.3.1. This requirement is deemed to be met if in the tests carried out by the procedure specified in annex 6 the deceleration of the headform does not exceed 80 g continuously for more than 3 ms. Moreover, no dangerous edge shall occur during or remain after the test.
- 5.1.3.2. The requirements of paragraph 5.1.3. shall not apply to rearmost seats or to back-to-back seats.
- 5.1.4. The surface of the rear parts of seats shall exhibit no dangerous roughness or sharp edges likely to increase the risk of severity of injury to the occupants. This requirement is considered as satisfied if the surface of the rear parts of seats tested in the conditions specified in paragraph 6.1. exhibit radii of curvature not less than:
- 2,5 mm in area 1,
5,0 mm in area 2,
3,2 mm in area 3.
- These areas are defined in paragraph 6.8.1.
- 5.1.4.1. This requirement does not apply to:
- 5.1.4.1.1. the parts of the different areas exhibiting a projection of less than 3,2 mm from the surrounding surface, which shall exhibit blunted edges, provided that the height of the projection is not more than half its width;
- 5.1.4.1.2. rearmost seats and back-to-back seats;
- 5.1.4.1.3. Rear parts of seats situated below a horizontal plane passing through the lowest R point in each row of seats. (Where rows of seats have different heights, starting from the rear, the plane shall be turned up or down forming a vertical step passing through the R point of the row of seats immediately in front);
- 5.1.4.1.4. parts such as "flexible wire mesh".
- 5.1.4.2. In area 2, defined in paragraph 6.8.1.2., surfaces may exhibit radii less than 5 mm, but not less than 2,5 mm provided that they pass the energy-dissipation test prescribed in annex 6 to this Regulation. Moreover, these surfaces must be padded to avoid direct contact of the head with the seat frame structure.
- 5.1.4.3. If the areas defined above contain parts covered with material softer than 50 Shore A hardness, the above requirements, with the exception of those relating to the energy-dissipation test in accordance with the requirements of annex 6, shall apply only to the rigid parts.

- 5.1.5. No failure shall be shown in the seat frame or in the seat anchorage, the adjustment and displacement systems or their locking devices during or after the tests prescribed in paragraphs 6.2. and 6.3. Permanent deformations, including ruptures, may be accepted, provided that these do not increase the risk of injury in the event of a collision and the prescribed loads were sustained.
- 5.1.6. No release of the locking systems shall occur during the tests described in paragraph 6.3. and in annex 9, paragraph 2.1.
- 5.1.7. After the tests, the displacement systems intended for permitting or facilitating the access of occupants must be in working order; they must be capable, at least once, of being unlocked and must permit the displacement of the seat or the part of the seat for which they are intended.
- Any other displacement systems, as well as adjustment systems and their locking systems are not required to be in working order.
- In the case of seats provided with head restraints, the strength of the seat-back and of its locking devices is deemed to meet the requirements set out in paragraph 6.2. when, after testing in accordance with paragraph 6.4.3.6., no breakage of the seat or seat-back has occurred: otherwise, it must be shown that the seat is capable of meeting the test requirements set out in paragraph 6.2.
- In the case of seats (benches) with more places to sit than head restraints, the test described in paragraph 6.2. shall be carried out.
- 5.2. General specifications applicable to seats of vehicles of categories N1, N2 and N3 and to seats of vehicles of categories M2 and M3 not covered by Regulation No. 80
- 5.2.1. Seats and bench seats must be firmly attached to the vehicle.
- 5.2.2. Sliding seats and bench seats must be automatically lockable in all the positions provided.
- 5.2.3. Adjustable seat-backs must be lockable in all the positions provided.
- 5.2.4. All seats which can be tipped forward or have fold-on backs must lock automatically in the normal position.
- 5.3. Mounting of head restraints
- 5.3.1. A head restraint shall be mounted on every outboard front seat in every vehicle of category M1. Seats fitted with head restraints, intended for fitment in other seating positions and in other categories of vehicles may also be approved to this Regulation.
- 5.3.2. A head restraint shall be mounted on every outboard front seat in every vehicle of category M2 with a maximum mass not exceeding 3500 kg and of category N1; head restraints mounted in such vehicles shall comply with the requirements of Regulation No. 25, as amended by the 03 series of amendments.

5.4. Special requirements for seats fitted or capable of being fitted with head restraints

- 5.4.1. The presence of the head restraint must not be an additional cause of danger to occupants of the vehicle. In particular, it shall not in any position of use exhibit any dangerous roughness or sharp edge liable to increase the risk or seriousness of injury to the occupants.
- 5.4.2. Parts of the front and rear faces of the head restraints situated in area 1, as defined in paragraph 6.8.1.1.3. below shall pass the energy absorption test.
- 5.4.2.1. This requirement is deemed to be met if in the tests carried out by the procedure specified in annex 6 the deceleration of the headform does not exceed 80 g continuously for more than 3 ms. Moreover, no dangerous edge shall occur during or remain after the test.
- 5.4.3. Parts of the front and rear faces of head restraints situated in area 2, as defined in paragraph 6.8.1.2.2. below, shall be so padded as to prevent any direct contact of the head with the components of the structure and shall meet the requirements of paragraph 5.1.4. above applicable to the rear parts of seats situated in area 2.
- 5.4.4. The requirements of paragraphs 5.4.2. and 5.4.3. above, shall not apply to parts of rear faces of head restraints designed to be fitted to seats behind which no seat is provided.
- 5.4.5. The head restraint shall be secured to the seat or to the vehicle structure in such a way that no rigid and dangerous parts project from the padding of the head restraint or from its attachment to the seat-back as a result of the pressure exerted by the headform during the test.
- 5.4.6. In the case of a seat fitted with a head restraint, the provisions of paragraph 5.1.3. may, after agreement of the technical service, be considered to be met if the seat fitted with its head restraint complies with the provisions of paragraph 5.4.2. above.

5.5. Height of head restraints

- 5.5.1. The height of head restraints shall be measured as described in paragraph 6.5. below.
- 5.5.2. For head restraints not adjustable for height, the height shall be not less than 800 mm in the case of front seats and 750 mm in the case of other seats.
- 5.5.3. For head restraints adjustable for height:
- 5.5.3.1. the height shall be not less than 800 mm in the case of front seats and 750 mm in the case of other seats; this value shall be obtained in a position between the highest and lowest positions to which adjustment is possible;
- 5.5.3.2. there shall be no "use position" resulting in a height of less than 750 mm;
- 5.5.3.3. in the case of seats other than the front seats the head restraints may be such that they can be displaced to a position resulting in a height of less than 750 mm, provided that such position is clearly recognizable to the occupant as not being included for the use of the head restraint;
- 5.5.3.4. in the case of front seats head restraints may be such that they can be automatically displaced when the seat is not occupied, to a position resulting in a height of less than 750 mm, provided that they automatically return to the position of use when the seat is occupied.

- 5.5.4. The dimensions mentioned in paragraphs 5.5.2. and 5.5.3.1. above may be less than 800 mm in the case of front seats and 750 mm in the case of other seats to leave adequate clearance between the head restraint and the interior surface of the roof, the windows or any part of the vehicle structure; however, the clearance shall not exceed 25 mm. In the case of seats fitted with displacement and/or adjustment systems, this shall apply to all seat positions. Furthermore, by derogation to paragraph 5.5.3.2. above, there shall not be any "use position" resulting in a height lower than 700 mm.
- 5.5.5. By derogation to the height requirements mentioned in paragraphs 5.5.2. and 5.5.3.1. above, the height of any head restraint designed to be provided in rear centre seats or seating positions shall be not less than 700 mm.
- 5.6. In the case of a seat capable of being fitted with a head restraint, the provisions of paragraphs 5.1.3. and 5.4.2. above shall be verified.
- 5.6.1. The height of the part of the device on which the head rests, measured as described in paragraph 6.5. below, shall in the case of a head restraint adjustable for height be not less than 100 mm.
- 5.7. There shall be no gap of more than 60 mm between the seat-back and the head restraint in the case of a device not adjustable for height. If the head restraint is adjustable for height it shall, in its lowest position, be not more than 25 mm from the top of the seat-back. In the case of seats or bench seats adjustable in height provided with separate head restraints, this requirement shall be verified for all the positions of the seat or bench seat.
- 5.8. In the case of head restraints integral with the seat-back, the area to be considered is:

above a plane perpendicular to the reference line at 540 mm from the R point.

Between two vertical longitudinal planes passing at 85 mm on either side of the reference line. In this area, one or more gaps which regardless of their shape can show a distance "a" of more than 60 mm when measured as described in paragraph 6.7. below, are permitted provided that, after the additional test under paragraph 6.4.3.3.2. below, the requirements of paragraph 5.11. below are still met.
- 5.9. In the case of head restraints adjustable for height one or more gaps, which regardless of their shape can show a distance "a" of more than 60 mm when measured as described in paragraph 6.7. below, are permitted on the part of the device serving as a head restraint provided that, after the additional test under paragraph 6.4.3.3.2. below, the requirements of paragraph 5.11. below are still met.
- 5.10. The width of the head restraint shall be such as to provide appropriate support for the head of a person normally seated. As determined according to the procedure described in paragraph 6.6. below, the head restraint shall cover an area extending not less than 85 mm to each side of the vertical median plane of the seat for which the head restraint is intended.
- 5.11. The head restraint and its anchorage shall be such that the maximum backward displacement X of the head permitted by the head restraint and measured in conformity with the static procedure laid down in paragraph 6.4.3. below, is less than 102 mm.
- 5.12. The head restraint and its anchorage shall be strong enough to bear without breakage the load specified in paragraph 6.4.3.6. below. In the case of head restraints integral with the

seat-back, the requirements of this paragraph shall apply to the part of the seat-back structure situated above a plane perpendicular to the reference line at 540 mm from the R point.

5.13. If the head restraint is adjustable, it shall not be possible to raise it beyond the maximum operational height except by deliberate action on the part of the user distinct from any act necessary for its adjustment.

5.14. The strength of the seat-back and of its locking devices is deemed to meet the requirements set out in paragraph 6.2. below when, after testing in accordance with paragraph 6.4.3.6. below, no breakage of the seat or seat-back has occurred; otherwise, it shall be shown that the seat is capable of meeting the test requirements set out in paragraph 6.2. below.

5.15. Special requirements regarding the protection of occupants from displaced luggage

5.15.1. Seat-backs

Seat-backs and/or head restraints located such that they constitute the forward boundary of the luggage compartment, all seats being in place and in the normal position of use as indicated by the manufacturer, shall have sufficient strength to protect the occupants from displaced luggage in a frontal impact. This requirement is deemed to be met if, during and after the test described in annex 9, the seat-backs remain in position and the locking mechanisms remain in place. However, the deformation of the seat-backs and their fastenings during the test is permitted, provided that the forward contour of the parts of the tested seat-back and/or head restraints, that are harder than 50 Shore A, does not move forward of a transverse vertical plane which passes through:

- (a) a point of 150 mm forward of the R point of the seat in question, for the parts of the head restraint;
- (b) a point of 100 mm forward of the R point of the seat in question, for parts of the seat-back;

excluding the rebound phases of the test blocks.

For integrated head restraints, the limit between the head restraint and the seat-back is defined by the plane perpendicular to the reference line 540 mm from the R point.

All measurements shall be taken in the longitudinal median plane of the corresponding seat or seating position for each seating position constituting the forward boundary of the luggage compartment.

During the test described in annex 9, the test blocks shall remain behind the seat-back(s) in question.

5.15.2. Partitioning systems

At the request of the vehicle manufacturer, the test described in annex 9 may be carried out with the partitioning systems in place, if these systems are fitted as standard equipment for the particular type of vehicle.

Partitioning systems, netting wire mesh located above the seat-backs in their normal position of use, shall be tested according to paragraph 2.2. of annex 9.

This requirement is deemed to be met if, during the test, the partitioning systems remain in position. However, the deformation of the partitioning systems during the test is permitted, provided that the forward contour of the partitioning (including parts of the tested seat-back(s) and/or head restraint(s) that are harder than 50 Shore A does not move forward of a transverse vertical plane which passes through:

- (a) a point of 150 mm forward of the R point of the seat in question, for parts of the head restraint;
- (b) a point of 100 mm forward of the R point of the seat in question, for parts of the seat-back and part of the partitioning system others than the head restraint.

For integrated head restraint, the limit between the head restraint and the seat-back is the one defined in paragraph 5.15.1.

All measurements shall be taken in the longitudinal median plane of the corresponding seat or seating position for each seating position constituting the forward boundary of the luggage compartment.

After the test, no sharp or rough edges likely to increase the danger or severity of injuries of the occupants shall be present.

- 5.15.3. The requirements mentioned in paragraphs 5.13.1. and 5.13.2. above shall not apply to luggage retention systems which are activated automatically in case of an impact. The manufacturer shall demonstrate to the satisfaction of the technical service that the protection offered by such systems is equivalent to that described in paragraphs 5.15.1. and 5.15.2.

6. TESTS

6.1. General specifications applicable to all tests

- 6.1.1. The seat-back, if adjustable, shall be locked in a position corresponding to a rearward inclination as close as possible to 25° from the vertical of the torso reference line of the manikin described in annex 3, unless otherwise specified by the manufacturer.
- 6.1.2. When a seat, its locking mechanism and its installation are identical or symmetrical with respect to another seat on the vehicle, the technical service may test only one such seat.
- 6.1.3. In the case of seats with adjustable head restraints, the tests shall be conducted with the head restraints placed in the most unfavourable position (generally, the highest position) allowed by its adjusting system.

6.2. Test of strength of the seat-back and its adjustment systems

- 6.2.1. A force producing a moment of 53 daNm in relation to the R point shall be applied longitudinally and rearwards to the upper part of the seat-back frame through a component simulating the back of the manikin shown in annex 3 to this Regulation. In the case of a bench seat, where part or all of the supporting frame (including that of the head restraints) is common to more than one seating position, the test shall be conducted simultaneously for all those seating positions.

- 6.3. Test of strength of the seat anchorage and the adjustment, locking and displacement systems
- 6.3.1. A longitudinal horizontal deceleration of not less than 20 g shall be applied for 30 milliseconds in the forward direction to the whole shell of the vehicle, in accordance with the requirements of annex 7, paragraph 1. At the request of the manufacturer the test pulse described in annex 9 - appendix, may be used alternatively.
- 6.3.2. A longitudinal deceleration in accordance with the requirements of paragraph 6.3.1. shall be applied in the rearward direction.
- 6.3.3. The requirements of paragraphs 6.3.1. and 6.3.2. above shall be verified for all positions of the seat. In the case of seats fitted with an adjustable head restraint, the test shall be conducted with the head restraints placed in the most unfavourable position (generally the highest position) allowed by its adjusting system. During the test the seat shall be so positioned that no external factor shall prevent the release of the locking systems.
- These conditions shall be considered to be met if the seat is tested after being adjusted in the following positions:
- the longitudinal adjustment is fixed one notch or 10 mm rearward of the most forward normal driving position or position of use as indicated by the manufacturer (for seats with independent vertical adjustment, the cushion shall be placed in its highest position);
- the longitudinal adjustment is fixed one notch or 10 mm forward of the most rearward normal driving position or position of use as indicated by the manufacturer (for seats with independent vertical adjustment, the cushion shall be placed in its lowest position), and, where appropriate, in accordance with the requirements of paragraph 6.3.4. below.
- 6.3.4. In cases where the arrangement of the locking systems is such that, in a seat position other than those defined in paragraph 6.3.3. above, the distribution of the forces on the locking devices and seat anchorages would be less favourable than with either configuration defined in paragraph 6.3.3., the tests shall be conducted for that less favourable seating position.
- 6.3.5. The test conditions of paragraph 6.3.1. shall be considered to be satisfied if, at the request of the manufacturer, they are replaced by a collision test of the complete vehicle in running order against a rigid barrier as laid down in paragraph 2. of annex 7 to this Regulation. In this case, the seat shall be adjusted for the least favourable conditions of distribution of stresses in the anchorage system as provided for in paragraphs 6.1.1., 6.3.3. and 6.3.4. above.
- 6.4. Test of the performance of the head restraint
- 6.4.1. If the head restraint is adjustable, it shall be placed in the most unfavourable position (generally the highest position) allowed by its adjustment system.
- 6.4.2. In the case of a bench seat, where part or all of the supporting frame (including that of the head restraints) is common to more than one seating position, the test shall be conducted simultaneously for all those seating positions.
- 6.4.3. Test
- 6.4.3.1. All lines, including the projections of the reference line, shall be drawn in the vertical median plane of the seat or seating position concerned (see annex 5 to this Regulation).

- 6.4.3.2. The displaced reference line is determined by applying to the part simulating the back of the manikin referred to in annex 3 to this Regulation an initial force producing a rearward moment of 37,3 daNm about the R point.
- 6.4.3.3. By means of a spherical headform 165 mm in diameter an initial force producing a moment of 37,3 daNm about the R point is applied at right angles to the displaced reference line at a distance of 65 mm below the top of the head restraint, the reference line being kept in its displaced position in accordance with paragraph 6.4.3.2.
- 6.4.3.3.1. If the presence of gaps prevents the application of the force prescribed in paragraph 6.4.3.3. at 65 mm from the top of the head restraint, the distance may be reduced so that the axis of the force passes through the centre line of the frame element nearest to the gap.
- 6.4.3.3.2. In the cases described in paragraphs 5.8. and 5.9. above, the test shall be repeated by applying to each gap, using a sphere of 165 mm in diameter, a force:
- passing through the centre of gravity of the smallest of the sections of the gap, along transversal planes parallel to the reference line, and
- reproducing a moment of 37,3 daNm about the R point.
- 6.4.3.4. The tangent Y to the spherical headform, parallel to the displaced reference line, is determined.
- 6.4.3.5. The distance X, provided for in paragraph 5.11. above, between the tangent Y and the displaced reference line is measured.
- 6.4.3.6. To check the effectiveness of the head restraint, the initial load specified in paragraphs 6.4.3.3. and 6.4.3.3.2. is increased to 89 daN unless the breakage of the seat or seat-back occurs earlier.
- 6.5. Determination of the height of the head restraint
- 6.5.1. All lines, including the projection of the reference line, shall be drawn in the vertical median plane of the seat or seating position concerned, the intersection of such plane with the seat determining the contour of the head restraint and of the seat-back (see figure 1 of annex 4 to this Regulation).
- 6.5.2. The manikin described in annex 3 to this Regulation shall be placed in a normal position on the seat.
- 6.5.3. The projection of the reference line of the manikin shown in annex 3 to this Regulation is then, in the seat concerned, drawn in the plane specified in paragraph 6.4.3.1. above.
- The tangent S to the top of the head restraint is drawn perpendicular to the reference line.
- 6.5.4. The distance "h" from the R point to the tangent S is the height to be taken into consideration in implementing the requirements of paragraph 5.5. above.
- 6.6. Determination of the width of the head restraint
(see figure 2 of annex 4 to this Regulation)

- 6.6.1. The plane S1, perpendicular to the reference line and situated 65 mm below the tangent S defined in paragraph 6.5.3. above, determines a section in the head restraint bounded by the outline C.
- 6.6.2. The width of the head restraint to be taken into consideration in implementing the requirements of paragraph 5.10. above, is the distance "L" measured in the plane S1 between the vertical longitudinal planes P and P'.
- 6.6.3. The width of the head restraint shall if necessary also be determined in the plane perpendicular to the reference line 635 mm above the R point of the seat, this distance being measured along the reference line.
- 6.7. Determination of distance "a" of head restraint gaps
(see annex 8 to this Regulation)
- 6.7.1. The distance "a" shall be determined for each gap and in relation to the front face of the head restraint, by means of a sphere having a diameter of 165 mm.
- 6.7.2. The sphere shall be put into contact with the gap in a point of the gap area which allows the maximum sphere intrusion, considering no load is to be applied.
- 6.7.3. The distance between the two points of contact of the sphere with the gap will constitute the distance "a" to be considered for the evaluation of the provisions under paragraphs 5.8. and 5.9. above.
- 6.8. Tests for checking energy dissipation on the seat-back and head restraint
- 6.8.1. The surfaces of the rear parts of seats to be checked are those situated in the areas defined below which can be contacted by a 165 mm diameter sphere when the seat is mounted in the vehicle.
- 6.8.1.1. Area 1
- 6.8.1.1.1. In the case of separate seats without head restraints, this area shall include the rear part of the seat-back between the longitudinal vertical planes situated at 100 mm on either side of the longitudinal median plane of the seat centre line, and above a plane perpendicular to the reference line 100 mm below the top of the seat-back.
- 6.8.1.1.2. In the case of bench seats without head restraints, this area shall extend between the longitudinal vertical planes situated at 100 mm on either side of the longitudinal median plane of each designated outboard seating position defined by the manufacturer and above a plane perpendicular to the reference line 100 mm below the top of the seat-back.
- 6.8.1.1.3. In the case of seats or bench seats with head restraints, this area shall extend between the longitudinal vertical planes, on either side of and 70 mm from the longitudinal median plane of the seat or of the seating position concerned and situated above the plane perpendicular to the reference line 635 mm from the R point. For the test, the head restraint, if adjustable shall be placed in the most unfavourable position (generally the highest) permitted by its adjustment system.
- 6.8.1.2. Area 2

- 6.8.1.2.1. In the case of seats or bench seats without head restraints and seats or bench seats with detachable or separate head restraints, area 2 shall extend above a plane perpendicular to the reference line 100 mm distant from the top of the seat-back, other than parts of area 1.
- 6.8.1.2.2. In the case of seats or bench seats with integrated head restraints, area 2 shall extend above a plane perpendicular to the reference line 440 mm distant from the R point of the seat or of the seating position concerned, other than parts of area 1.
- 6.8.1.3. Area 3
- 6.8.1.3.1. Area 3 is defined as the part of the back of the seat or the bench seats situated above the horizontal planes defined in paragraph 5.1.4.1.3. above, excluding parts situated in area 1 and area 2.
- 6.9. Equivalent test methods
- If a test method other than those specified in paragraphs 6.2., 6.3., 6.4. above and annex 6 is used, its equivalence shall be proved.
7. 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:
- 7.1. Every vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 5. above. However, in the case of head restraints as defined in paragraph 2.12.2. and 2.12.3 above, nothing shall prevent the vehicle from conforming to the vehicle type approved, even if it is marketed with seats not fitted with head restraints.
- 7.2. The competent authority which granted type approval may at any time verify the conformity control methods applied for each production unit. The authority may also carry out random checks on serially-manufactured vehicles in respect to the requirements set out in paragraph 5. above.
8. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 8.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 7.1. above are not complied with or if the vehicles fail in the checks prescribed in paragraph 7. above.
- 8.2. If a 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 1 to this Regulation.
9. MODIFICATIONS OF THE VEHICLE TYPE AND EXTENSION OF APPROVAL WITH RESPECT TO THE SEATS, THEIR ANCHORAGES AND/OR THEIR HEAD RESTRAINTS

- 9.1. Every modification of the vehicle type with respect to the seats, their anchorages and/or their head restraints shall be notified to the administrative department which approved the vehicle type. The department may then either:
 - 9.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any event the vehicle still complies with the requirements; or
 - 9.1.2. consider that the modifications are sufficiently unimportant for the results specified in paragraph 6.2., 6.3. and 6.4. above to be verified by calculations based on the approval test results; or
 - 9.1.3. require a further report from the technical service responsible for conducting the tests.
- 9.2. Confirmation or refusal of approval, specifying the modifications, shall be communicated to the Parties to the Agreement applying this Regulation by means of the procedure laid down in paragraph 4.3. above.
- 9.3. 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.
10. PRODUCTION DEFINITELY DISCONTINUED
 - 10.1. 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 1 to this Regulation.
11. INSTRUCTIONS FOR USE
 - 11.1. For seats fitted with adjustable head restraints, the manufacturers shall provide instructions on how to operate, adjust, lock and, where applicable, remove the head restraints.
12. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the 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 extension or refusal or withdrawal of approval, issued in other countries, are to be sent.
13. TRANSITIONAL PROVISIONS
 - 13.1. 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.
 - 13.2. As from 1 October 1999, 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.

- 13.3. As from 1 October 2001, Contracting Parties applying this Regulation may refuse to recognize approvals which were not granted in accordance with the 06 series of amendments to this Regulation.
- 13.4. As from the official date of entry into force of the 07 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approvals under this Regulation as amended by the 07 series of amendments.
- 13.5. As from 24 months after the date of entry into force of the 07 series of amendments, Contracting Parties applying this Regulation shall grant ECE approval only if the vehicle type to be approved complies with the requirements of this Regulation as amended by the 07 series of amendments.
- 13.6. As from 48 months after the date of entry into force of the 07 series of amendments, existing 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 07 series of amendments.
-

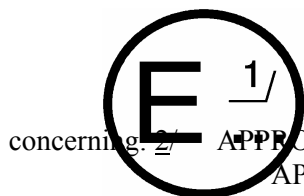
Annex 1

COMMUNICATION

(maximum format: A4 (210 x 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 the strength of the seats and their anchorages, in the case either of seats fitted or capable of being fitted with head restraints or of seats not capable of being fitted with such devices and the characteristics of head restraints pursuant to Regulation No. 17

Approval No. Extension No.

1. Trade name or mark of the motor vehicle
2. Vehicle type
3. Manufacturer's name and address
4. If applicable, name and address of the manufacturer's representative

5. Description of seats
6. Number of seats fitted or capable of being fitted with head restraints, adjustable or not adjustable

7. Description of the adjustment, displacement and locking systems of the seat or of its parts and a description of occupant protection system against displacement of luggage.....

8. Description of seat anchorage
9. Longitudinal position of the seats during the tests
10. Vehicle submitted for approval on
11. Technical service responsible for conducting approval tests

12. Date of report issued by that service
13. No. of report issued by that service
14. Remarks
15. Approval is granted/refused/extended/withdrawn 2/
16. Reason(s) of extension (if applicable)
17. Position of approval mark on the vehicle
18. Place
19. Date
20. Signature
21. The following documents, bearing the approval number shown above, are annexed to this communication:
 - ... drawings, diagrams and plans of the seats, their anchorage on the vehicle, the adjustment and displacement systems of the seats and their parts, and their locking devices;
 - ... photographs of the seats, their anchorages, the adjustment and displacement systems of the seats and their parts, and their locking devices, and of additional occupant protection system against displacement of luggage.

Note: In the case of seats fitted with head restraints as defined in paragraphs 2.12.2. and 2.12.3. of this Regulation, the head restraint shall be shown on all drawings, diagrams and photographs.

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 2

ARRANGEMENTS OF APPROVAL MARKS

Model A

(see paragraphs 4.4., 4.4.1., 4.4.2. and 4.4.3. of this Regulation)

Vehicle with at least one seat fitted or capable
of being fitted with a head restraint



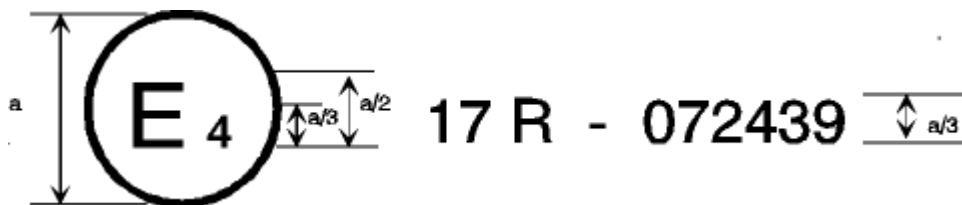
$a = 8 \text{ mm min}$

The above approval mark when affixed to a vehicle shows that the vehicle type concerned, with regard to the strength of the seats fitted or capable of being fitted with head restraints and with regard to characteristics of the head restraints, has been approved in the Netherlands (E4) pursuant to Regulation No. 17, under the approval number 072439. The first two digits of the approval number indicate that the Regulation already contained the 07 series of amendments at the time of approval. The above approval mark also shows that the vehicle type was approved pursuant to Regulation No. 17 with regard to the strength of any seats on the vehicle which are not fitted or capable of being fitted with head restraints.

Model B

(see paragraphs 4.4.; 4.4.1. and 4.4.2. of this Regulation)

Vehicle with seats not fitted or not capable
of being fitted with head restraints



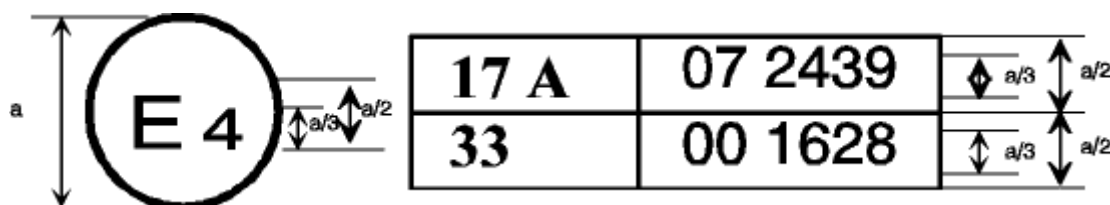
$a = 8 \text{ mm min}$

The above approval mark when affixed to a vehicle shows that the vehicle type has seats not fitted or capable of being fitted with head restraints, and has, with regard to the strength of the seats and their anchorages, been approved in the Netherlands (E4) pursuant to Regulation No. 17 under the approval number 072439. The first two digits of the approval number indicate that the Regulation already contained the 07 series of amendments at the time of approval.

Model C

(see paragraph 4.5. of this Regulation)

Vehicle with at least one seat fitted or capable
of being fitted with a head restraint



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

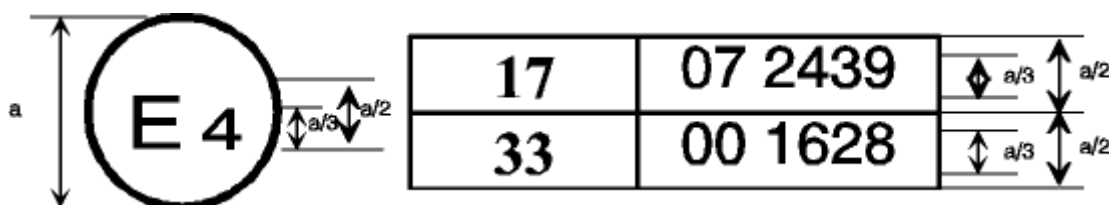
The above approval mark when affixed to a vehicle shows that the vehicle type has at least one seat fitted or capable of being fitted with a head restraint, and was approved in the Netherlands (E4) pursuant to Regulations Nos. 17 and 33. 1/

The approval numbers indicate that, on the dates when approval was granted, Regulation No. 17 included the 07 series of amendments but Regulation No. 33 was still in its original form. The above approval mark also shows that the vehicle type was approved pursuant to Regulation No. 17 with regard to the strength of any seats on the vehicle which are not fitted or capable of being fitted with head restraints.

Model D

(see paragraph 4.5. of this Regulation)

Vehicle with seats not fitted or not capable
of being fitted with head restraints


 $a = 8 \text{ mm min}$

The above approval mark when affixed to a vehicle shows that the vehicle type has seats not fitted or capable of being fitted with head restraints, and was approved in the Netherlands (E4) pursuant to Regulations Nos. 17 and 33. ^{1/} The approval numbers indicate that, on the dates when approval was granted, Regulation No. 17 included the 07 series of amendments but Regulation No. 33 was still in its original form.

^{1/} The second number is given merely as an example.

Annex 3PROCEDURE 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

For the purposes of this annex:

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 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 measured 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;

^{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.

- 2.8. "Centre plane 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 co-ordinate of the "H" point on the "Y" axis. For individual seats, the centre plane of the seat coincides with the centre plane of the occupant. For other seats, the centre plane 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 co-ordinates 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:

- 3.1.1. the co-ordinates 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 co-ordinates 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 co-ordinates 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 co-ordinates, 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 degree 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 reaches 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 one 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 2.1.1. 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 be then 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 2/ 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 centre plane of the occupant (C/LO) coincides with the centre plane 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 centre plane of the seat.

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 centre plane

2/ Tilt angle, height difference with a seat mounting, surface texture, etc.

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 centre plane 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 10 degrees arc (5 degrees to each side of the vertical centre plane) 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 co-ordinates 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.

Annex 3 - 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 stimulate 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.

*/ For details of the construction of the 3-D H machine refer to Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, Pennsylvania 15096, United States of America.

The machine corresponds to that described in ISO Standard 6549 : 1980.

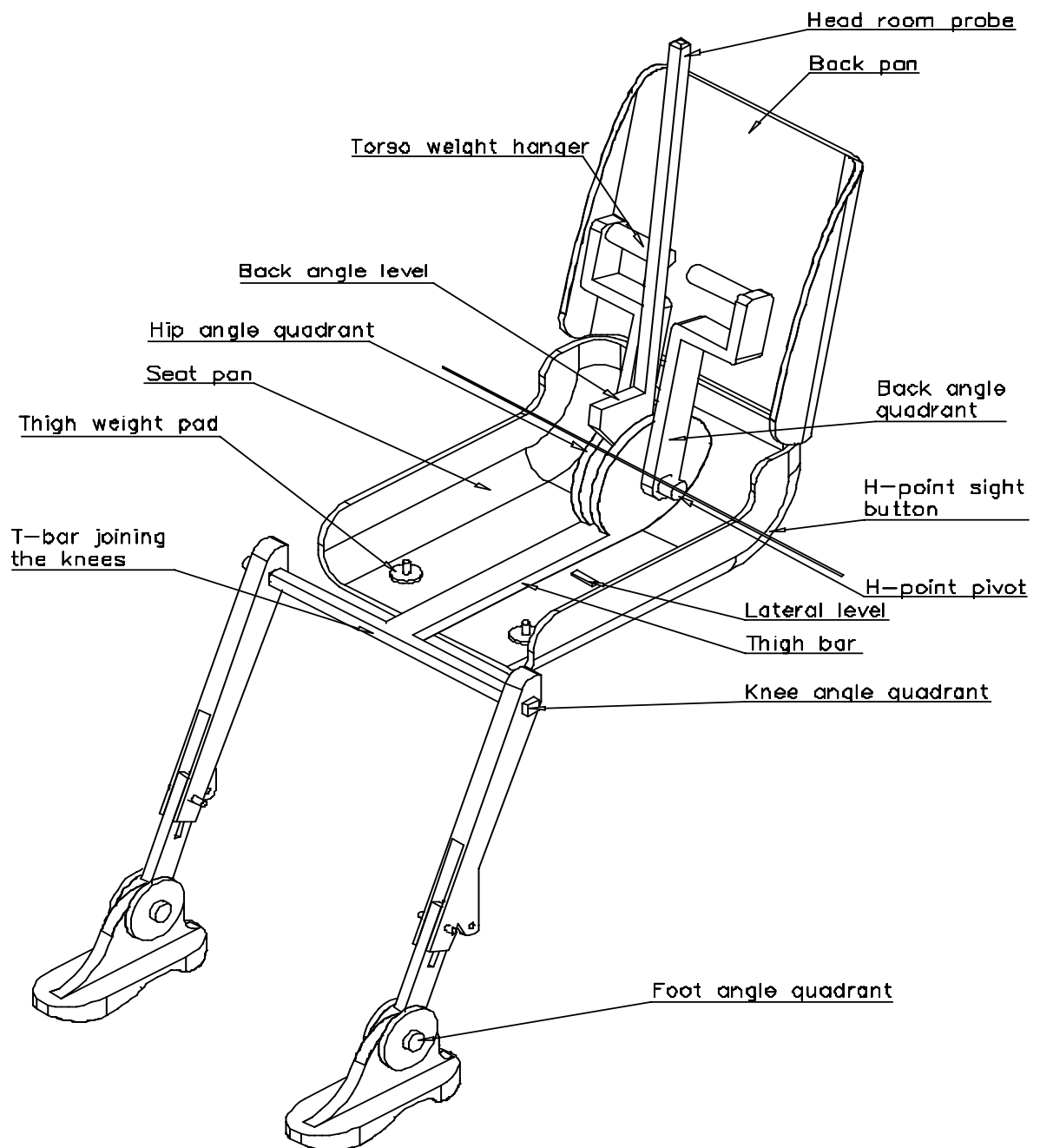


Figure 1 - 3-D H machine elements designation

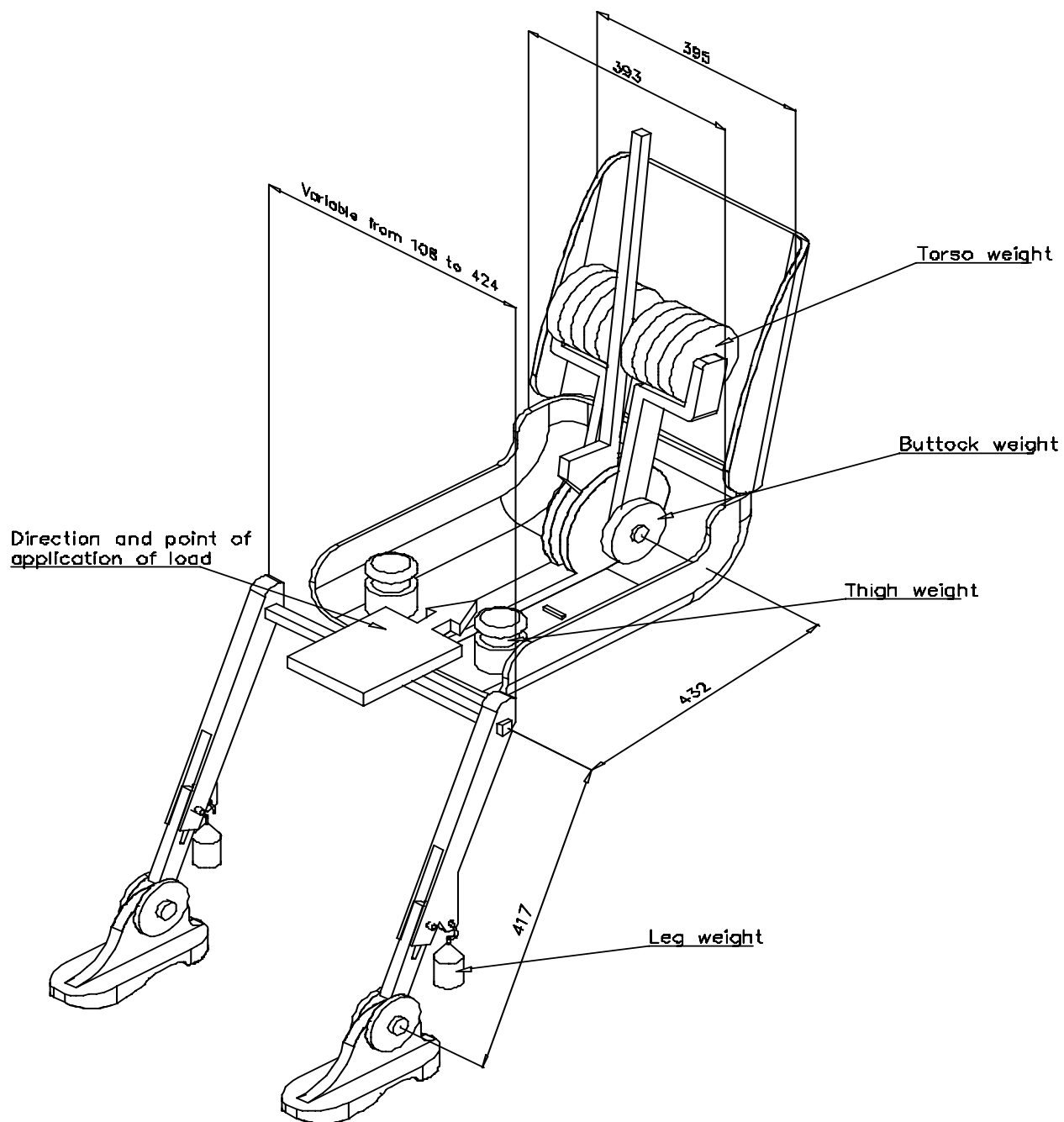


Figure 2 - Dimensions of the 3-D H machine elements and load distribution
(Dimensions in millimeters)

Annex 3 - 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 co-ordinates of the fiducial marks correspond to the values indicated by the manufacturer.
3. The co-ordinates of the "R" point and the "H" point are established in relation to the fiducial marks defined by the vehicle manufacturer.

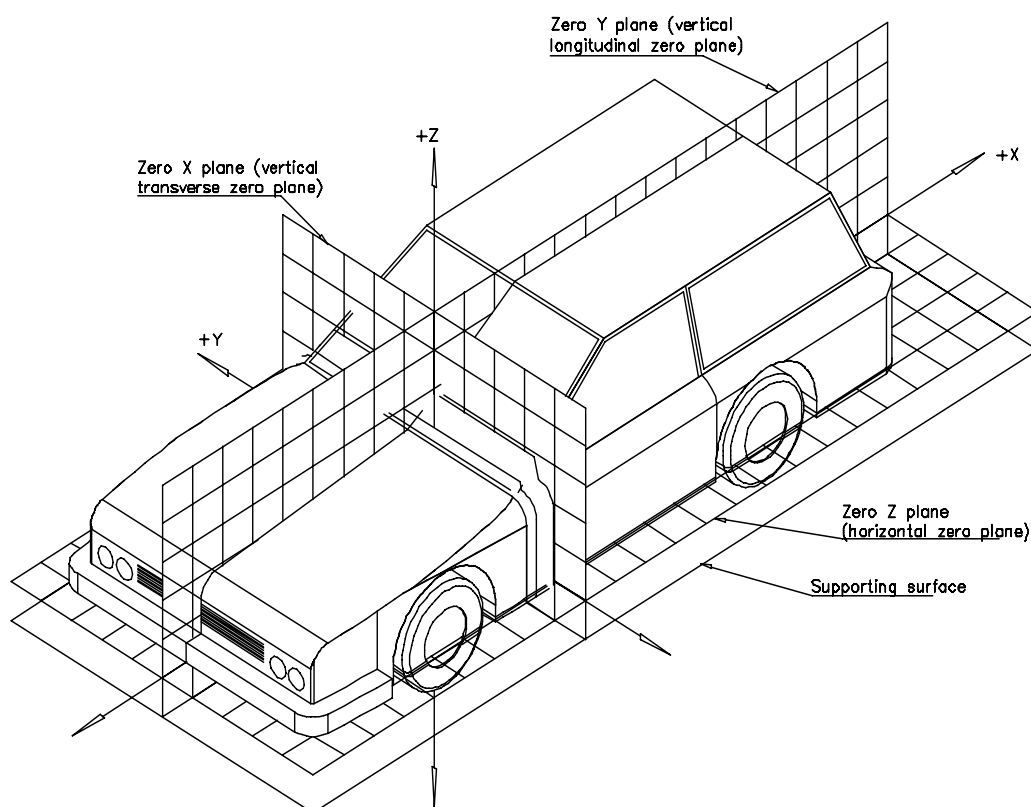


Figure - Three-dimensional reference system

*/ The reference system corresponds to ISO standard 4130 : 1978.

Annex 3 - 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. Co-ordinates of fiducial marks

X
Y
Z

3. List of reference data

3.1. Seating position:

3.1.1. Co-ordinates of "R" point

X
Y
Z

3.1.2. Design torso angle:

3.1.3. Specification for seat adjustment */

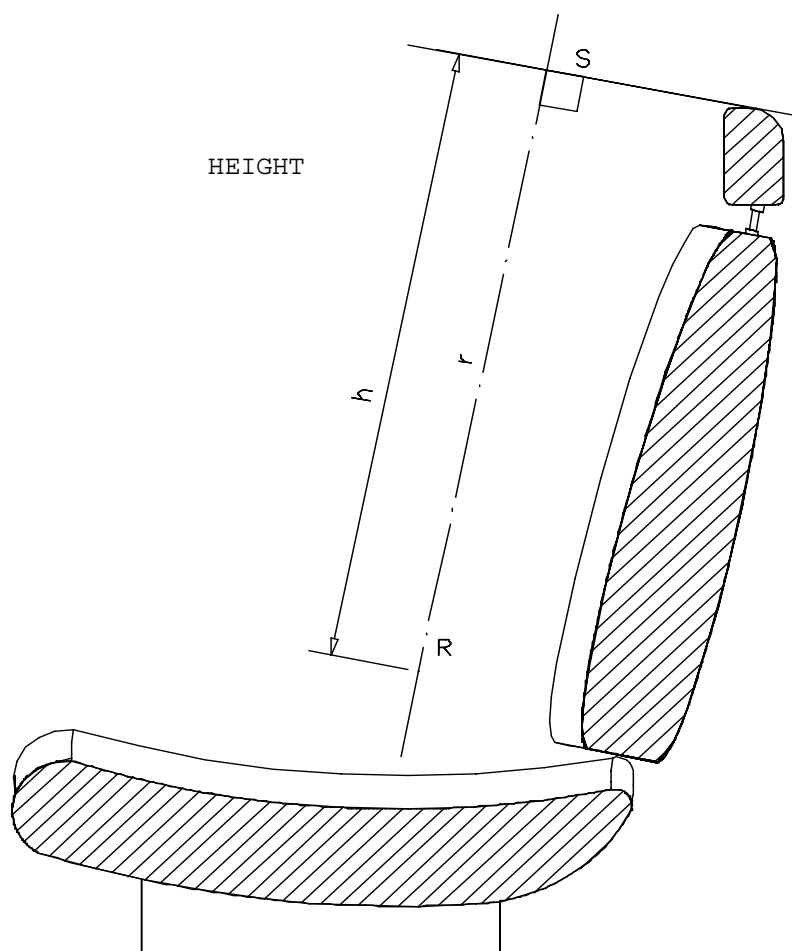
horizontal:
vertical:
angular:
torso angle:

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

*/ Strike out what does not apply.

Annex 4

DETERMINATION OF THE HEIGHT AND WIDTH OF HEAD RESTRAINTS

Figure 1

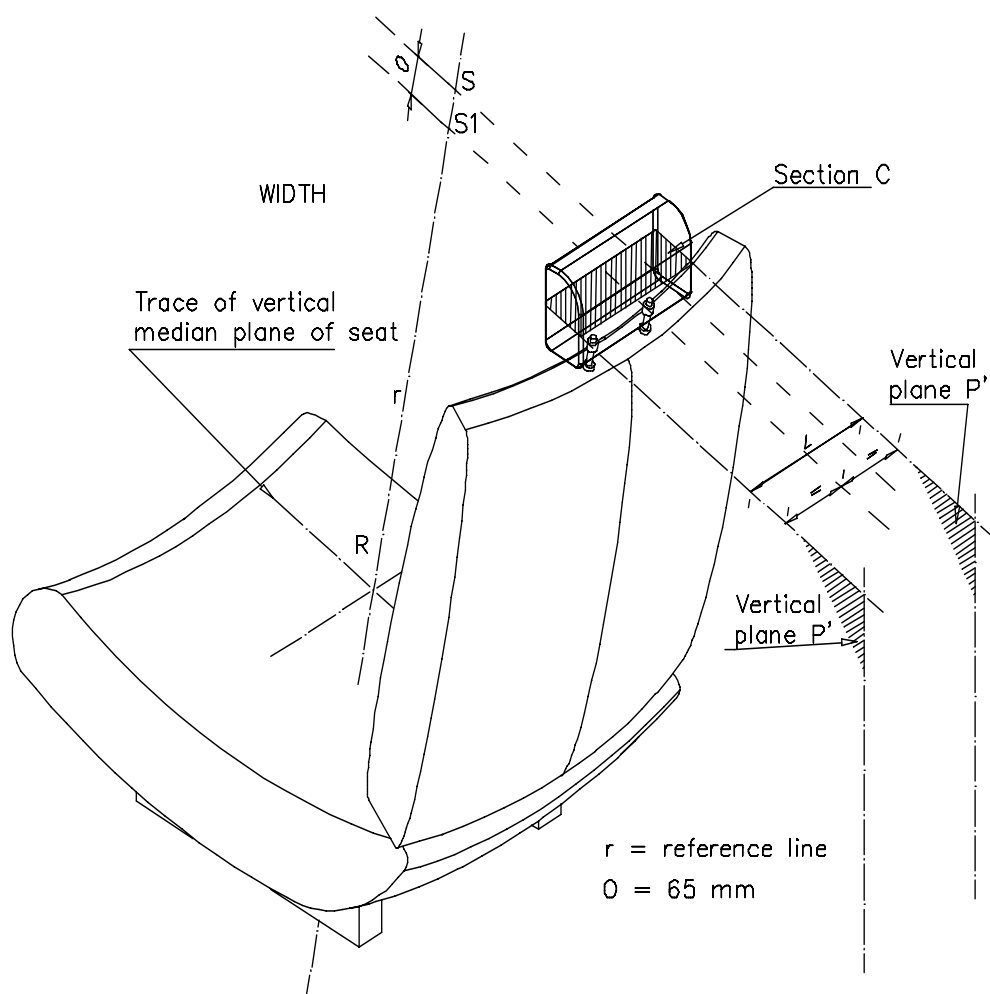
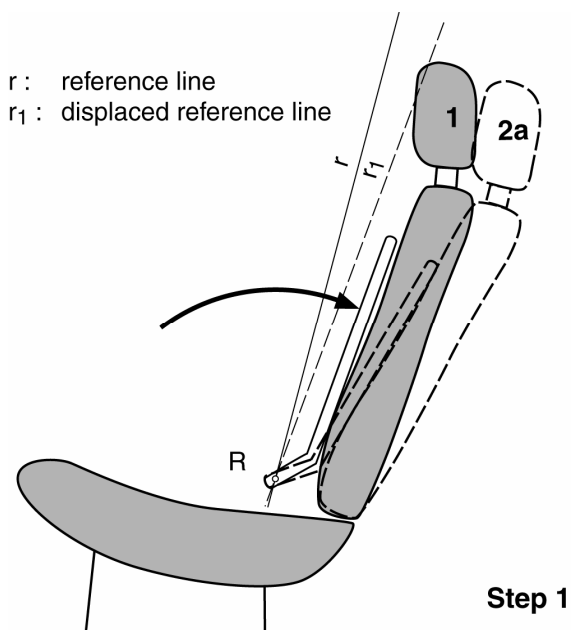


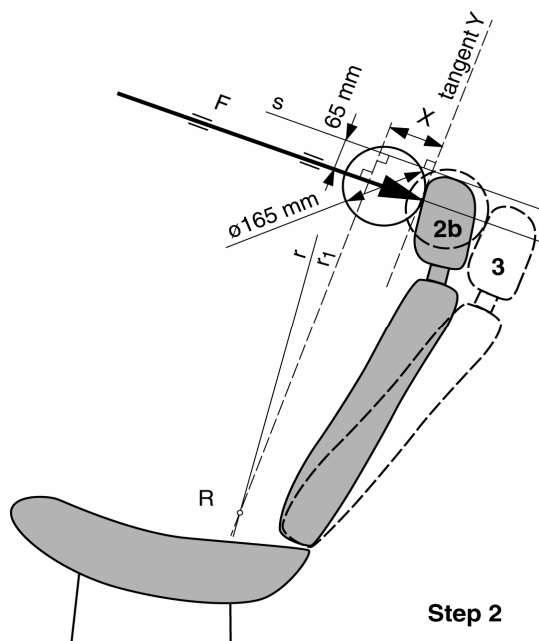
Figure 2

Annex 5

DETAILS OF LINES AND MEASUREMENTS TAKEN DURING TESTS



1. Original unloaded position.
- 2a. Displaced position by applying to the manikin's back a moment of 373 Nm about the R point, defining the position of the displaced reference line r_1 .
- 2b. Displaced position by applying to the 165 mm sphere a force F producing a moment of 373 Nm about the R point, keeping the displaced reference line r_1 in place.
3. Position after displacement by the force F increased to 890 N.



Annex 6

TEST PROCEDURE FOR CHECKING ENERGY DISSIPATION

1. Installation, test apparatus, recording instruments and procedure

1.1. Setting up

The seat, as mounted in the vehicle, shall be firmly secured to the test bench with the attachment parts provided by the manufacturer, so as to remain stationary when the impact is applied.

The seat-back, if adjustable, shall be locked in the position specified in paragraph 6.1.1. of this Regulation.

If the seat is fitted with a head restraint, the head restraint shall be mounted on the seat-back as in the vehicle. Where the head restraint is separate, it shall be secured to the part of the vehicle structure to which it is normally attached.

If the head restraint is adjustable, it shall be placed in the most unfavourable position allowed by its adjusting systems.

1.2. Test apparatus

1.2.1. This apparatus consists of a pendulum whose pivot is supported by ball-bearings and whose reduced mass m_r at its centre of percussion is 6,8 kg. The lower extremity of the pendulum consists of a rigid headform 165 mm in diameter whose centre is identical with the centre of percussion of the pendulum.

1.2.2. The headform shall be fitted with two accelerometers and a speed-measuring device, all capable of measuring values in the direction of impact.

1.3. Recording instruments

The recording instruments used shall be such that measurements can be made with the following degrees of accuracy:

1.3.1. Acceleration:

accuracy = ± 5 % of the actual value;

frequency class of data channel: class 600 corresponding to ISO Standard 6487 (1980);

cross-axis sensitivity = < 5 % of the lowest point on the scale.

*/ The relationship of the reduced mass " m_r " of the pendulum to the total mass " m " of the pendulum at a distance " a " between the centre of percussion and the axis of rotation and at a distance " l " between the centre of gravity and the axis of rotation is given by the formula:

$$m_r = m \frac{l}{a}$$

1.3.2. Speed:

accuracy: $\pm 2,5$ % of the actual value;

sensitivity: 0,5 km/h.

1.3.3. Time recording:

the instrumentation shall enable the action to be recorded throughout its duration and readings to be made to within one one-thousandth of a second;

the beginning of the impact at the moment of first contact between the headform and the item being tested shall be detected on the recordings used for analysing the test.

1.4. Test procedure

1.4.1. Tests on the seat-back

With the seat installed as indicated in paragraph 1.1. of this annex, the direction of impact from the rear towards the front shall be situated in a longitudinal plane at an angle of 45° from the vertical.

The impact points shall be selected by the test laboratory in area 1 as defined in paragraph 6.8.1.1. of this Regulation, or if necessary in area 2 as defined in paragraph 6.8.1.2. of this Regulation, on surfaces exhibiting radii of curvature less than 5 mm.

1.4.2. Tests on the head restraint

The head restraint shall be fitted and adjusted as indicated in paragraph 1.1. of this annex. Impacts shall be performed on points selected by the test laboratory in area 1 as defined in paragraph 6.8.1.1. of this Regulation, and possibly in area 2 as defined in paragraph 6.8.1.2. of this Regulation, on surfaces exhibiting radii of curvature less than 5 mm.

1.4.2.1. For the rear face, the direction of impact from the rear towards the front shall be in a longitudinal plane at an angle of 45° from the vertical.

1.4.2.2. For the front face, the direction of impact from the front towards the rear shall be horizontal in a longitudinal plane.

1.4.2.3. The front and rear zones are respectively bounded by the horizontal plane tangential to the top of the head restraint as determined in paragraph 6.5. of this Regulation.

1.4.3. The headform shall strike the test item at a speed of 24,1 km/h: this speed shall be achieved either by the mere energy of propulsion or by using an additional impelling device.

2. Results

The deceleration rate shall be taken as the average of the readings on the two decelerometers.

3. Equivalent procedures (see paragraph 6.9. of this Regulation).

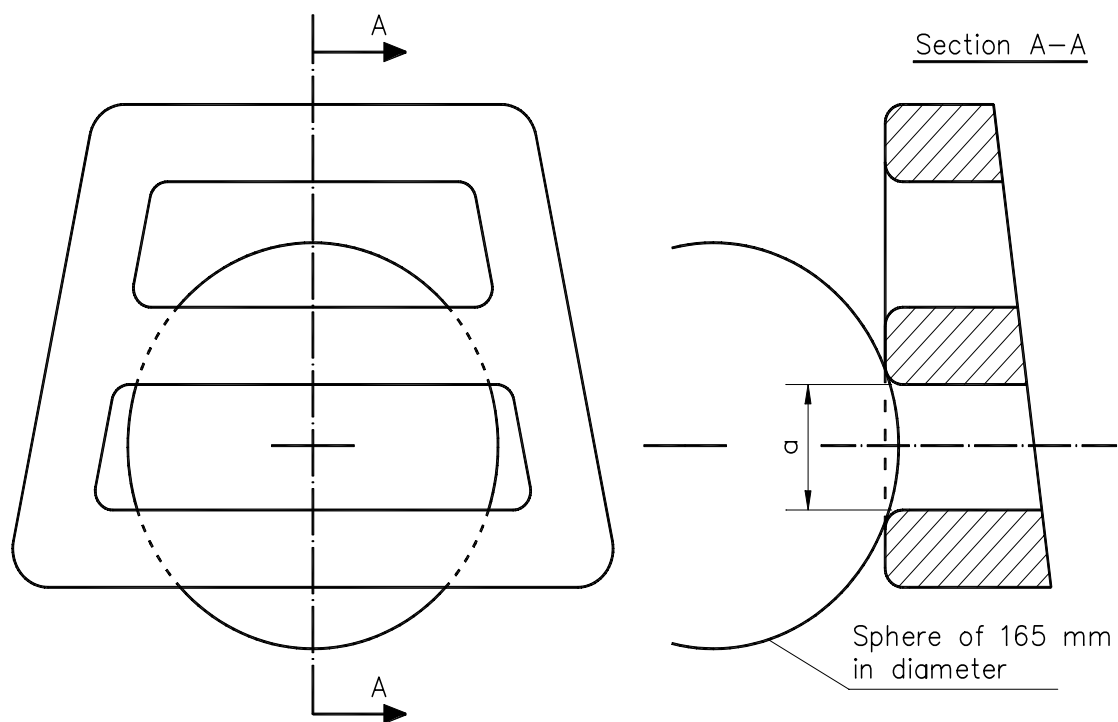
Annex 7

METHOD FOR TESTING THE STRENGTH OF SEAT ANCHORAGES
AND THEIR ADJUSTMENT, LOCKING AND DISPLACEMENT SYSTEMS

1. Test of resistance to inertia effects
 - 1.1. The seats to be tested shall be mounted on the vehicle body for which they are designed. This vehicle body shall be firmly anchored on a test trolley as prescribed in the following paragraphs.
 - 1.2. The method used for anchoring the vehicle body on the test trolley shall not result in a reinforcement of the seat anchorages.
 - 1.3. The seats and their parts shall be adjusted and locked as prescribed in paragraph 6.1.1. and in one of the positions described in paragraph 6.3.3. or 6.3.4. of this Regulation.
 - 1.4. If the seats of a group do not present essential differences in the sense of paragraph 2.2. of this Regulation, the tests prescribed in paragraphs 6.3.1. and 6.3.2. of this Regulation may be carried out with one seat adjusted to its foremost position and the other seat adjusted to its rearmost position.
 - 1.5. The trolley deceleration is measured with data channels of frequency class (CFC) 60 corresponding to the characteristics of International Standard ISO 6487 (1980).
 2. Collision test of the complete vehicle against a rigid barrier
 - 2.1. The barrier shall consist of a block of reinforced concrete of not less than 3 m width, not less than 1,5 m height and not less than 0,6 m thickness. The front face shall be perpendicular to the final part of the run-up track and shall be covered with plywood boards 19 ∇ 1 mm thick. At least 90 tonnes of earth shall be compressed behind the block of reinforced concrete. The barrier of reinforced concrete and earth may be replaced by obstacles having the same front surface, provided that they give equivalent results.
 - 2.2. At the moment of impact the vehicle shall run free. It shall reach the obstacle on a course perpendicular to the collision wall; the maximum lateral misalignment allowed between the vertical median line of the front of the vehicle and the vertical median line of the collision wall shall be ∇ 30 cm; at the moment of impact the vehicle shall no longer be subjected to the action of any additional steering or propelling device. The speed on impact shall be between 48,3 km/h and 53,1 km/h.
 - 2.3. The fuel feed system shall be filled to at least 90 per cent of its capacity with fuel or an equivalent liquid.
-

Annex 8

DETERMINATION OF DIMENSION "a" OF HEAD RESTRAINT GAPS

Figure 1: Example of horizontal gaps

Note: Section A-A is to be made in a point of the gap area which allows the maximum sphere intrusion, without exerting any load.

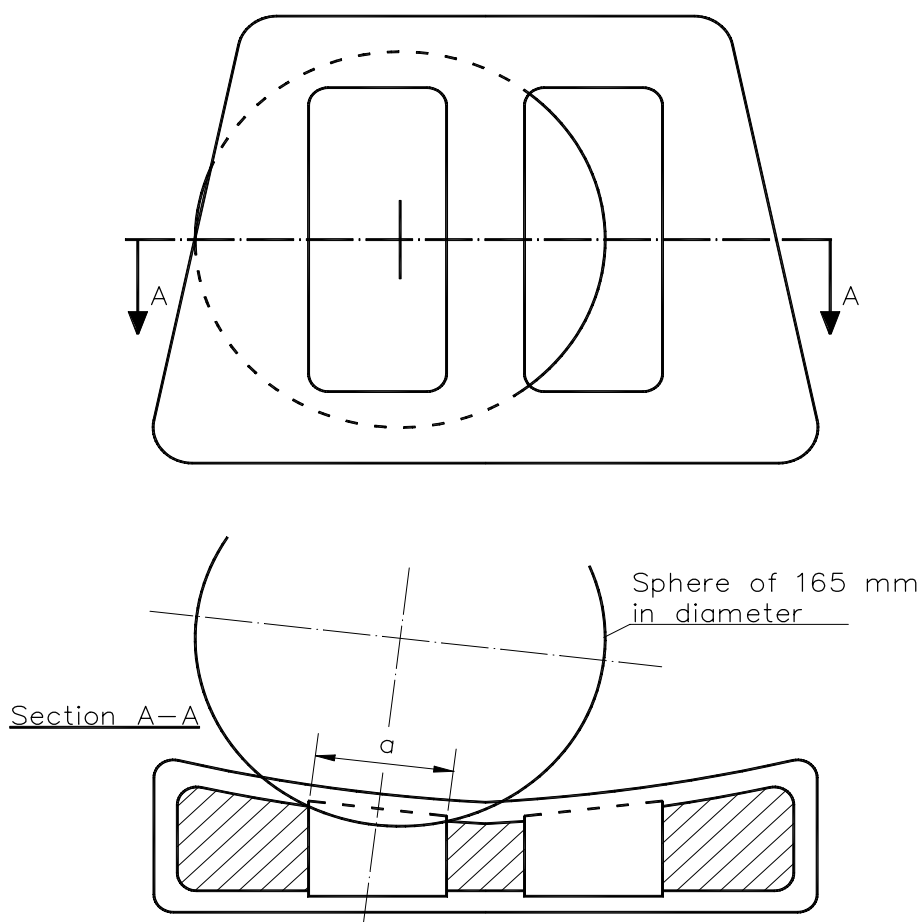


Figure 2. Example of vertical gaps

Note: Section A-A is to be made in a point of the gap area which allows the maximum sphere intrusion, without exerting any load.

—

Annex 9

TEST PROCEDURE FOR DEVICES INTENDED TO PROTECT THE OCCUPANTS
AGAINST DISPLACEMENT OF LUGGAGE

1. Test blocks

Rigid blocks, with the centre of inertia in the geometric centre.

Type 1

Dimensions: 300 mm x 300 mm x 300 mm
all edges and corners rounded to 20 mm

Mass: 18 kg

Type 2

Dimensions: 500 mm x 350 mm x 125 mm
all edges and corners rounded to 20 mm

Mass: 10 kg

2. Test preparation

2.1. Test of seat-backs (see figure 1)

2.1.1. General requirements

2.1.1.1. At the option of the car manufacturer, parts whose hardness is lower than 50 Shore A can be removed from the tested seat and head restraint for the tests.

2.1.1.2. Two type 1 test blocks shall be placed on the floor of the luggage compartment. In order to determine the location of the test blocks in the longitudinal direction, they shall first be positioned such that their front side contacts that part of the vehicle which constitutes the forward boundary of the luggage compartment and that their lower side rests on the floor of the luggage compartment. They shall then be moved backwards and parallel to the longitudinal median plane of the vehicle until their geometrical centre has traversed a horizontal distance of 200 mm. If the dimensions of the luggage compartment do not allow a distance of 200 mm and if the rear seats are horizontally adjustable, these seats shall be moved forward to the limit of the adjustment range intended for normal occupant use, or to the position resulting in a distance of 200 mm, whichever is less. In other cases, the test blocks shall be placed as far as possible behind the rear seats. The distance between the longitudinal median plane of the vehicle and the inward facing side of each test block shall be 25 mm to obtain a distance of 50 mm between both blocks.

2.1.1.3. During the test, the seats must be adjusted to ensure that the locking system cannot be released by external factors. If applicable, the seats shall be adjusted as follows:

The longitudinal adjustment shall be secured one notch or 10 mm in front of the rearmost possible position of use specified by the manufacturer (for seats with independent vertical adjustment, the cushion shall be placed to its lowest possible position). The test shall be carried out with the seat-backs in their normal position of use.

- 2.1.1.4. If the seat-back is fitted with a head restraint, the test must be carried out with the head restraint placed in the highest position, if adjustable.
- 2.1.1.5. If the back(s) of the rear seat(s) can be folded down, they shall be secured in their upright normal position by the standard locking mechanism.
- 2.1.1.6. Seats behind which the type 1 blocks cannot be installed are exempted from this test

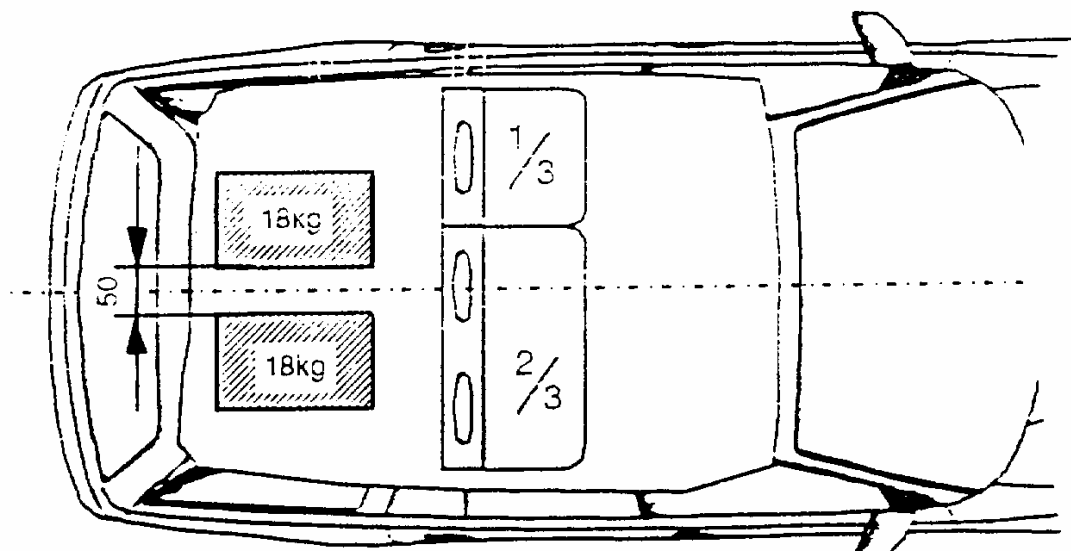


Figure 1: Positions of test blocks before test of rear seat-backs

- 2.1.2. Vehicles with more than two rows of seats
 - 2.1.2.1. If the rearmost row of seats is removable and/or can be folded down by the user according to the manufacturer's instructions in order to increase the luggage compartment area, then the seat row immediately in front of this rearmost row shall also be tested.
 - 2.1.2.2. However, in this case, the Technical Service, after consultation with the manufacturer, may decide not to test one of the two rearmost rows of seats if the seats and their attachments are of similar design and if the test requirement of 200 mm is respected.
- 2.1.3. When there is a gap, allowing sliding of one type 1 block past the seats, then the test loads (two type 1 blocks) shall be installed behind the seats after agreement between the Technical Service and the manufacturer.
- 2.1.4. The exact test configuration shall be noted in the test report.
- 2.2. Test of partitioning systems

For the test of the partitioning systems above the seat-backs, the vehicle shall be fitted with a fixed raised test floor having a load surface that locates the centre of gravity of the test block centrally between the top edge of the bordering seat-back (without taking into account the head restraints) and the bottom edge of the roof lining. A type 2 test block is placed on the raised test floor with its largest surface 500 x 350 mm, centrally in relation to the longitudinal axis of the vehicle and with its surface 500 x 125 mm to the front.

Partitioning systems behind which the type 2 test block cannot be installed are exempted from this test. The test block is placed directly in contact with the partitioning system. In addition, two type 1 test blocks are positioned in accordance with paragraph 2.1. in order to perform a simultaneous test on the seat-backs (see figure 2).

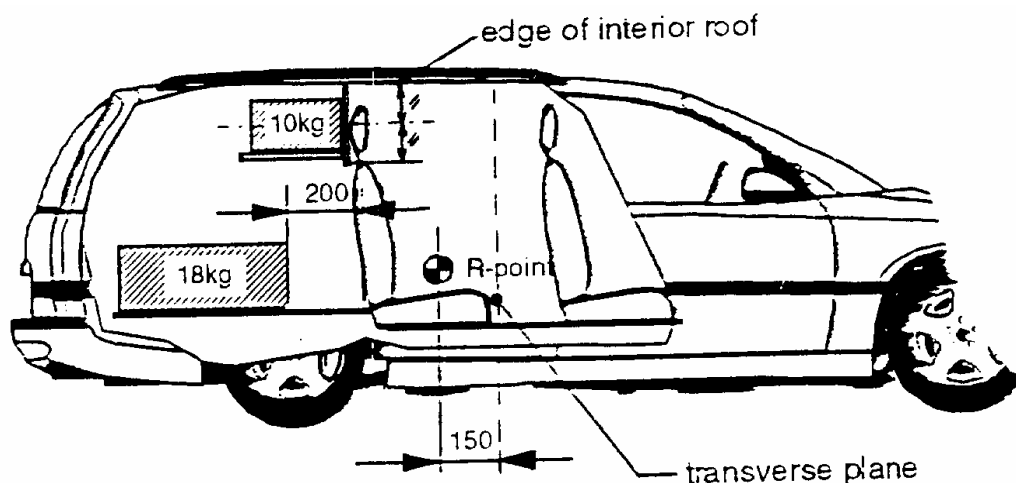
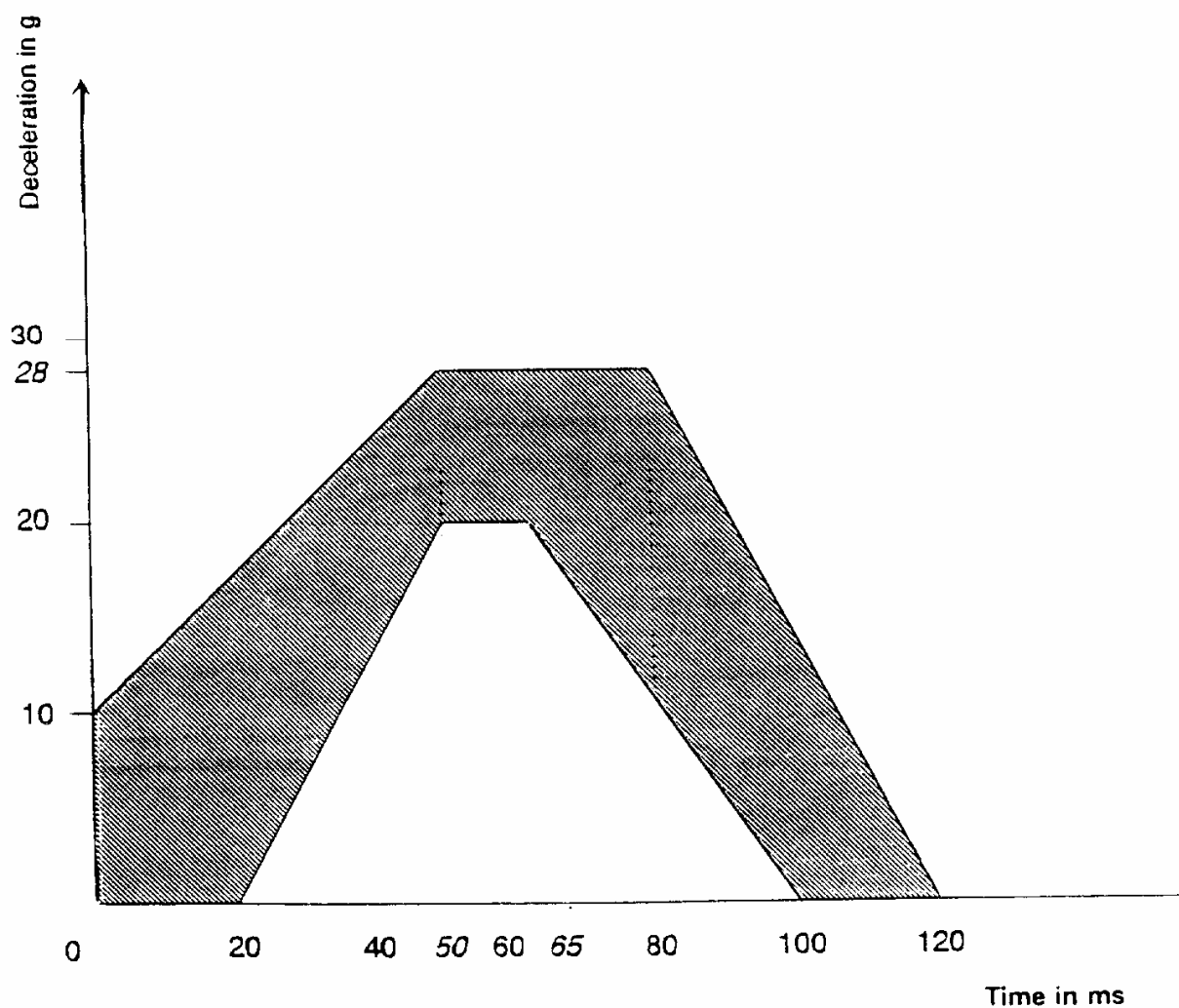


Figure 2: Testing of a partitioning system above the backrest

- 2.2.1. If the seat-back is fitted with a head restraint, the test must be carried out with the head restraint placed in the highest position, if adjustable.
3. Dynamic testing of seat-backs and partitioning systems used as luggage restraint systems
- 3.1. The body of the passenger car shall be anchored securely to a test sled, and this anchorage shall not act as reinforcement for seat-backs and the partitioning system. After the installation of the test blocks as described in paragraph 2.1. or 2.2., the passenger car body shall be accelerated as shown in annex 9, appendix, so that at the moment of impact, its free running speed is $50 \pm 0/-2$ km/h. With the agreement of the manufacturer, the above described test pulse corridor can be used alternatively to fulfil the test of the seat strength according to paragraph 6.3.1.

Annex 9 - AppendixSLED DECELERATION CORRIDOR AS A FUNCTION OF TIME
(Frontal impact)

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/Rev.X, available at:
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29docstts.html>.

Regulation No 55 of the Economic Commission for Europe of the United Nations (UN/ECE) – Uniform provisions concerning the approval of mechanical coupling components of combinations of vehicles

Addendum 54: Regulation No. 55

Revision 1

Incorporating all valid text up to:

The 01 series of amendments - Date of entry into force: 16 September 2001
Corrigendum 1 to the 01 series of amendments, subject of depositary notification C.N.602.2002.TREATIES-1 dated 13 June 2002

1. SCOPE

- 1.1. This Regulation lays down the requirements which the mechanical coupling devices and components shall meet in order to be regarded internationally as being mutually compatible.
- 1.2. This Regulation applies to devices and components intended for:
 - 1.2.1. motor vehicles and trailers intended to form a combination of vehicles¹
 - 1.2.2. motor vehicles and trailers intended to form articulated vehicles¹, where the vertical load imposed on the motor vehicle by the trailer does not exceed 200 kN.
- 1.3. This Regulation applies to:
 - 1.3.1. standard devices and components as defined in paragraph 2.3.;
 - 1.3.2. non-standard devices and components as defined in paragraph 2.4.;
 - 1.3.3. non-standard miscellaneous devices and components as defined in paragraph 2.5.

2. DEFINITIONS

¹ Within the meaning of the Convention on Road Traffic (Vienna, 1968) article 1, subparagraphs (t) and (u).

For the purposes of this Regulation:

2.1. "mechanical coupling devices and components means" all those items on the frame, load-bearing parts of the bodywork and the chassis of the motor vehicle and trailer by means of which they are connected together to form the combination of vehicles or the articulated vehicles. Fixed or detachable parts for the attachment or operation of the mechanical coupling device or component are included.

2.2. automatic coupling requirement is achieved if reversing the towing vehicle against the trailer is sufficient to engage the coupling completely, to lock it automatically and to indicate proper engagement of the locking devices without any external intervention.

In the case of hook type couplings automatic coupling requirement is achieved if opening and closing of the coupling locking device takes place without any external intervention when the drawbar eye is inserted into the hook.

2.3. standard mechanical coupling devices and components conform to standard dimensions and characteristic values as given in this Regulation. They are interchangeable within their class, independent of manufacturer.

2.4. non-standard mechanical coupling devices and components do not conform in all respects to the standard dimensions and characteristic values given in this Regulation but can be connected to standard coupling devices and components in the relevant class.

2.5. non-standard miscellaneous mechanical coupling devices and components do not conform to standard dimensions and characteristic values as given in this Regulation and cannot be connected to standard coupling devices and components. They include, for example, devices which do not correspond with any of the Classes A to L and T listed in paragraph 2.6. such as those intended for special, heavy transport use and miscellaneous devices conforming to existing national standards.

2.6. mechanical coupling devices and components are classified according to type as follows:

2.6.1. Class A Coupling balls and towing brackets employing a 50 mm diameter spherical device and brackets on the towing vehicle for connecting to the trailer by means of a coupling head - see annex 5, paragraph 1.

2.6.1.1. Class A50-1 to 50-5 Standard 50 mm diameter coupling balls with flange type bolted fixing.

2.6.1.2. Class A50-X Non-standard 50 mm diameter coupling balls and brackets.

2.6.2. Class B Coupling heads fitted to the drawbar of trailers for connecting to the 50 mm diameter coupling ball on the towing vehicle - see annex 5, paragraph 2.

- 2.6.2.1. Class B50-X Non-standard 50 mm diameter coupling heads.
- 2.6.3. Class C Drawbar couplings with a 50 mm diameter pin and with a jaw and an automatic closing and locking pin on the towing vehicle for connecting to the trailer by means of a drawbar eye - see annex 5, paragraph 3.:
- 2.6.3.1. Class C50-1 to 50-7 Standard 50 mm pin diameter drawbar couplings.
- 2.6.3.2. Class C50-X Non-standard 50 mm pin diameter drawbar couplings.
- 2.6.4. Class D Drawbar eyes having a parallel hole suitable for a 50 mm diameter pin and fitted to the drawbar of trailers for connecting to automatic drawbar couplings - see annex 5, paragraph 4.:
- 2.6.4.1. Class D50-A Standard 50 mm pin diameter drawbar eyes for welded attachment.
- 2.6.4.2. Class D50-B Standard 50 mm pin diameter drawbar eyes for threaded attachment.
- 2.6.4.3. Class D50-C and 50-D Standard 50 mm pin diameter drawbar eyes for bolted attachment.
- 2.6.4.4. Class D50-X Non-standard 50 mm pin diameter drawbar eyes.
- 2.6.5. Class E Non-standard drawbars comprising overrun devices and similar items of equipment mounted on the front of the towed vehicle, or to the vehicle chassis, which are suitable for coupling to the towing vehicle by means of drawbar eyes, coupling heads or similar coupling devices - see annex 5, paragraph 5.

Drawbars may be hinged to move freely in a vertical plane and not support any vertical load or be fixed in a vertical plane so as to support a vertical load (Rigid drawbars). Rigid drawbars can be entirely rigid or be flexibly mounted.

Drawbars may comprise more than one component and may be adjustable or cranked.

This Regulation applies to drawbars which are separate units, not an integral part of the chassis of the towed vehicle.
- 2.6.6. Class F Non-standard drawbeams comprising all components and devices between the coupling devices, such as coupling balls and drawbar couplings, and the frame (for example the rear cross member), the load-bearing bodywork or the chassis of the towing vehicle - see annex 5, paragraph 6.
- 2.6.7. Class G Fifth wheel couplings are plate type couplings having an automatic coupling lock and are fitted to the towing vehicle for connecting with a 50 mm diameter fifth wheel coupling pin fitted to a semitrailer - see annex 5, paragraph 7.

- 2.6.7.1. Class G50 Standard 50 mm pin diameter fifth wheel couplings.
- 2.6.7.2. Class G50-X Non-standard 50 mm pin diameter fifth wheel couplings.
- 2.6.8. Class H Fifth wheel coupling pins, 50 mm diameter, are devices fitted to a semitrailer to connect with the fifth wheel coupling of the towing vehicle - see annex 5, paragraph 8.:
- 2.6.8.1. Class H50-X Non-standard 50 mm pin diameter fifth wheel coupling pins.
- 2.6.9. Class J Non-standard mounting plates comprising all components and devices for attaching fifth wheel couplings to the frame or chassis of the towing vehicle. The mounting plate may have provision for moving horizontally, that is to form a sliding fifth wheel - see annex 5, paragraph 9.
- 2.6.10. Class K Standard, hook type couplings intended for use with appropriate Class L type toroidal drawbar eyes - see annex 5, paragraph 10.
- 2.6.11. Class L Standard toroidal drawbar eyes for use with appropriate Class K hook type couplings - see annex 5, paragraph 4.
- 2.6.12. Class S Devices and components which do not conform to any of the Classes A to L or T above and which are used, for example, for special heavy transport or are devices unique to some countries and covered by existing national standards.
- 2.6.13. Class T Non-standard, non-automatic dedicated drawbar type couplings which are able to be separated only by the use of tools and are typically used for trailers of car transporters. They shall be approved as a matched pair.
- 2.7. Steering wedges are devices or components mounted on semitrailers which control positive steering of the trailer in conjunction with the fifth wheel coupling.
- 2.8. Remote control systems are devices and components which enable the coupling device to be operated from the side of the vehicle or from the driving cab of the vehicle.
- 2.9. Remote indicators are devices and components which give an indication in the vehicle cab that coupling has been effected and that the locking devices have engaged.
- 2.10. "type of coupling device or component" means a device or component which does not differ in such essential respects as:
 - 2.10.1. the manufacturer's or supplier's trade name or mark;
 - 2.10.2. the class of coupling as defined in paragraph 2.6.;
 - 2.10.3. the external shape, principal dimensions or fundamental difference in design including materials used; and

2.10.4. the characteristic values D , D_c , S , V and U as defined in paragraph 2.11.

2.11. The characteristic values D , D_c , S , V and U are defined or determined as:

2.11.1. The D or D_c value is the theoretical reference value for the horizontal forces in the towing vehicle and the trailer and is used as the basis for horizontal loads in the dynamic tests.

For mechanical coupling devices and components not designed to support imposed vertical loads, the value is:

$$D = g \frac{T \times R}{T + R} \text{ KN}$$

For mechanical coupling devices and components for centre axle trailers as defined in 2.13, the value is:

$$D_c = g \frac{T \times C}{T + R} \text{ KN}$$

For fifth wheel couplings of Class G, fifth wheel coupling pins of Class H and mounting plates of Class J, as defined in paragraph 2.6., the value is:

$$D = g \frac{0,6 \times T \times R}{T + R - U} \text{ KN}$$

where:

T is the technically permissible maximum mass of the towing vehicle, in tonnes. Where relevant, this includes the vertical load imposed by a centre axle trailer.

R is the technically permissible maximum mass, in tonnes, of a trailer with drawbar free to move in a vertical plane, or of a semitrailer.²

C is the mass, in tonnes, transmitted to the ground by the axle or axles of the centre axle trailer, as defined in paragraph 2.13., when coupled to the towing vehicle and loaded to the technically permissible maximum mass². For Category O_1 and O_2 centre axle trailers³ the technically permissible maximum mass will be that declared by the manufacturer of the towing vehicle.

g is the acceleration due to gravity (assumed to be 9.81 m/s^2)

² The mass T and R and the technically permissible maximum mass, may be greater than the permissible maximum mass prescribed by national legislation.

³ See definitions in Regulation N° 13 annexed to the 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions for wheeled vehicles, Equipment and Parts which can be Fitted and/or be Used on Vehicles and Conditions for Reciprocal Recognition of Approvals granted on the Basis of these Prescriptions. The definition is also contained in annex 7 of Consolidated Resolution on the Construction vehicles (R. E. 3) (document TRANS/ WP. 29/ 78/ Rev. 1/ Amend. 2).

U is as defined in paragraph 2.11.2.

S is as defined in paragraph 2.11.3.

- 2.11.2. The **U** value is the vertical mass, in tonnes, imposed on the fifth wheel coupling by the semitrailer of technically permissible maximum mass ²
- 2.11.3. The **S** value is the vertical mass, in kilograms, imposed on the coupling, under static conditions, by the centre axle trailer, as defined in paragraph 2.13., of technically permissible maximum mass ²
- 2.11.4. The **V** value is the theoretical reference value of the amplitude of the vertical force imposed on the coupling by the centre axle trailer of technically permissible maximum mass greater than 3.5 tonnes. The **V** value is used as the basis for vertical forces in the dynamic tests.

$$V = \frac{axCxX^2}{L^2} \text{ (seen the note below)}$$

where:

a is an equivalent vertical acceleration at the coupling depending on the type of suspension system of the rear axle of the towing vehicle.

For air suspension (or suspension systems with equivalent damping characteristics)

$$a = 1.8 \text{ m/s}^2$$

For other types of suspension:

$$a = 2.4 \text{ m/s}^2$$

X is the length of the loading area of the trailer, in metres (see Figure 1)

L is the distance from the centre of the drawbar eye to the centre of the axle assembly, in metres (see Figure 1)

Note: (If less than 1.0, the value of 1.0 shall be used)

$$\frac{X^2}{L^2} \geq 1.0$$

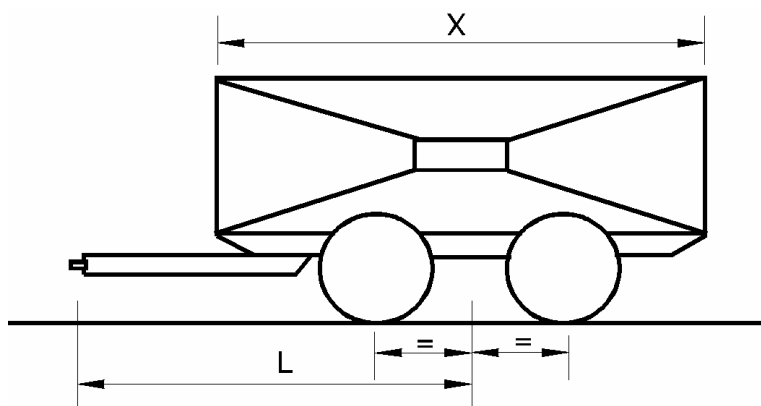


Figure 1 – Dimensions of the centre axle trailer**2.12. Symbols and definitions used in annex 6 of this Regulation.**

A_v = maximum permitted axle mass of the steered axle in tonnes.

C = mass of centre axle trailer in tonnes - see paragraph 2.11.1. of this Regulation.

D = D value in kN - see paragraph 2.11.1. of this Regulation.

$D_c = D_c$ value in kN for centre axle trailers - see paragraph 2.11.1. of this Regulation.

R = mass of towed vehicle in tonnes - see paragraph 2.11.1. of this Regulation.

T = mass of towing vehicle in tonnes - see paragraph 2.11.1. of this Regulation.

F_a = static lifting force in kN.

F_h = horizontal component of test force in longitudinal axis of vehicle in kN.

F_s = vertical component of test force in kN.

S = static vertical mass in kg.

U = fifth wheel imposed vertical mass in tonnes.

V = V -value in kN - see paragraph 2.11.4. of this Regulation.

a = equivalent vertical acceleration factor at the coupling point of centre axle trailers depending on the type of suspension of the rear axle(s) of the towing vehicle - see paragraph 2.11.4. of this Regulation.

e = longitudinal distance between the coupling point of coupling balls which can be dismantled and the vertical plane of the fixing points (see Figures 20c to 20f) in mm.

f = vertical distance between the coupling point of coupling balls which can be dismantled and the horizontal plane of the fixing points (see Figures 20c to 20f) in mm.

g = acceleration due to gravity, assumed as 9.81 m/s^2 .

L = theoretical drawbar length between the centre of the drawbar eye and the centre of the axle assembly in meters.

X = length of the loading area of a centre axle trailer in meters.

Subscripts:

O = maximum test force

U = minimum test force

a = static force

h = horizontal

p = pulsating

res = resultant

s = vertical

w = alternating force

- 2.13. "Centre axle trailer" means a trailer having a drawbar which cannot move in a vertical plane independent of the trailer and having an axle or axles positioned close to the centre of gravity of the trailer, when uniformly loaded. The vertical load imposed on the coupling of the towing vehicle shall not exceed 10 per cent of the maximum mass of the trailer, or 1 000 kg, whichever is the lesser.

The maximum mass of the centre axle trailer means the total mass transmitted to the ground by the axle or axles of the trailer when coupled to a towing vehicle and when loaded to the technically permissible maximum mass⁴.

- 2.14. "Positive mechanical engagement" means that the design and geometry of a device and its component parts shall be such that it will not open or disengage under the action of any forces or components of forces to which it is subject during normal use or testing.
- 2.15. "Vehicle type" means vehicles which do not differ in such essential respects as the structure, dimensions, shape and materials in areas to which the mechanical coupling device or component is affixed. This applies to both the towing vehicle and trailer.

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval shall be submitted by the holder of the trade-name or mark, or by his duly accredited representative.
- 3.2. or each type of mechanical coupling device or component the application shall be accompanied by the following information, for example, by means of the Communication form given in annex 1:

⁴ The technically permissible mass, may be greater than the maximum permissible mass prescribed by national legislation

- 3.2.1. details of all manufacturer's or supplier's trade names or marks to be applied to the coupling device or component;
- 3.2.2. three sets of drawings which are sufficiently detailed to define the device or component and which specify how it is to be fitted to the vehicle; the drawings shall show the position and space provided for the approval number and other marking as given in paragraph 7.;
- 3.2.3. a statement of the values of D, D_c, S, V and U as applicable and as defined in paragraph 2.11.

For Class A towing brackets a statement of the maximum permissible towing vehicle and trailer masses and the maximum permissible static vertical imposed load on the tow ball as advised by the manufacturer of the towing vehicle;

- 3.2.3.1. The characteristic values shall be at least equal to those applicable to the maximum permissible towing vehicle, trailer and combination masses.
- 3.2.4. a detailed technical description of the device or component, specifying, in particular, the type and the materials used;
- 3.2.5. restrictions on the vehicles to which the coupling may be fitted - see annex 1, paragraph 12. and annex 5, paragraph 3.4.;
- 3.2.6. one sample, plus additional samples as requested by the type approval authority or technical service;
- 3.2.7. all samples shall be fully finished with the final surface treatment applied. However, if the final treatment is by painting or epoxy powder coating, this should be omitted;
- 3.2.8. in the case of a mechanical coupling device or component designed for a specific vehicle type, the manufacturer of the device or component shall also submit the installation data given by the vehicle manufacturer. The approval authority or technical service may also request that a vehicle representative of the type be submitted.

4. GENERAL REQUIREMENTS FOR MECHANICAL COUPLING DEVICES OR COMPONENTS

- 4.1. Each sample shall conform to the dimensional and strength specifications set out in annexes 5 and 6. Following the tests specified in annex 6 there shall not be any cracks, fractures or any excessive permanent distortion which would be detrimental to the satisfactory operation of the device or component.
- 4.2. All parts of the mechanical coupling device or component whose failure could result in separation of the vehicle and trailer shall be made of steel. Other materials may be used provided that equivalence has been demonstrated by the manufacturer to the satisfaction of the type approval

authority or technical service of the Contracting Party applying this Regulation.

- 4.3. The mechanical coupling devices or components shall be safe to operate and coupling and uncoupling shall be possible by one person without the use of tools. With the exception of Class T couplings only devices which allow automatic coupling shall be allowed for the coupling of trailers having a maximum technically permissible mass greater than 3.5 tonnes.
- 4.4. The mechanical coupling devices or components shall be designed and manufactured such that in normal use and with correct maintenance and replacement of wearing parts they will continue to function satisfactorily and retain the characteristics prescribed by this Regulation.
- 4.5. All mechanical coupling devices or components shall be designed to have positive mechanical engagement and the closed position shall be locked at least once by further positive mechanical engagement unless further requirements are stated in annex 5. Alternatively there may be two or more separate arrangements to ensure the integrity of the device but each arrangement shall be designed to have positive mechanical engagement and shall be tested individually to any requirements given in annex 6. Positive mechanical engagement shall be as defined in paragraph 2.14.

Spring forces may be used only to close the device and to prevent the effects of vibration from causing component parts of the device to move to positions where it may open or disengage.

The failure or omission of any one single spring shall not allow the complete device to open or disengage.

- 4.6. Every device or component shall be accompanied by installation and operating instructions giving sufficient information for any competent person to install it correctly on the vehicle and operate it properly - see also annex 7. The instructions shall be in at least the language of the country in which it will be offered for sale. In the case of devices and components supplied for original equipment fitting by a vehicle manufacturer or bodybuilder, installation instructions may be dispensed with but the vehicle manufacturer or bodybuilder will be responsible for ensuring that the vehicle operator is supplied with the necessary instructions for correct operation of the coupling device or component.
- 4.7. For devices and components of Class A, or Class S, if applicable, for use with trailers of maximum permissible mass not exceeding 3.5 tonnes, and which are produced by manufacturers not having any association with the vehicle manufacturer and where the devices and components are intended for fitting in the after-market, the height and other installation features of the coupling shall, in all cases, be verified by the type approval authority or technical service in accordance with annex 7, paragraph 1.
- 4.8. For heavy duty and other non-standard miscellaneous coupling devices or components, Class S and Class T, the relevant requirements in annexes 5,

6 and 7 for the closest standard or non-standard device or component shall be used.

5. APPLICATION FOR APPROVAL OF A VEHICLE FITTED WITH A MECHANICAL COUPLING DEVICE OR COMPONENT

- 5.1. Where a vehicle manufacturer applies for approval of a vehicle fitted with a mechanical coupling device or component or authorizes the use of a vehicle for towing any form of trailer, then, at the request of a bona fide applicant for possible type approval for a mechanical coupling device or component, or of the type approval authority or technical service of a Contracting Party, the vehicle manufacturer shall readily make available to that inquirer or authority or technical service, such information as required in paragraph 5.3 below, to enable a manufacturer of a coupling device or component to properly design and manufacture a mechanical coupling device or component for that vehicle. At the request of a bona fide applicant for possible type approval for a mechanical coupling device or component, any information given in paragraph 5.3 below which is held by the type approval authority shall be released to that applicant.
- 5.2. The application for approval of a vehicle type with regard to the fitting of a mechanical coupling device or component shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 5.3. It shall be accompanied by the following information to enable the type approval authority to complete the communication form given in annex 2.
- 5.3.1. a detailed description of the vehicle type and of the mechanical coupling device or component and, at the request of the type approval authority or technical service, a copy of the approval form for the device or component;
- 5.3.2. The information shall also include the maximum permissible masses of the towing and towed vehicles, the distribution of the maximum permissible mass of the towing vehicle between the axles, the maximum permissible axle masses, the maximum permissible vertical loading to be imposed on the rear of the towing vehicle and details and/or drawings of the installation mounting points for the device or component and of any additional reinforcing plates, support brackets and so on, necessary for safe attachment of the mechanical coupling device or component to the towing vehicle;
- 5.3.2.1. the loading condition at which the height of the tow ball of M1 category vehicles is to be measured - see paragraph 2 of annex 7, appendix 1.
- 5.3.3. three sets of drawings which are sufficiently detailed to identify the device or component and which specify how it is to be fitted to the vehicle; the drawings shall show the position and space provided for the approval number and other marking as given in paragraph 7.;

- 5.3.4. a detailed technical description of the device or component, specifying, in particular, the type and the materials used;
- 5.3.5. a statement of the values of D , D_c , S , V and U as applicable and as defined in paragraph 2.11.;
- 5.3.5.1. The characteristic values shall be at least equal to those applicable to the maximum permissible towing vehicle, trailer and combination masses.
- 5.3.6. a vehicle, representative of the type to be approved and fitted with a mechanical coupling device, shall be submitted to the type approval authority or technical service which may also request additional samples of the device or component;
- 5.3.7. a vehicle not having all of the components appropriate to the type may be accepted provided that the applicant can show, to the satisfaction of the type approval authority or technical service, that the absence of the components does not have any effect on the results of the inspection as far as the requirements of this Regulation are concerned.

6. GENERAL REQUIREMENTS FOR VEHICLES FITTED WITH A MECHANICAL COUPLING DEVICE OR COMPONENT

- 6.1. The mechanical coupling device or component fitted to the vehicle shall be approved in accordance with the requirements of paragraphs 3. and 4. and annexes 5 and 6 of this Regulation.
- 6.2. The installation of the mechanical coupling device or component shall meet the requirements of annex 7 to this Regulation.
- 6.3. Operating instructions shall be provided for use of the coupling device or component which shall contain any special instructions for operations which are different from those normally associated with the type of coupling device or component and instructions for coupling and uncoupling with different modes of operation, for example, at various angles between the towing and towed vehicles. Each vehicle shall be accompanied by these operating instructions which shall be at least in the language of the country in which it will be offered for sale.

7. MARKINGS

- 7.1. Types of mechanical coupling devices and components submitted for approval shall bear the trade name or mark of the manufacturer, supplier or applicant.
- 7.2. There shall be a sufficiently large space for application of the approval mark referred to in paragraph 8.5. and shown in annex 3. This space shall be shown on the drawings referred to in paragraph 3.2.2.
- 7.3. Adjacent to the approval mark referred to in paragraphs 7.2. and 8.5., the mechanical coupling device or component shall be marked with the class

of coupling, as defined in paragraph 2.6. and the relevant characteristic values as defined in paragraph 2.11. and shown in annex 4. The position for these markings shall be shown on the drawings referred to in paragraph 3.2.2.

The characteristic values need not be marked in cases where those values are defined in the classification given in this Regulation, for example, Classes A50-1 to A50-5.

- 7.4. Where the mechanical coupling device or component is approved for alternative characteristic values within the same class of coupling or device, a maximum of two alternatives shall be marked on the device or component.
- 7.5. If the application of the mechanical coupling device or component is restricted in any way, for example, if it is not to be used with steering wedges, then that restriction shall be marked on the device or component.
- 7.6. All markings shall be permanent and legible when the device or component is installed on the vehicle.

8. APPROVAL

- 8.1. If the sample(s) of a type of mechanical coupling device or component meets (meet) the requirements of this Regulation, approval shall be granted subject to the requirements of paragraph 10. being satisfactorily met.
- 8.2. An approval number shall be assigned to each type approved. Its first two digits 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 device or component referred to in this Regulation.
- 8.3. Notice of approval or of extension, refusal or withdrawal of approval or of production definitely discontinued, relating to a type of mechanical coupling device or component approved pursuant to this Regulation, shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a communication form conforming to the model in either annex 1 or annex 2 to this Regulation.
- 8.4. In addition to the mark prescribed in paragraph 7.1., there shall be affixed to every mechanical coupling device or component approved under this Regulation, in the space referred to in paragraph 7.2., an approval mark as described in paragraph 8.5.
- 8.5. The approval mark shall be an international mark comprising:

- 8.5.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval ⁵;
- 8.5.2. the approval number prescribed in paragraph 8.2.;
- 8.5.3. the approval mark and number shall be arranged as shown in the example in annex 3.

9. MODIFICATIONS OF THE MECHANICAL COUPLING DEVICE OR COMPONENT, OR OF THE VEHICLE AND EXTENSION OF APPROVAL

- 9.1. Any modification to the type of mechanical coupling device or component, or of the vehicle as defined in paragraph 2.10. shall be notified to the type approval authority or technical service which granted the approval. The type approval authority or technical service may then either:
 - 9.1.1. consider that the modifications are unlikely to have any appreciable adverse effect and that in any case the device, component or vehicle still conforms to requirements; or
 - 9.1.2. require a further test report.
- 9.2. Confirmation of, or refusal of approval, specifying the modification, shall be communicated by the procedure prescribed in paragraph 8.3. to the Contracting Parties applying this Regulation.
- 9.3. The type approval authority or technical service issuing an extension of approval shall assign a series number for such an extension and shall inform the other Contracting Parties applying this Regulation by the procedure prescribed in paragraph 8.3.

10. CONFORMITY OF PRODUCTION PROCEDURES

- 10.1. The holder of the approval must ensure that results of the conformity of production tests are recorded and that the annexed documents remain available for a period determined in agreement with the approval authority

⁵ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (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, 35-36 (vacant), 37 for Turkey, 38-39 (vacant), 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 and 46 for Ukraine. 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.

or technical service. This period must not exceed 10 years counted from the time when production is definitely discontinued.

- 10.2. The type approval authority or technical service 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 once every two years.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 11.1. The approval granted in respect of a type of mechanical coupling device or component pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a device or component bearing the approval mark does not conform to the type approved.
- 11.2. 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 either annex 1 or annex 2 to this Regulation.

12. PRODUCTION DEFINITELY DISCONTINUED

- 12.1. If the holder of the approval completely ceases to manufacture a type of mechanical coupling device or component approved in accordance with this Regulation, he shall so inform the type approval authority or technical service which granted the approval. Upon receiving the relevant communication, that type approval authority or technical service shall inform thereof the other Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in either annex 1 or annex 2 to this Regulation.

13. TRANSITIONAL PROVISIONS

Until the United Nations Secretary-General is notified otherwise, Contracting Parties applying this Regulation that are Member States of the European Community (at the time of adoption of the 01 series of amendments, Italy, Netherlands, Belgium, United Kingdom, Luxembourg, Finland and Greece) declare that, in relation to mechanical coupling devices and components, they will only be bound by the obligations of the Agreement to which this Regulation is annexed with respect to such devices and components intended for vehicles of categories other than M₁.

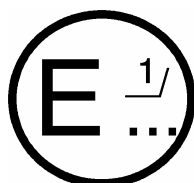
14. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS

- 14.1. The Contracting 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 extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.

Annex 1**COMMUNICATION**

(maximum format: A4 (210 x 297 mm))

¹issued by: Name of administration:concerning: ²/

APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a type of mechanical coupling device or component pursuant to Regulation No. 55

Approval No Extension No

1. Trade name or mark of the device or component:
2. Manufacturer's name for the type of device or component:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Alternative supplier's names or trade marks applied to the device or component:
6. Name and address of company or body taking responsibility for the conformity of production:
7. Submitted for approval on:
8. Technical service responsible for conducting approval tests:

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.

9. Brief description:

9.1. Type and class of device or component:

9.2. Characteristic values:

9.2.1. Primary values:

D..... kN D_c kN S..... kg

U.....tonnes V..... kN

Alternative values:

D..... kN D_c kN S..... kg

U.....tonnes V..... kN

9.3. For Class A mechanical coupling devices or components, including towing brackets:

Vehicle manufacturer's maximum permissible vehicle mass:kg

Distribution of maximum permissible vehicle mass between the axles:

Vehicle manufacturer's maximum permissible towable trailer mass:kg

Vehicle manufacturer's maximum permissible static mass on coupling ball:kg

Maximum mass of the vehicle, with bodywork, in running order, including coolant, oils, fuel, tools and spare wheel (if supplied) but not including driver:kg

Loading condition under which the tow ball height of a mechanical coupling device fitted to category M1 vehicles is to be measured - see paragraph 2 of annex 7, appendix 1:

10. Instructions for the attachment of the coupling device or component type to the vehicle and photographs or drawings of the mounting points given by the vehicle manufacturer:

11. Information on the fitting of any special reinforcing brackets or plates or spacing components necessary for the attachment of the coupling device or component:

12. Additional information where the use of the coupling device or component is restricted to special types of vehicles - see annex 5, paragraph 3.4.

13. For Class K hook type couplings, details of the drawbar eyes suitable for use with the particular hook type.

14. Date of test report:

15. Number of test report:

16. Approval mark position:

17. Reason(s) for extension of approval:

18. Approval granted/extended/refused/withdrawn: ²

19. Place:

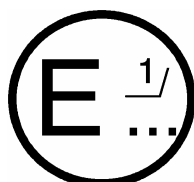
20. Date:

21. Signature:

22. The list of documents deposited with the Administration Service which has granted approval is annexed to this communication and may be obtained on request.

Annex 2**COMMUNICATION**

(maximum format: A4 (210 x 297 mm))

¹ issued by: Name of administration:concerning: ²

APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type with regard to the fitting of a mechanical coupling device or component pursuant to Regulation No. 55.

Approval No..... Extension No

1. Trade name or mark of vehicle:

2. Vehicle type:

3. Manufacturer's name and address:

4. If applicable, name and address of the manufacturer's representative:

5. Vehicle category, for example, M1, N1:

6. Maximum permissible vehicle mass:kg

Distribution of maximum permissible vehicle mass between the axles:

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.

Maximum permissible towable trailer mass:kg

Maximum permissible static mass on coupling ball:kg

Maximum mass of the vehicle, with bodywork, in running order, including coolant, oils, fuel, tools and spare wheel (if supplied) but not including driver:kg

7. D..... kN D_c kN S..... kg

U.....tonnes V..... kN

8. Instructions for the attachment of the coupling device or component type to the vehicle and photographs or drawings of the mounting points:

9. Information on the fitting of any special reinforcing brackets or plates or spacing components necessary for the attachment of the coupling device or component:

10. Trade name or mark of the mechanical coupling device or component and the approval number:

11. Class of coupling device or component:

12. Submitted for approval on:

13. Technical service responsible for conducting approval tests:

14. Date of test report:

15. Number of test report:

16. Approval mark position:

17. Reason(s) for extension of approval:

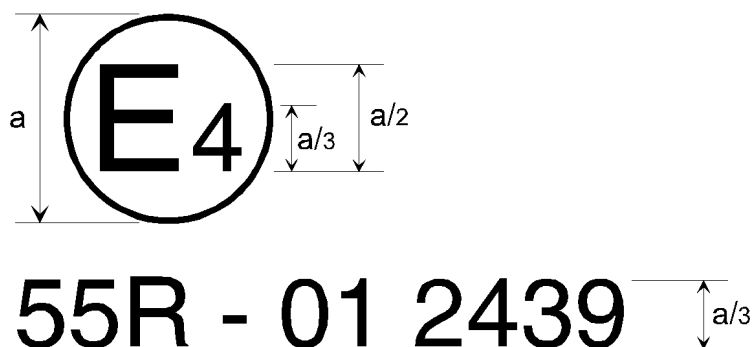
18. Approval granted/extended/refused/withdrawn: A1_S4_F1 ²

19. Place:

20. Date:

21. Signature:

22. The list of documents deposited with the Administration Service which has granted approval is annexed to this communication and may be obtained on request.

Annex 3**EXAMPLE OF AN ARRANGEMENT OF THE APPROVAL
MARK**

a = 8 mm minimum

The mechanical coupling device or component or vehicle bearing the approval mark shown above is a device or component approved in the Netherlands (E4), under approval number 2439, meeting the requirements of the 01 series of amendments to this Regulation.

Note: The approval number and additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face in the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Annex 4

EXAMPLES OF ARRANGEMENTS OF MARKING OF THE CHARACTERISTIC VALUES

1. All mechanical coupling devices or components shall be marked with the class of the device or component. In addition there shall be marking to indicate the capacity in terms of characteristic values as defined in paragraph 2.11. of this Regulation.
- 1.1. The height of all letters and numbers shall be not less than those of the approval number, that is $a/3$ where a is 8 mm.
- 1.2. The characteristic values applicable to each device or component which are to be marked are as shown in the table below - see also paragraph 7.3. of this Regulation:

TABLE 1 - Relevant characteristics values to be marked on coupling devices or components

Description of mechanical coupling device or component	Relevant characteristic values to be marked					
	Class	D	D _c	S	U	V
Coupling balls and towing brackets - see annex 5, para. 1 of this Regulation	*	*		*		
Coupling heads	*	*		*		
Drawbar couplings	*	*	*	*		*
Drawbar eyes	*	*	*	*		*
Drawbars	*	*	*	*		*
Drawbeams	*	*	*	*		*
Fifth wheel couplings	*	*			*	
Fifth wheel pins	*	*				
Fifth wheel mounting plates	*	*			*	
Hook type couplings	*	*	*	*		*

Examples: C50-X D130 D_c90 S1000 V35 would identify a non-standard drawbar coupling of Class C50-X with a maximum D value of 130 kN, a maximum permitted

D_c value of 90 kN, a maximum permitted static vertical imposed mass of 1000 kg and a maximum permitted V value of 35 kN.

A50-X D20 S120 would identify a standard towing bracket with ball coupling of Class A50-X with a maximum D value of 20 kN and a maximum permitted static vertical imposed mass of 120 kg.

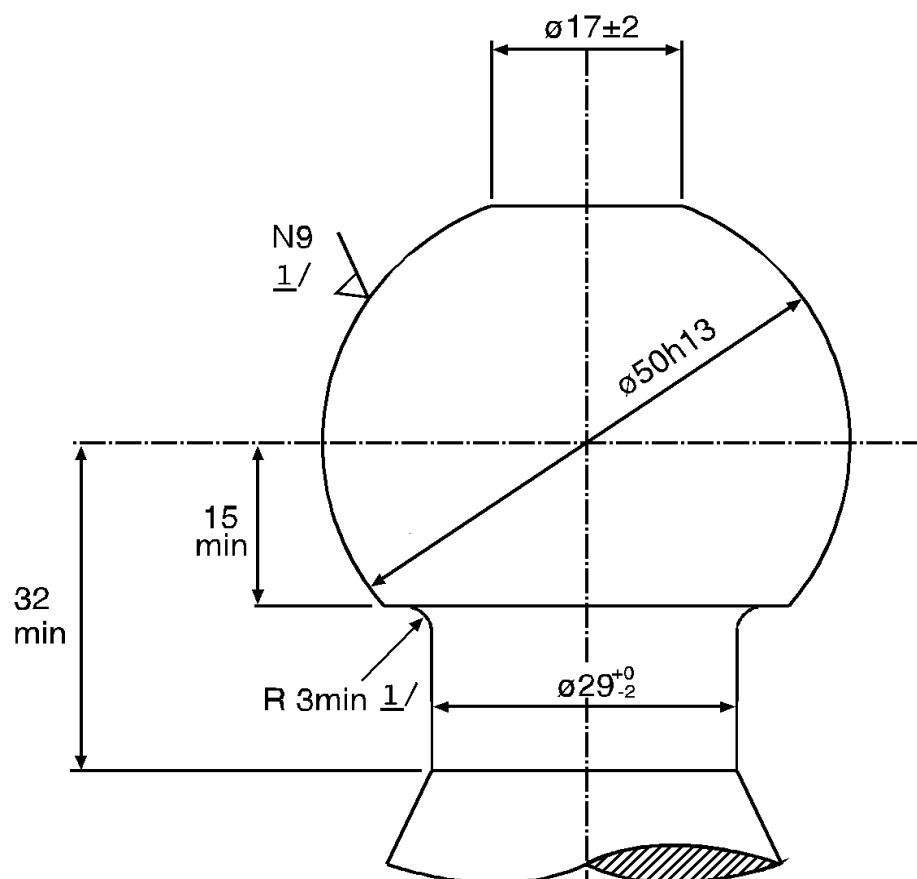
Annex 5

REQUIREMENTS FOR MECHANICAL COUPLING DEVICES OR COMPONENTS

1. COUPLING BALLS AND TOWING BRACKETS

The requirements stated in paragraphs 1.1. to 1.5. of this annex are applicable to all coupling balls and towing brackets of Class A. Paragraph 1.6. details additional requirements which must be fulfilled by standard 50 mm diameter coupling balls with flange type bolted fixings.

- 1.1. Coupling balls of Class A shall conform to Figure 2 in external shape and external dimensions.



1/ The connecting radius between the ball and the neck should be tangential both to the neck and to the lower horizontal surface of the coupling ball

2/ See ISO/R 468 and ISO 1302, the roughness number N9 refers to an R_a value of 6.3mm.

Figure 2 - Coupling ball of Class A

- 1.2. The shape and dimensions of towing brackets shall meet the requirements of the vehicle manufacturer concerning the attachment points and additional mounting devices or components if necessary.
- 1.3. Removable coupling balls:
 - 1.3.1. In the case of removable coupling balls or components which are not fixed by bolts, for example Class A50-X, the point of connection and the locking arrangement shall be designed for positive mechanical engagement.
 - 1.3.2. In the case of a removable coupling ball or component which may be separately approved for use with a variety of towing brackets for different vehicle applications, for example Class A50-X, the clearance space when such a coupling ball is fitted to the towing bracket shall be that prescribed in annex 7, Figure 25.
- 1.4. Coupling balls and towing devices shall be able to satisfy the tests given in annex 6, paragraph 3.1.
- 1.5. Manufacturers of towing brackets shall incorporate attachment points to which either secondary couplings or devices necessary to enable the trailer to be stopped automatically in the event of separation of the main coupling, may be attached. This requirement is necessary to enable the vehicle to comply with the requirements of paragraph 5.2.2.9. of UN/ECE Regulation No. 13 - Uniform Provisions concerning the approval of vehicles of categories M, N and O with regard to braking.
 - 1.5.1. The attachment points for a secondary coupling and/or breakaway cable shall be positioned such that when in use, the secondary coupling or breakaway cable does not restrict the normal articulation of the coupling or interfere with the normal inertia braking system operation.

A single attachment point shall be positioned within 100 mm of a vertical plane passing through the centre of articulation of the coupling. If this is not practicable, two attachment points shall be provided, one on each side of the vertical centre line and equidistant from the centre line by a maximum of 250 mm. The attachment point(s) shall be as rearward and as high as practicable.
- 1.6. Special requirements for standard coupling balls and flange type towing brackets of Classes A50-1 to A50-5 inclusive:
 - 1.6.1. Dimensions of Class A50-1 coupling balls and flange type towing brackets shall be as given in Figure 3 and Table 2.
 - 1.6.2. Dimensions of Class A50-2, A50-3, A50-4 and A50-5 coupling balls and flange type towing brackets shall be as given in Figure 4 and Table 2.
 - 1.6.3. Coupling balls and flange type towing brackets of the classes A50-1 to A50-5 inclusive, shall be suitable and tested for the characteristic values given in Table 3.

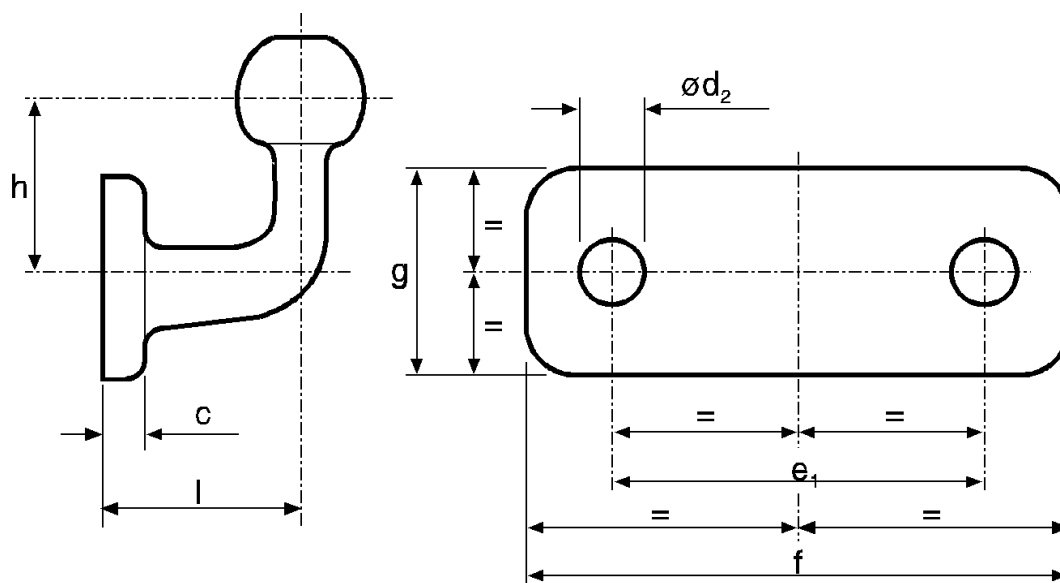


Figure 3 - Dimensions of standard flange type ball couplings of Class A50-1

(see Table 2)

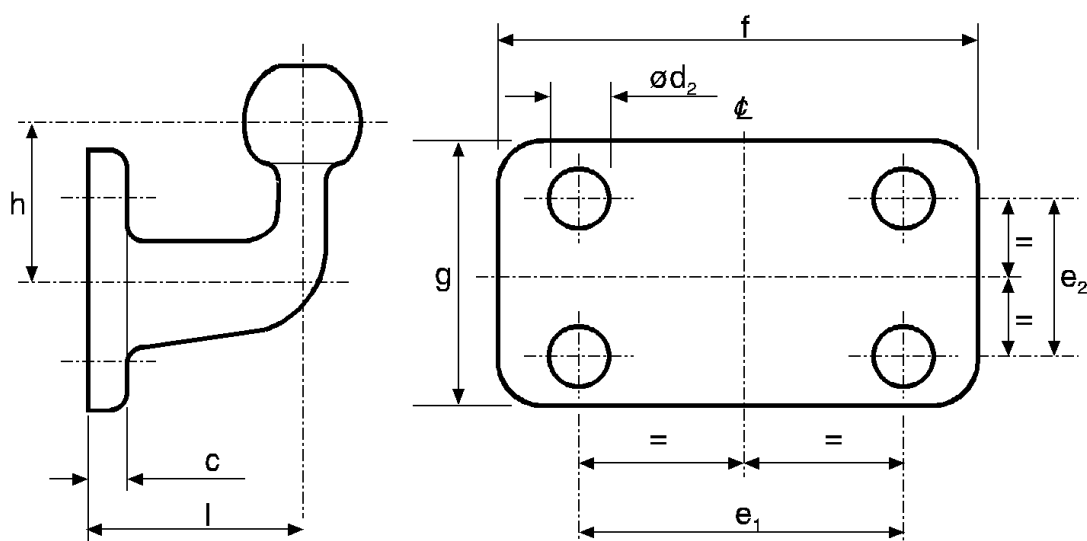


Figure 4 - Dimensions of standard flange type ball couplings of Class A50-2 to A50-5 (see Table 2)

TABLE 2 -Dimensions of standard flange type ball couplings (mm), see Figures 3 and 4.

Class	A50-1	A50-2, A50-4	A50-3, A50-5	Comments
e_1	90	83	120	± 0.5
e_2	--	56	55	± 0.5
d_2	17	10.5	15	H13
f	130	110	155	+ 6.0 -0
g	50	85	90	+ 6.0 -0
c	15	15	15	maximum
l	55	110	120	± 5.0
h	70	80	80	± 5.0

TABLE 3 -Characteristic values for standard flange type ball couplings

Class	A50-1	A50-2	A50-3	A50-4	A50-5
D	17	20	30	20	30
S	120	120	120	150	150

D = Maximum D value (kN)

S = Maximum static vertical mass (kg)

- 1.7. Manufacturers of coupling balls and towing brackets intended for fitment in the after-market and which do not have any association with the relevant vehicle manufacturer shall be aware of the requirements for articulation of the coupling given in paragraph 2 of this annex and shall comply with the appropriate requirements in annex 7 to this Regulation.

2. COUPLING HEADS

- 2.1. Coupling heads of Class B50 shall be designed so that they can be used safely with the coupling balls described in paragraph 1 of this annex and thereby retain the prescribed characteristics.

Coupling heads shall be designed in such a way that safe coupling is ensured, also taking into account the wear of the coupling devices.

- 2.2. Coupling heads shall be able to satisfy the tests laid down in annex 6, paragraph 3.2.

- 2.3. Any additional device (e.g. braking, stabilizer, etc.) shall not have any adverse effect on the mechanical connection.

- 2.4. When not attached to the vehicle, horizontal rotation of the coupling head shall be at least 90° to each side of the centre line of the coupling ball and mounting described in paragraph 1 of this annex. Simultaneously, there shall be an angle of free vertical movement 20° above and below the horizontal. Also, in conjunction with the horizontal angle of rotation of 90° it shall be possible for there to be 25° of roll in both directions about the horizontal axis. The following articulation shall be possible at all angles of horizontal rotation:

(i) vertical pitch $\pm 15^\circ$ with axial roll $\pm 25^\circ$

(ii) axial roll $\pm 10^\circ$ with vertical pitch $\pm 20^\circ$

3. DRAWBAR COUPLINGS

The requirements of paragraphs 3.1. to 3.6. of this annex are applicable to all drawbar couplings of Class C50. Additional requirements which must be fulfilled by standard drawbar couplings of Classes C50-1 to C50-6 are given in paragraph 3.7.

- 3.1. Performance requirements - All drawbar couplings shall be able to satisfy the tests stated in annex 6, paragraph 3.3.

- 3.2. Suitable drawbar eyes - Class C50 drawbar couplings shall be compatible with all Class D50 drawbar eyes and couplings with the specified characteristics.

- 3.3. Jaw

Class C50 drawbar couplings shall have a jaw which is designed such that the appropriate drawbar eye is guided into the coupling.

If the jaw, or a part supporting the jaw, can pivot about the vertical axis, it shall establish itself automatically in the normal position and with the coupling pin open, be effectively restrained in this position to give satisfactory guidance for the drawbar eye during the coupling procedure.

If the jaw, or a part supporting the jaw, can pivot about the horizontal transverse axis, the joint providing the rotation capability shall be restrained in its normal position by a locking torque. The torque shall be sufficient to prevent a force of 200 N acting vertically upwards on the top of the jaw producing any deflection of the joint from its normal position. The locking torque shall be greater than that created by operation of the hand lever described in paragraph 3.6 of this annex. It shall be possible to bring the jaw to its normal position manually. A jaw that pivots about the horizontal transverse axis is only approved for bearing mass, S, of up to 50 kg and a V-value of up to 5 kN.

If the jaw, or a part supporting the jaw, is pivoted about the longitudinal axis, the rotation shall be restrained by a locking torque of at least 100 Nm.

The minimum required size of the jaw depends on the D value of the coupling:

D value $\leq$ 18 kN - width 150 mm, height 100 mm

D value $>$ 18 kN $\leq$ 25 kN - width 280 mm, height 170 mm

D value $>$ 25 kN - width 360 mm, height 200 mm

The external corners of the jaw may be radiused.

Smaller jaws are permitted for Class C50-X drawbar couplings if their use is restricted to centre axle trailers up to 3.5 tonnes maximum permissible mass or if the use of a jaw from the above table is impossible due to technical reasons and if, furthermore, there are special circumstances such as visual aids for ensuring safe execution of the automatic coupling procedure and if the field of application is restricted in the approval according to information given by the coupling manufacturer in the Communication form shown in annex 1.

3.4. Minimum articulation of the coupled drawbar eye

The drawbar eye, when coupled to a drawbar coupling but not fitted to a vehicle, shall have the degrees of articulation given below. If part of the articulation is provided by a special joint (Class C50-X drawbar couplings only), the field of application, given in the communication form shown in annex 1, shall be restricted to the cases stated in annex 7, paragraph 1.3.8.

3.4.1. $\pm 90^\circ$ horizontally about the vertical axis from the longitudinal axis of the vehicle - see Figure 5.

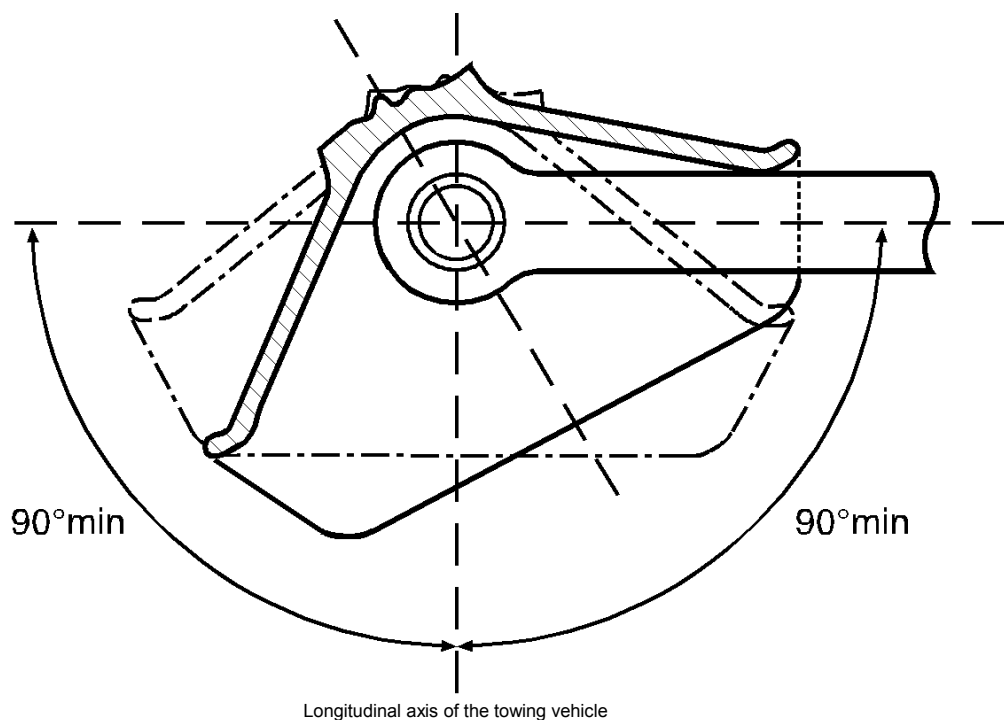


Figure 5 - Horizontal rotation of the coupled drawbar eye

3.4.2. $\pm 20^\circ$ vertically about the transverse axis from the horizontal plane of the vehicle - see Figure 6.

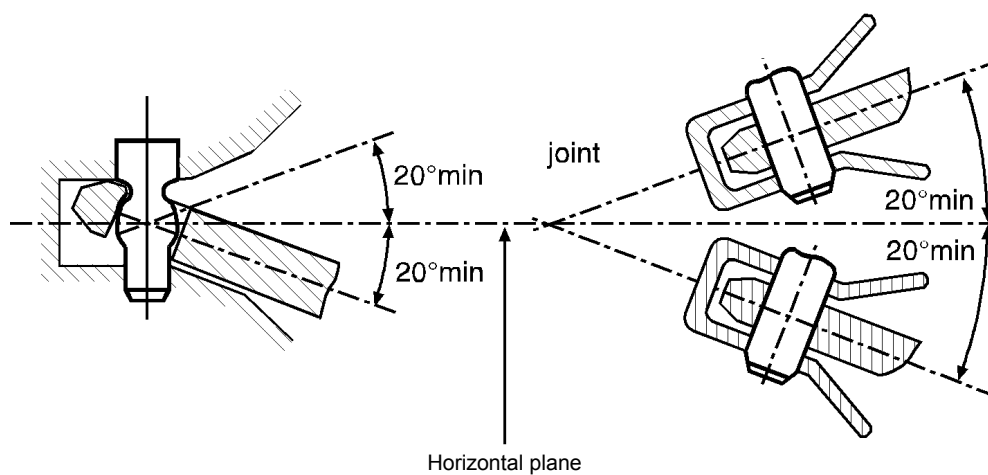


Figure 6 - Vertical rotation of the coupled drawbar eye

3.4.3. $\pm 25^\circ$ axial rotation about the longitudinal axis from the horizontal plane of the vehicle - see Figure 7.

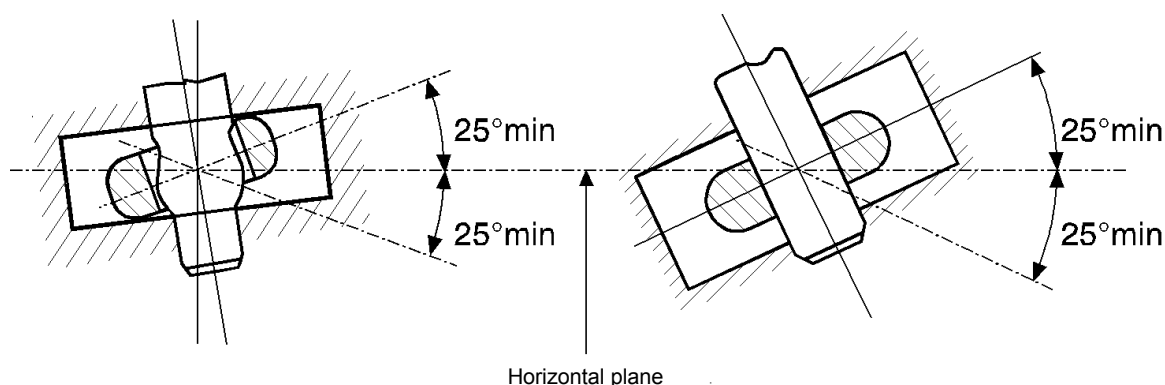


Figure 7 - Axial rotation of the coupled drawbar eye

3.5. Locking to prevent inadvertent uncoupling:

In the closed position the coupling pin shall be locked by two positive mechanical engagement locking devices each of which shall remain effective should the other fail.

The closed and locked position of the coupling shall be clearly indicated externally by a mechanical device. It shall be possible to verify the position of the indicator by feel, for example, in the dark.

The mechanical indication device shall indicate the engagement of both locking devices (an AND condition).

However, it is sufficient for the engagement of only one locking device to be indicated if, in this situation, engagement of the second locking device is an inherent feature of the design.

3.6. Hand levers

Hand levers shall be of a design suitable for easy use with the end rounded off. The coupling shall not have any sharp edges or points of possible pinching near the hand lever which could result in injury during operation of the coupling. The force needed to release the coupling, measured without the drawbar eye, shall not exceed 250 N perpendicular to the hand lever along the line of operation.

3.7. Special requirements for standard drawbar couplings of Class C50-1 to C50-6:

3.7.1. The swivel motion of the drawbar eye about the transverse axis must be achieved through the spherical shape of the coupling pin (and not by means of a joint);

- 3.7.2. Tensile and compressive shock loads along the longitudinal axis due to the clearance between the coupling pin and the drawbar eye shall be attenuated by spring and/or damping devices (except C50-1).
- 3.7.3. The dimensions shall be as given in Figure 8 and Table 4.
- 3.7.4. The couplings shall be suitable and tested for the characteristic values given in Table 5.
- 3.7.5. The coupling shall be opened by means of a hand lever at the coupling (no remote control).

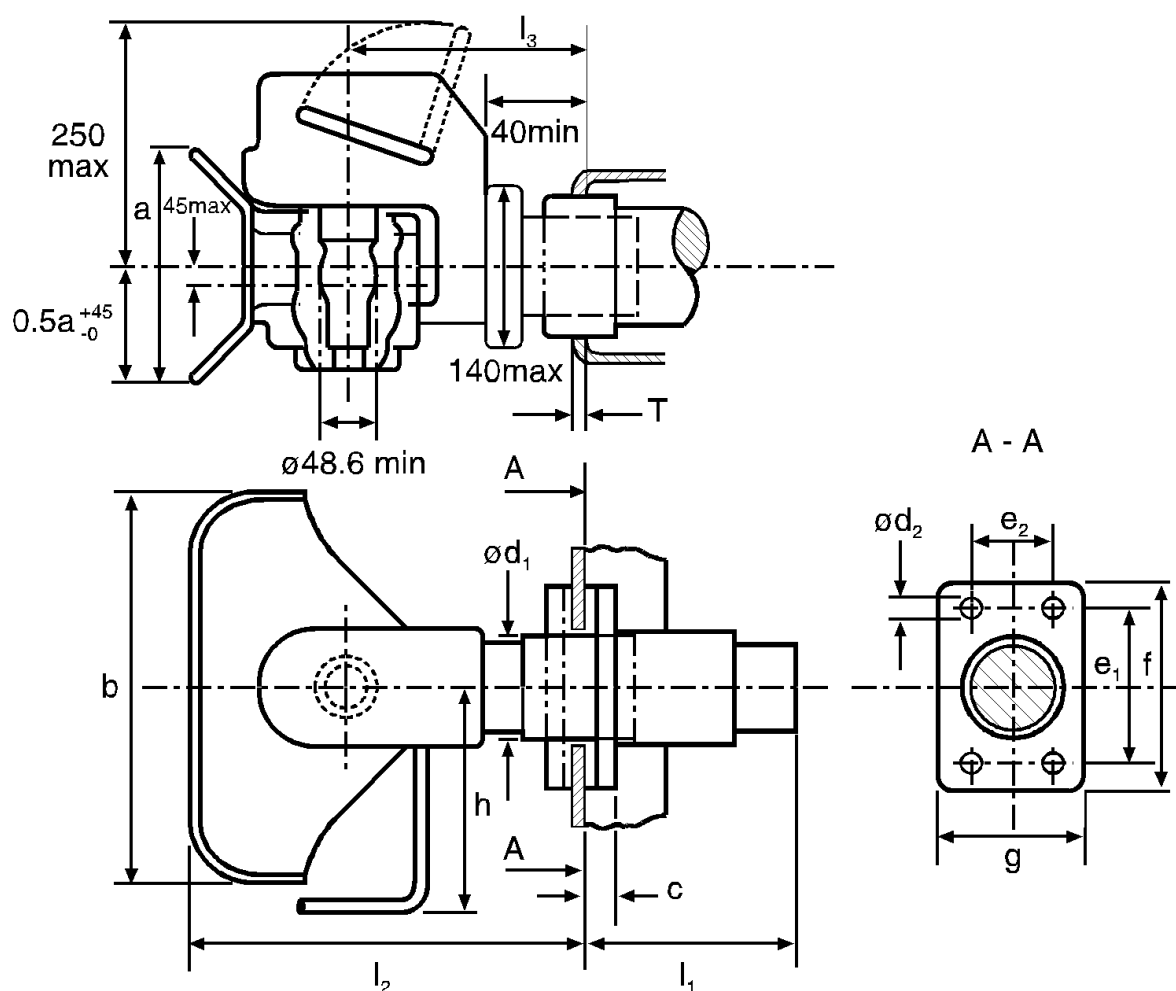


Figure 8 - Dimensions of standard drawbar couplings (mm), see Table 4

TABLE 4 - Dimensions of standard drawbar couplings (mm), see Figure 8

Class	C50-1	C50-2	C50-3	C50-4	C50-5	C50-6 C50-7	Remarks
e_1	83	83	120	140	160	160	± 0.5
e_2	56	56	55	80	100	100	± 0.5
d_1	--	54	74	84	94	94	maximum
d_2	10.5	10.5	15	17	21	21	H13
F	110	110	155	180	200	200	+6.0 -0
G	85	85	90	120	140	140	± 3.0
A	100	170	200	200	200	200	+20.0 -0
B	150	280	360	360	360	360	+20.0 -0
C	20	20	24	30	30	30	maximum
H	150	190	265	265	265	265	maximum
l_1	--	150	250	300	300	300	maximum
l_2	150	300	330	330	330	330	maximum
l_3	100	160	180	180	180	180	± 20.0
T	--	15	20	35	35	35	maximum

TABLE 5 - Characteristic values for standard drawbar couplings

Class	C50-1	C50-2	C50-3	C50-4	C50-5	C50-6	C50-7
D	18	25	70	100	130	190	190
D _c	18	25	50	70	90	120	130
S	200	250	650	900	1000	1000	1000
V	12	10	18	25	35	50	75

D = maximum D value (kN)

D_c = maximum D value (kN) for centre axle trailer applications

S = maximum static vertical load on coupling (kg)

V = maximum V value (kN)

4. DRAWBAR EYES

4.1. General requirements for drawbar eyes of Class D50:

All drawbar eyes of Class D50 shall be able to satisfy the test stated in annex 6, paragraph 3.4.

Class D50 drawbar eyes are intended for use with C50 drawbar couplings. Drawbar eyes shall not be able to rotate axially (because the respective couplings can rotate).

If Class D50 drawbar eyes are fitted with sleeves, they shall comply with the dimensions shown in Figure 9 (not permitted for Class D50-C) or Figure 10.

The sleeves must not be welded into the drawbar eyes.

Class D50 drawbar eyes shall have the dimensions given in paragraph 4.2. The form of shank for drawbar eyes of Class D50-X is not specified, but for a distance of 210 mm from the centre of the eye the height "h" and the width "b" shall be within the limits given in Table 6.

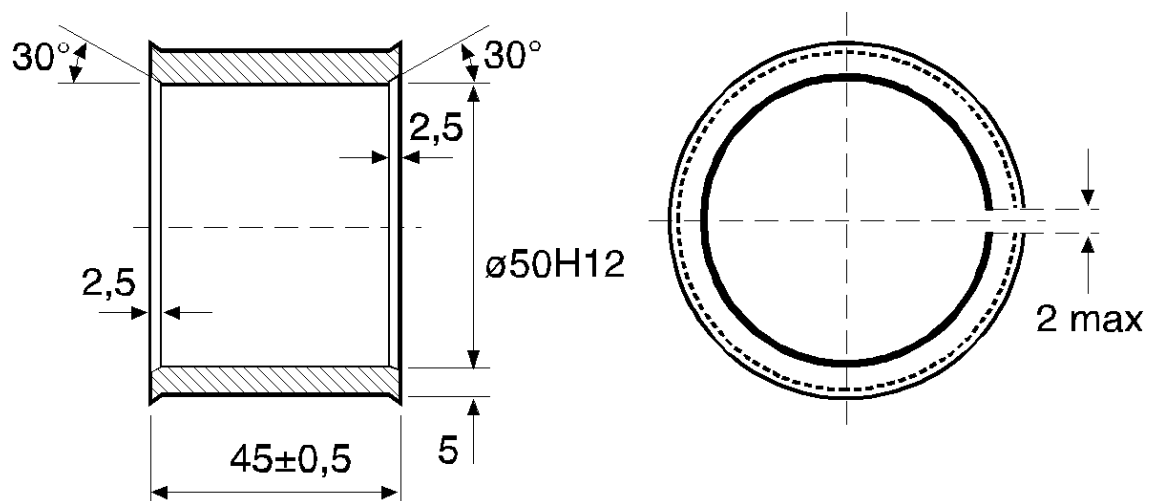


Figure 9 - Slotted sleeve for Class D50 drawbar eyes

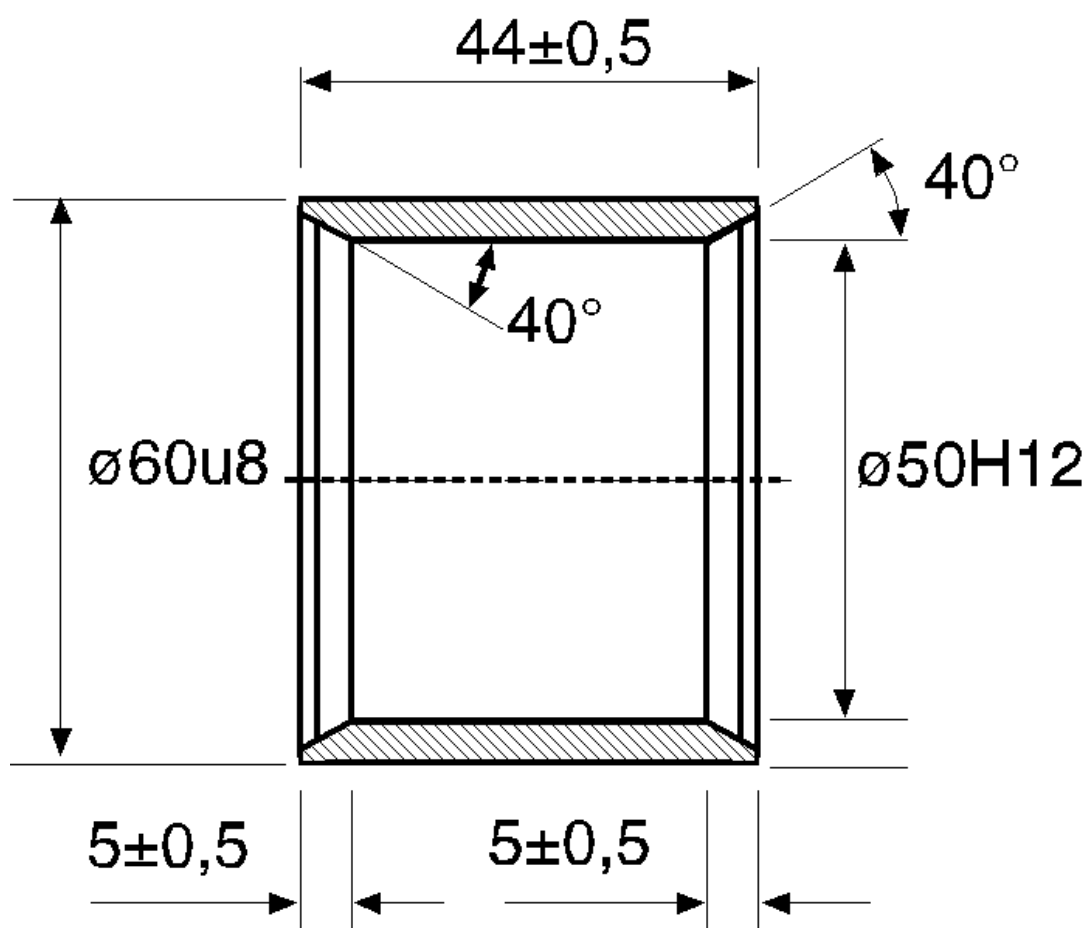


Figure 10 - Non-slotted sleeve for Class D50-C drawbar eyes

TABLE 6 - Dimensions for drawbar eyes D50-A and D50-X,

see Figure 11

Class	h (mm)	b (mm)
D50-A	65 +2/-1	60 +2/-1
D50-X	80 maximum	62 maximum

TABLE 7 - Characteristic values for standard drawbar eyes

Class	D	D _c	S	V
D50-A	130	90	1 000	30
D50-B	130	90	1 000	25
D50-C	190	120	1 000	50
D50-D	190	130	1000	75

4.2. Special requirements for Class D50 drawbar eyes:

- 4.2.1. Class D50-A and D50-X drawbar eyes shall have the dimensions illustrated in Figure 11.

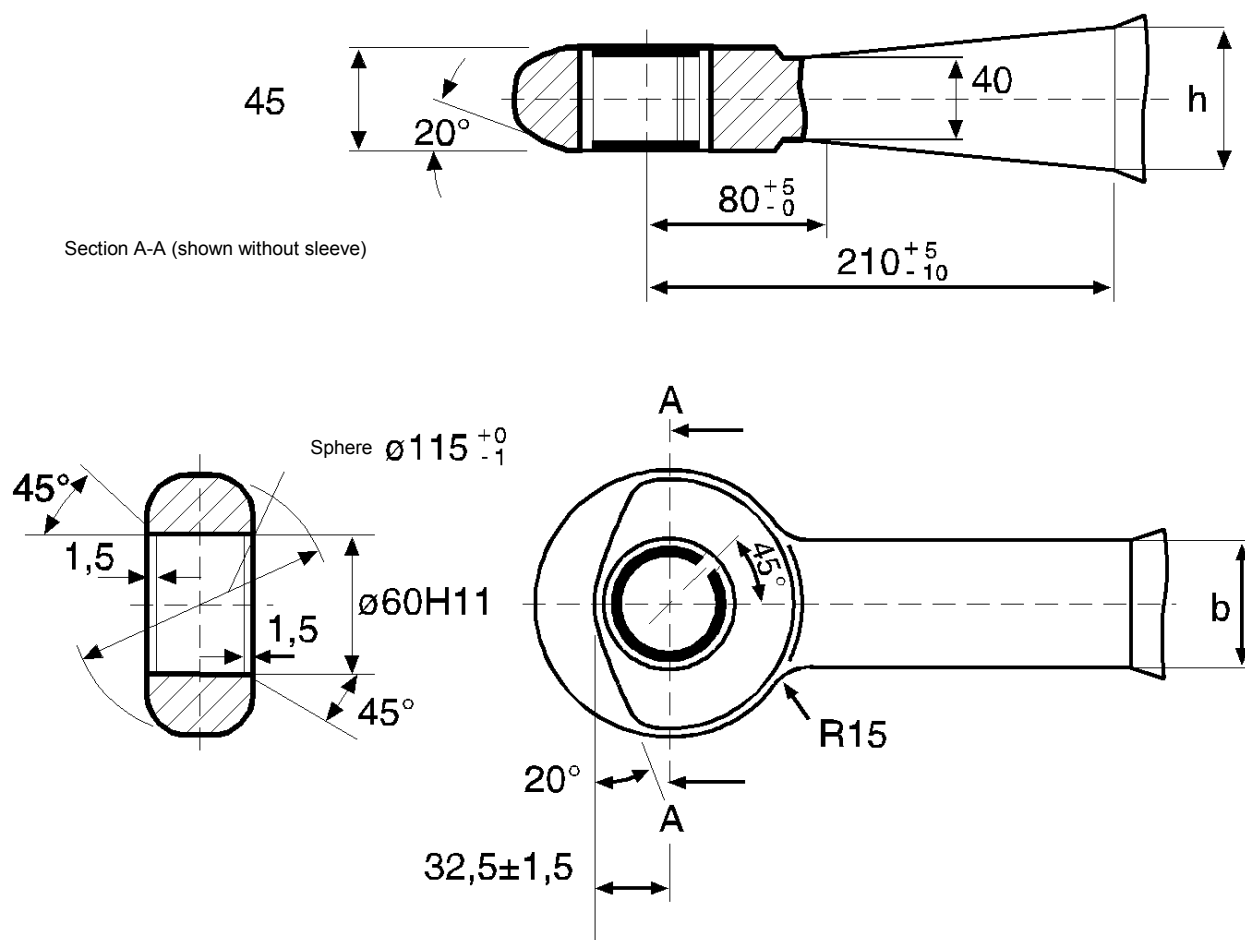


Figure 11 - Dimensions of Classes D50-A and D50-X drawbar eyes, see Table 6

4.2.2. Class D50-B drawbar eyes shall have the dimensions illustrated in Figure 12.

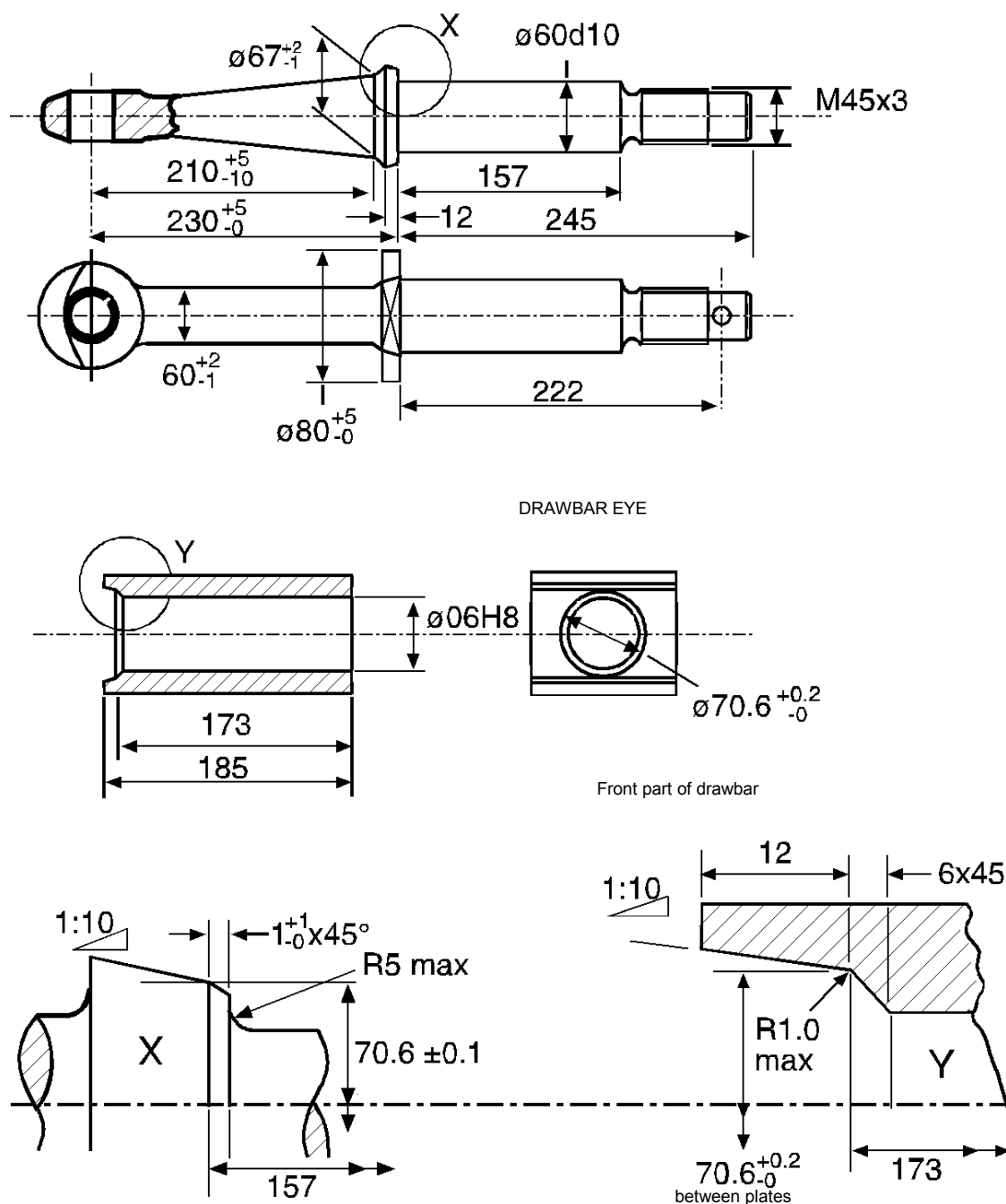
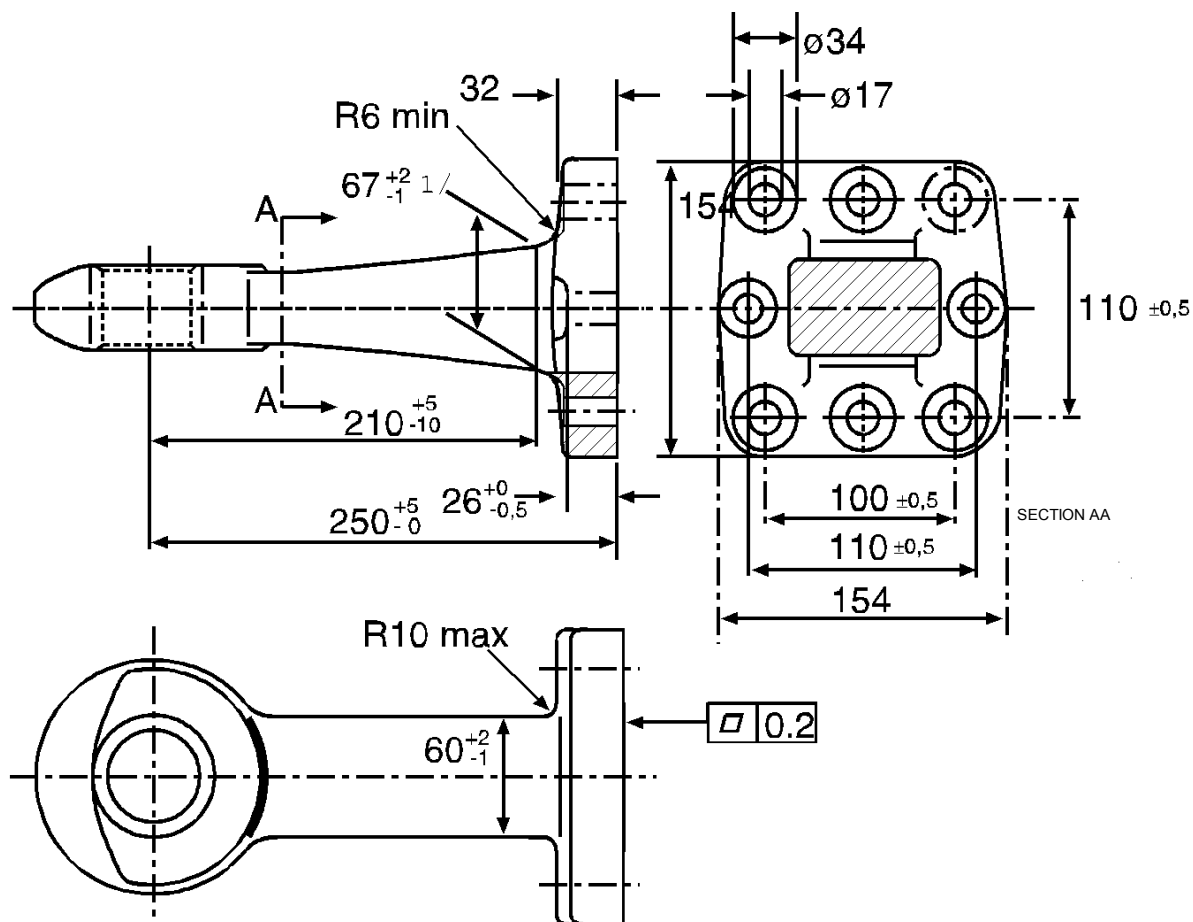


Figure 12 - Dimensions of Class D50-B drawbar eyes, see other dimensions in Figure 11

4.2.3. Classes D50-C and D50-D drawbar eyes shall have the dimensions illustrated in Figure 13.



1/ For Class D50-D drawbar eyes this dimension shall be "80 max."

Figure 13 - Dimensions of Classes D50-C and D50-D drawbar eyes, see other dimensions in Figure 11

- 4.2.4. Classes D50-C and D50-D drawbar eyes shall be fitted with non slotted sleeves shown in Figure 10.
- 4.3. Load values for standard drawbar eyes

Standard drawbar eyes and the means of attachment shall be suitable for, and tested for, the load values stated in Table 7.
- 4.4. General requirements for Class L toroidal drawbar eyes:
 - 4.4.1. Class L toroidal drawbar eyes are intended for use with Class K hook type couplings

- 4.4.2. When used with a Class K hook type coupling they shall meet the requirements for articulation given in paragraph 10.2 of this annex.
- 4.4.3. Class L toroidal drawbar eyes shall have the dimensions given in Figure 14 and Table 8

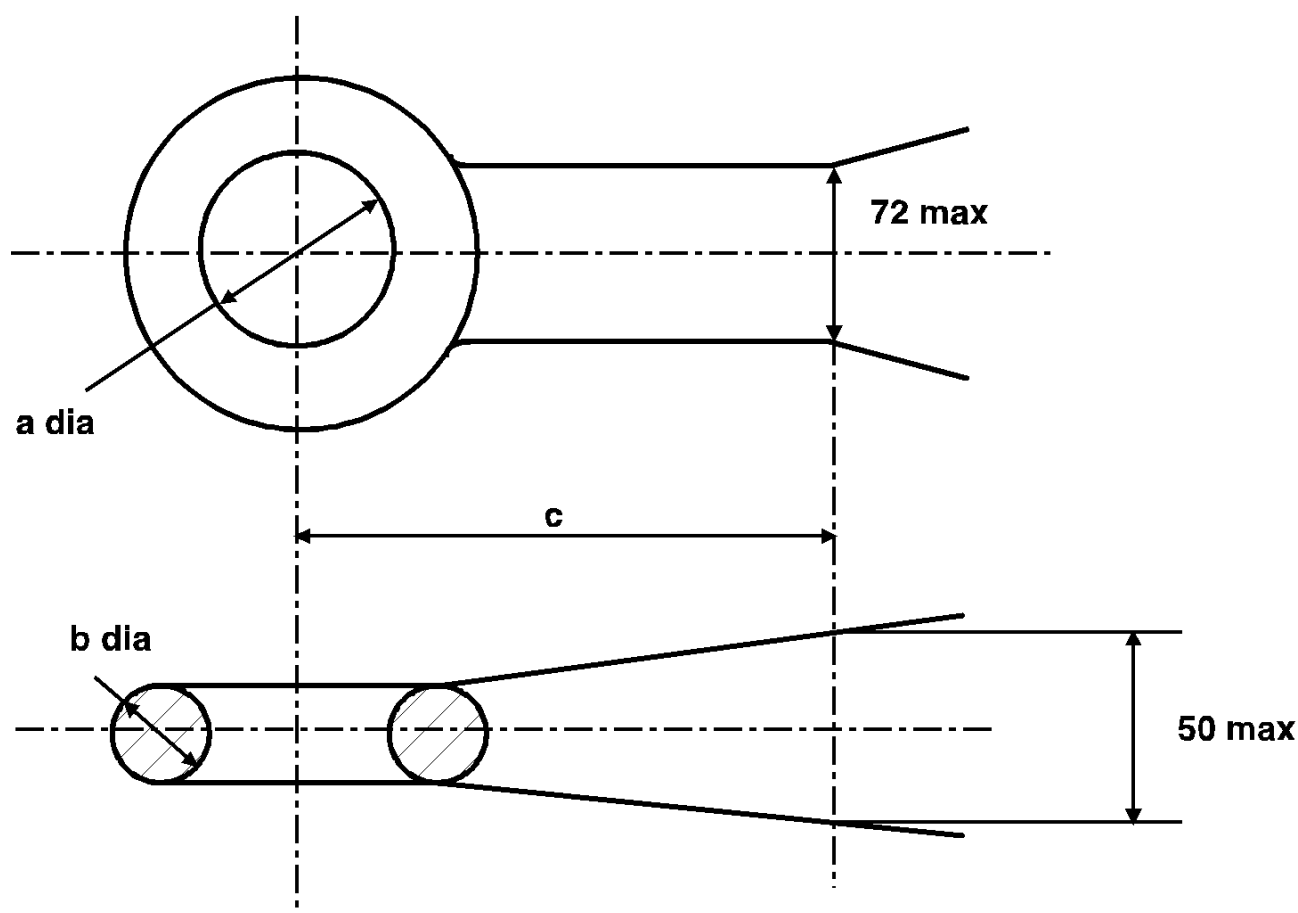


Figure 14 - Dimensions of Class L toroidal drawbar eyes - see Table 8

- 4.4.4. Class L toroidal drawbar eyes shall satisfy the tests given in annex 6, paragraph 3.4 and shall be suitable for the characteristic values given in Table 9.

TABLE 8 - Dimensions of Class L toroidal drawbar eyes - see Figure 14 (Dimensions in mm)

Class	L1	L2	L3	L4	L5	Remarks
a	68+1.6/-0.0	76.2±0.8	76.2±0.8	76.2±0.8	68+1.6/-0.0	

b	41.2±0.8	41.2±0.8	41.2±0.8	41.2±0.8	41.2±0.8	
c	70	65	65	65	70	Min

TABLE 9 - Characteristic values for Class L toroidal drawbar eyes

Class	L1	L2	L3	L4	L5
D kN	30	70	100	130	180
D _c kN	27	54	70	90	120
S kg	200	700	950	1000	1000
V kN	12	18	25	35	50

5. DRAWBARS

- 5.1. Drawbars of class E shall satisfy the tests prescribed in annex 6, paragraph 3.3.
- 5.2. In order to provide a connection to the towing vehicle, the drawbars can be fitted either with coupling heads as in paragraph 2 or drawbar eyes as in paragraph 4 of this annex. The coupling heads and drawbar eyes can be attached by screwing, bolting or welding.
- 5.3. Height adjusting devices for hinged drawbars
 - 5.3.1. Hinged drawbars shall be fitted with devices for adjusting the drawbar to the height of the coupling device or jaw. These devices shall be designed so that the drawbar can be adjusted by one person without tools or any other aids.
 - 5.3.2. Height adjusting devices shall be able to adjust the drawbar eyes or ball couplings from the horizontal above the ground at least 300 mm upwards and downwards. Within this range the drawbar shall be adjustable steplessly, or in maximum steps of 50 mm measured at the drawbar eye or ball coupling.
 - 5.3.3. Height adjusting devices shall not interfere with the easy movement of the drawbar after coupling.
 - 5.3.4. The height adjusting devices shall not interfere with the action of any inertia, overrun type, brake.
- 5.4. In the case of drawbars combined with inertia, overrun, brakes, the distance between the centre of the drawbar eye and the end of the free shank of the drawbar eye shall not be less than 200 mm in the brake

application position. With the shank of the drawbar eye fully inserted the distance shall not be less than 150 mm.

- 5.5. Drawbars for use on centre axle trailers shall possess at least half the moment of resistance against lateral forces as against vertical forces.

6. DRAWBEAMS

- 6.1. Drawbeams of Class F shall satisfy the tests prescribed in annex 6, paragraph 3.3
- 6.2. The drilling pattern for mounting of Class C standard drawbar couplings shall be in accordance with Figure 15 and Table 10 below.
- 6.3. Drawbeams shall not be welded to the chassis, bodywork or other part of the vehicle.

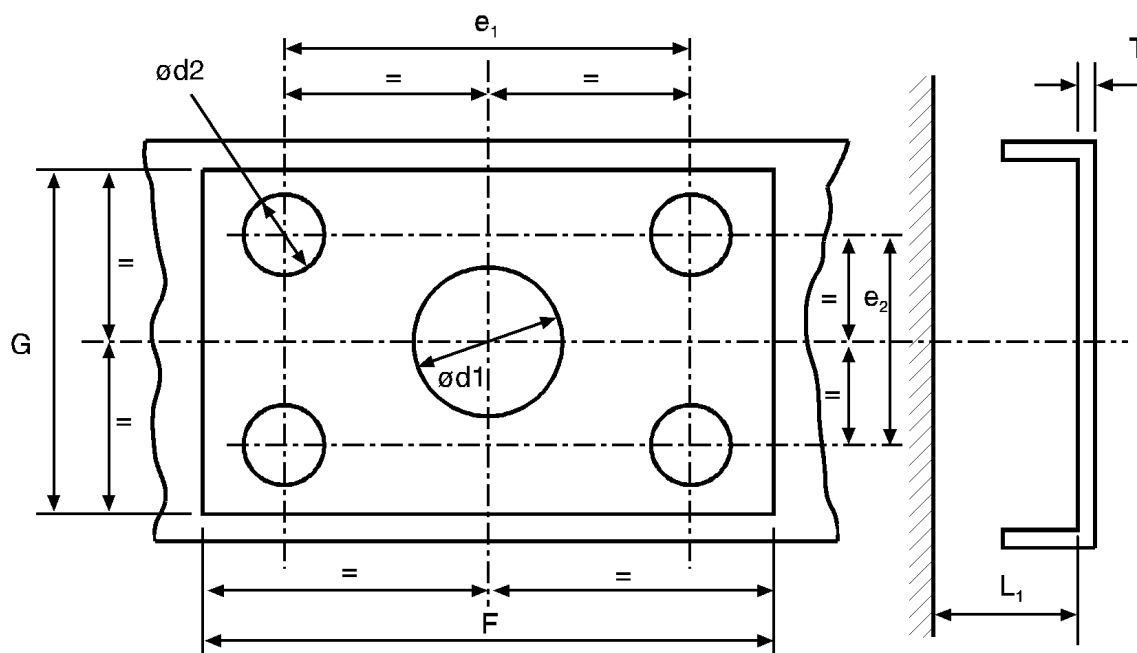


Figure 15 - Mounting dimensions for standard drawbar couplings (see Table 10)

TABLE 10 - Mounting dimensions for standard drawbar couplings (mm) - see Figure 15

Class	C50-1	C50-2	C50-3	C50-4	C50-5	C50-6C50-7	Remarks
e_1	83	83	120	140	160	160	± 0.5
e_2	56	56	55	80	100	100	± 0.5
d_1	-	55	75	85	95	95	+1.0/-0.5
d_2	10.5	10.5	15	17	21	21	H13
T	-	15	20	35	35	35	maximum
F	120	120	165	190	210	210	minimum
G	95	95	100	130	150	150	minimum
L_1	-	200	300	400	400	400	minimum

7. FIFTH WHEEL COUPLINGS AND STEERING WEDGES

The requirements of paragraphs 7.1 to 7.7 are applicable to all fifth wheel couplings of Class G50.

Additional requirements which shall be fulfilled by standard coupling devices are given in paragraph 7.9.

Steering wedges shall satisfy the requirements listed in paragraph 7.8.

7.1. Suitable fifth wheel coupling pins

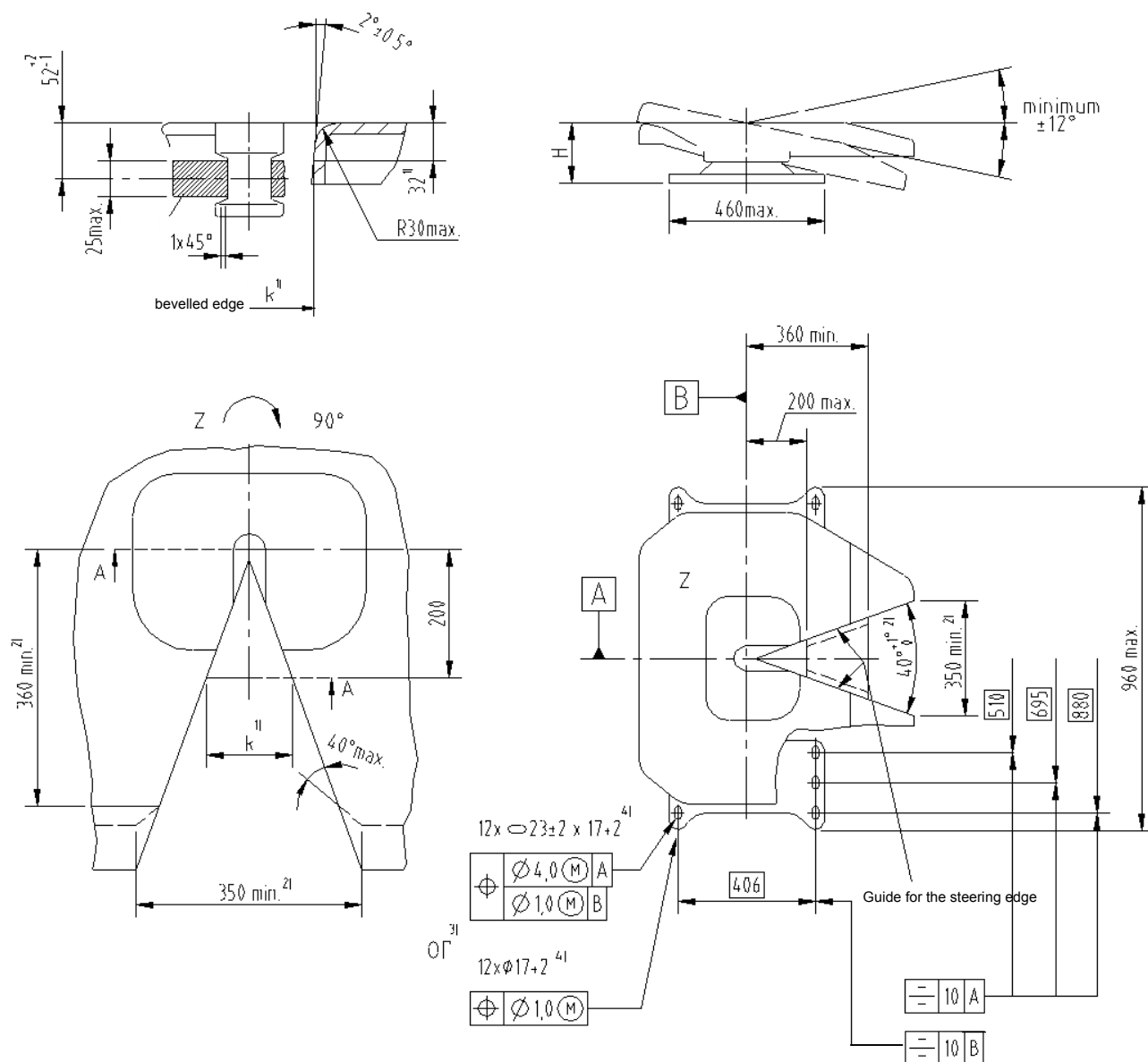
Class G50 fifth wheel couplings shall be designed so that they can be used with Class H50 coupling pins and, together, provide the specified characteristics.

7.2. Guides

Fifth wheel couplings shall be equipped with a guide which ensures safe and correct engagement of the coupling pin. The entry width of the guide for standard 50 mm diameter fifth wheel couplings shall be at least 350 mm (see Figure 16).

For small, non-standard, fifth wheel couplings of Class G50-X and having a maximum "D" value of 25 kN, the entry width shall be at least 250 mm.

Section A-A
Enlarged view of coupling pin



Notes

1/ To provide for the use of steering wedges, measure the reference dimension $k = 137 \pm 3$ mm at 32 mm below the top surface and at a distance of 200 mm from the transverse centre line of the coupling.

2/ The $40^{\circ} +1^{\circ}/-0^{\circ}$ throat angle must be maintained over a distance of 360 mm minimum from the transverse centre line of the coupling. The entry width of 350 mm minimum may be obtained outside this distance by increasing the entry angle up to an included angle of 120° maximum as shown in dotted line.

3/ Elongated mounting holes 23 ± 2 mm x $17 +2/-0$ mm

or round mounting holes Dia. 17 +2/-0 mm could be used.

4/ When using elongated holes or holes > 18 mm diameter, washers 40 mm diameter, 6 mm thick, or means of equal strength, e.g. flat steel plate, are to be used.

Figure 16 - Dimensions of standard fifth wheel couplings (see Table 11)

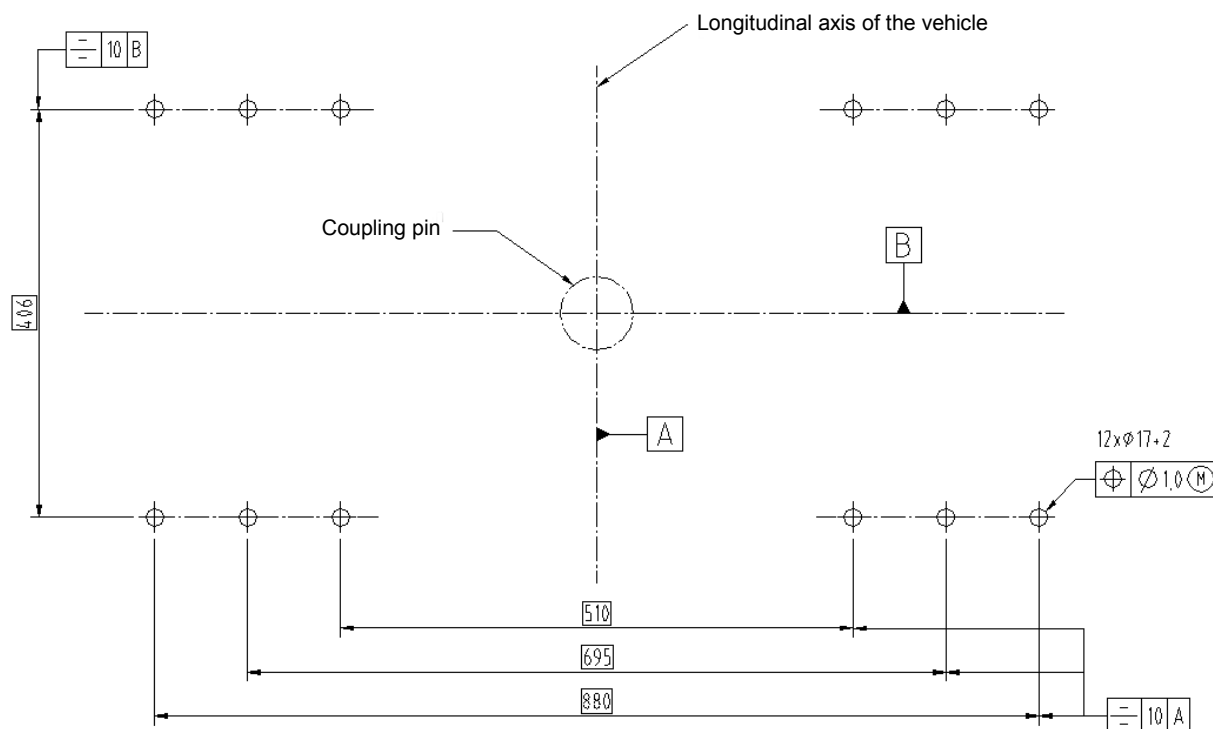


Figure 16a - Mounting holes tolerances for class J mounting plates for fifth wheel couplings (see para. 9.1. of this annex)

TABLE 11 - Dimensions of standard fifth wheel couplings (mm), see Figure 16

Class	G50-1	G50-2	G50-3	G50-4	G50-5	G50-6
H	140-159	160-179	180-199	200-219	220-239	240-260

7.3. Minimum articulation of the fifth wheel coupling

With the coupling pin engaged, without the fifth wheel coupling being attached to a vehicle or mounting plate, but taking into account the effect of the mounting bolts, the coupling shall permit, simultaneously, the following minimum values of articulation of the coupling pin:

- 7.3.1. $\pm 90^\circ$ about the vertical axis (not applicable to fifth wheel couplings with positive steering);
- 7.3.2. $\pm 12^\circ$ about the horizontal axis transverse to the direction of travel. This angle does not necessarily cover off-road use.
- 7.3.3. Axial rotation about the longitudinal axis of up to $\pm 3^\circ$ is permitted. However, on a fully oscillating fifth wheel coupling, this angle may be exceeded, providing that the locking mechanism enables the restriction of the rotation to $\pm 3^\circ$ maximum.

7.4. Locking devices to prevent uncoupling of fifth wheel couplings

The fifth wheel coupling shall be locked in the coupled position by two positive mechanical locking devices each of which shall remain effective should the other fail.

The primary locking device shall operate automatically but the secondary locking device may either be automatic or be engaged manually. The secondary locking device may be designed to work in conjunction with the primary device and provide an additional positive mechanical lock for the primary device. It shall only be possible to engage the secondary locking device if the primary device is properly engaged.

It shall not be possible for the locking devices to be released inadvertently. Release shall require intentional action by the driver or operator of the vehicle.

The closed and locked position of the coupling shall be indicated visually by a mechanical device and it shall be possible to verify the position of the indicator by feel, for example, to allow the position to be checked during darkness. The indication device shall indicate the engagement of both primary and secondary locking devices, however, it is sufficient for the engagement of only one device to be indicated if, in this case, the engagement of the other device is a simultaneous and inherent feature of the design.

7.5. Operating devices or release mechanisms

In the closed position the operating devices or release mechanisms shall be prevented from being operated inadvertently or accidentally. The locking system shall be such as to require positive, conscious action to release the locking device in order to operate coupling release mechanism.

7.6. Surface finish

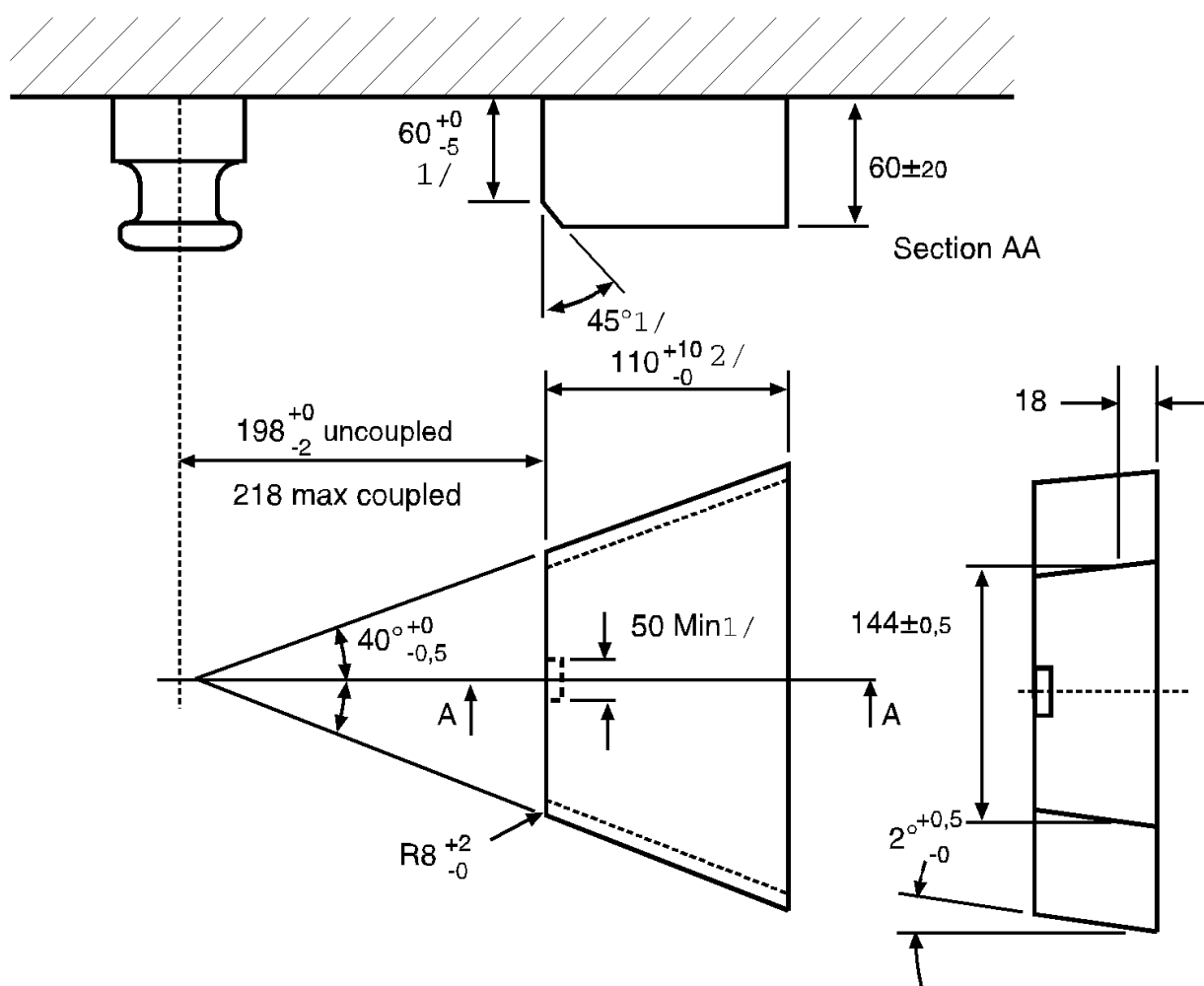
The surfaces of the coupling plate and coupling lock shall be functionally satisfactory and be carefully machined, forged, cast or pressed.

7.7. Load requirements

All fifth wheel couplings shall be able to satisfy the tests described in annex 6, paragraph 3.7.

7.8. Steering wedges

7.8.1. The dimensions of steering wedges for the positive steering of semitrailers shall be as in Figure 17.



Notes:

1/ Only applicable to steering wedges over 60 mm thick.

2/ This dimension only refers to the functional surface: the steering wedge itself can be longer.

Figure 17 - Dimensions of spring-mounted steering wedges

7.8.2. The steering wedge shall allow safe and correct coupling and shall be spring-mounted. The strength of the spring shall be selected so that it is possible to couple an unloaded semitrailer and so that, with the semitrailer fully loaded the steering wedge is firmly in contact with the flanks of the coupling during use. Uncoupling of the fifth wheel shall be possible with the semitrailer both loaded and unloaded.

7.9. Special requirements for standard fifth wheel couplings:

7.9.1. the dimensions shall be as shown in Figure 16 and Table 11.

7.9.2. they shall be suitable for, and tested for, a D value of 150 kN and a U value of 20 tonnes.

7.9.3. release shall be possible by a hand lever mounted directly on the coupling.

7.9.4. they shall be suitable for the positive steering of semitrailers by means of steering wedges - see paragraph 7.8.

8. FIFTH WHEEL COUPLING PINS

8.1. Fifth wheel coupling pins of Class H50 (ISO 337) shall have the dimensions shown in Figure 18

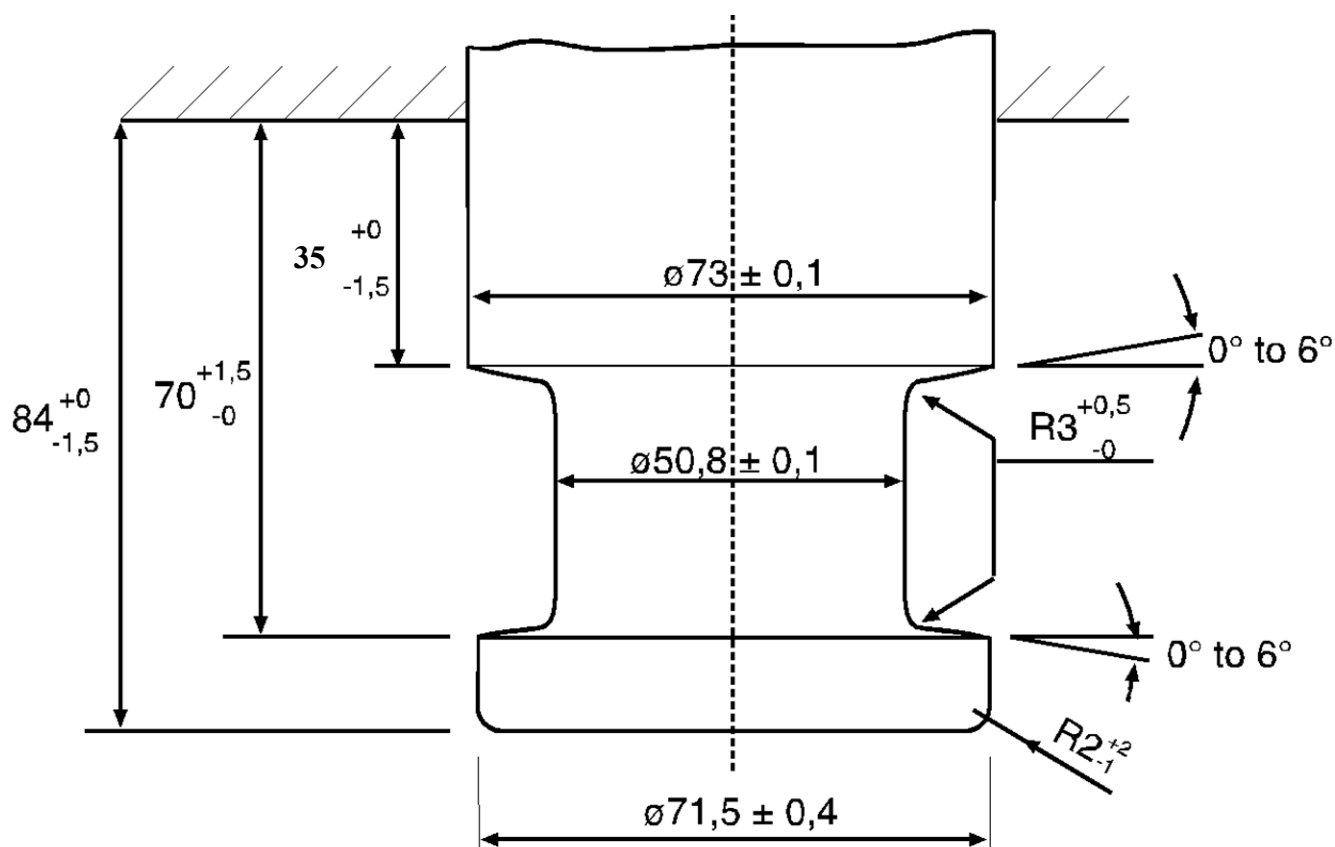


Figure 18 - Dimensions of Class H50 fifth wheel coupling pins

- 8.2. The coupling pins shall be able to satisfy the tests described in annex 6, paragraph 3.9.

9. MOUNTING PLATES

- 9.1. Class J mounting plates for fifth wheel couplings shall have circular mounting holes positioned as shown in Figure 16a if they are intended for standard fifth wheel couplings. However, the mounting holes shall be 17 mm +2.0 mm/ -0.0 mm diameter. The holes shall be circular, NOT slotted (see Figure 16a).
- 9.2. Mounting plates for standard fifth wheel couplings shall be suitable for the positive steering of semitrailers (with steering wedges). Mounting plates for non-standard fifth wheel couplings which are unsuitable for positive steering shall be marked appropriately.
- 9.3. Mounting plates for fifth wheel couplings shall be able to satisfy the tests described in annex 6, paragraph 3.8.

10. HOOK TYPE COUPLINGS

- 10.1. General requirements for Class K hook type couplings:
 - 10.1.1. All Class K hook type couplings shall satisfy the tests given in annex 6, paragraph 3.5 and shall be suitable for the characteristic values given in Table 13
 - 10.1.2. Class K hook type couplings shall have the dimensions given in Figure 19 and Table 12. Class K1 to K4 are non-automatic couplings for use only on trailers not exceeding 3.5 tonnes maximum permissible mass and Class KA1 to KA3 are automatic couplings.

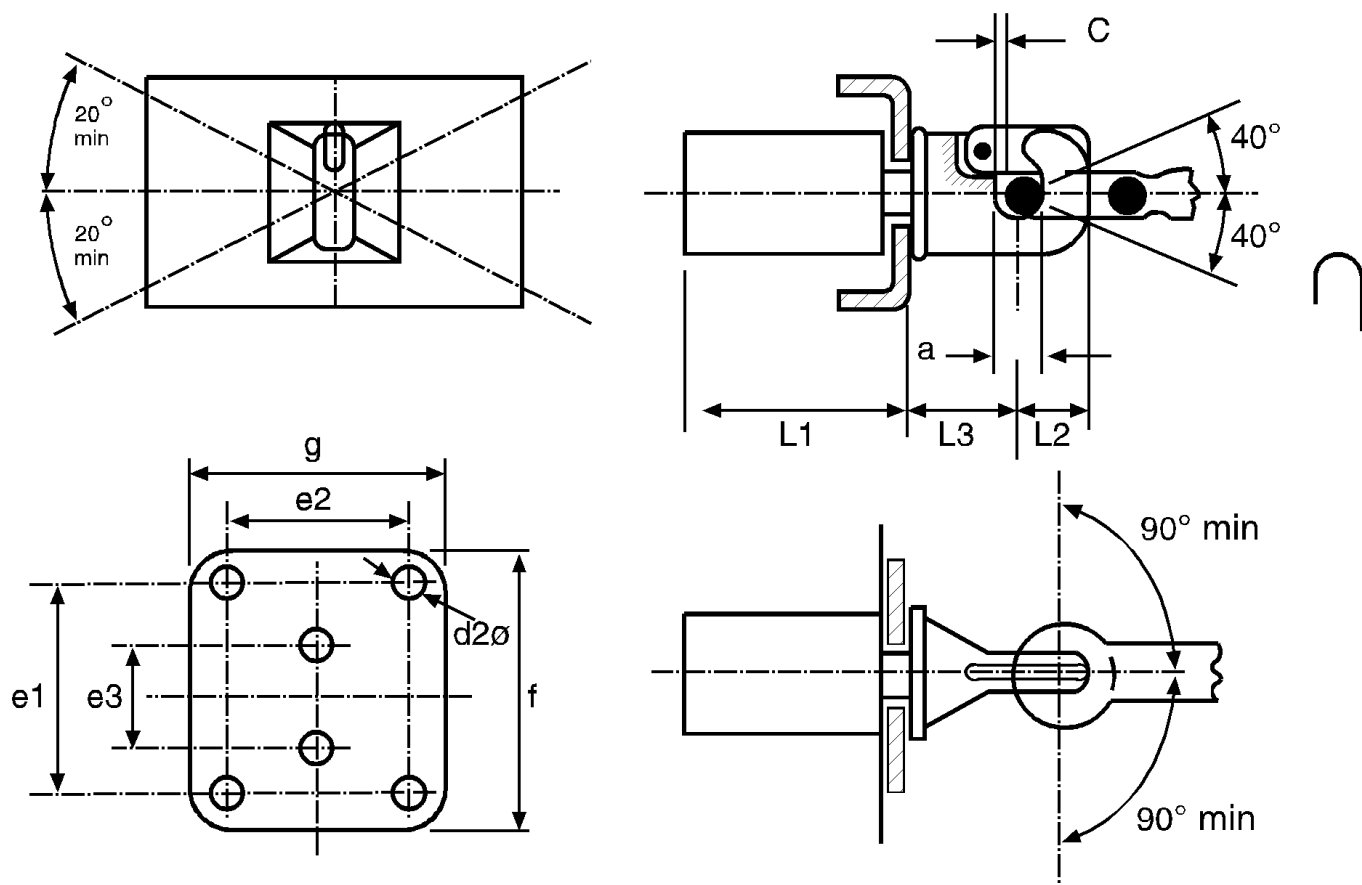


Figure 19 - Dimensions and articulation of Class K hook type couplings

- 10.1.3. A hook type coupling shall only be used with a toroidal drawbar eye and when used with a Class L toroidal drawbar eye the Class K coupling shall have the degrees of articulation given in paragraph 10.2 of this annex.
- 10.1.4. A Class K hook type coupling shall be used with a toroidal eye giving a minimum clearance, or free movement, of 3 mm and a maximum clearance of 5 mm when new. Suitable drawbar eyes shall be declared by the coupling manufacturer on the Communication form shown in annex 1.
- 10.2. A Class K coupling when used with a Class L toroidal eye, but not fitted to a vehicle, shall have the following non-simultaneous angles of articulation - see also Figure 19:
- 10.2.1. $\pm 90^\circ$ horizontally about the vertical axis of the coupling;
 - 10.2.2. $\pm 40^\circ$ vertically about the horizontal transverse axis of the coupling;
 - 10.2.3. $\pm 20^\circ$ axial rotation about the horizontal longitudinal center line of the coupling.

10.3. Automatic Class K hook type couplings shall have a jaw designed such that the drawbar eye is guided into the coupling.

10.4. Locking to prevent inadvertent uncoupling:

In the closed position the coupling shall be locked by two positive mechanical engagement locking devices each of which shall remain effective should the other fail.

The closed and locked position of the coupling shall be clearly indicated externally by a mechanical device. It shall be possible to verify the position of the indicator by feel, for example, in the dark.

The mechanical indication device shall indicate the engagement of both locking devices (an AND condition).

However, it is sufficient for the engagement of only one locking device to be indicated if, in this situation, engagement of the second locking device is an inherent feature of the design.

10.5. Hand levers

Hand levers shall be of a design suitable for easy use with the end rounded off. The coupling shall not have any sharp edges or points of possible pinching near the hand lever which could result in injury during operation of the coupling. The force needed to release the coupling, measured without the drawbar eye, shall not exceed 250 N perpendicular to the hand lever along the line of operation.

TABLE 12 - Dimensions for Class K hook type couplings - see Figure 19

Class	K1	K2	K3	K4	KA1	KA2	KA3	Remarks
e ₁	-	83	83	120	120	140	160	±0.5
e ₂	-	56	56	55	55	80	100	±0.5
e ₃	90	-	-	-	-	-	-	±0.5
d ₂	17	10.5	10.5	15	15	17	21	H13
c	3	3	3	3	3	3	3	Min
f	130	175	175	180	180	200	200	Max
g	100	100	100	120	120	140	200	Max
a	45	45	45	45	45	45	45	+1.6/-0.0
L ₁	120	120	120	120	250	300	300	Max
L ₂	74	74	63	74	90	90	90	Max
L ₃	110	130	130	150	150	200	200	Max

TABLE 13 - Characteristic values for Class K hook type couplings

Class	K1	K2	K3	K4	KA1	KA2	KA3
D kN	17	20	20	25	70	100	130
D _c kN	-	-	17	20	54	70	90
S kg	120	120	200	250	700	900	1000
V kN	-	-	10	10	18	25	35

11. DEDICATED DRAWBAR TYPE COUPLINGS - CLASS T

- 11.1. Class T dedicated drawbar type couplings are intended for use on specific vehicle combinations, for example, car transporters. These vehicles have special structures and may need particular and unusual location of the coupling.
- 11.2. Class T couplings shall be restricted to use with centre axle trailers and this restriction shall be notified on the Communication form shown in annex 1.
- 11.3. Class T couplings shall be approved as a matched pair and it shall not be possible to separate the coupling other than in a workshop using tools which are not normally carried on the vehicle.
- 11.4. Class T couplings shall not be automatic in operation.
- 11.5. Class T couplings shall satisfy the relevant test requirements given in annex 6, paragraph 3.3., except paragraph 3.3.4.
- 11.6. The following minimum and simultaneous angles of articulation shall be possible with the coupling not fitted to a vehicle but assembled, and in the same normal position as when fitted to a vehicle;
 - 11.6.1. $\pm 90^\circ$ horizontally about the vertical axis;
 - 11.6.2. $\pm 8^\circ$ vertically about the horizontal transverse axis;
 - 11.6.3. $\pm 3^\circ$ axial rotation about the horizontal longitudinal axis.

12. DEVICES FOR REMOTE INDICATION AND REMOTE CONTROL

12.1. General requirements

Devices for remote indication and remote control are permitted only on automatic coupling devices of Classes C50-X and G50-X.

Devices for remote indication and remote control shall not interfere with the minimum free movement of the coupled drawbar eye or coupled semitrailer. They shall be permanently fitted to the vehicle.

All the devices for remote indication or remote control fall within the scope of testing and approval of the coupling device together with all parts of the operating devices and transmission devices.

12.2. Remote indication

- 12.2.1. For an automatic coupling procedure, remote indication devices shall indicate the closed and doubly locked position of the coupling in an

optical manner according to paragraph 12.2.2. Additionally the open position may be indicated as in paragraph 12.2.3.

The remote indication device shall be automatically activated and reset during every opening and closing of the coupling.

12.2.2. The change from the open to the closed and doubly locked position shall be indicated by a green optical signal.

12.2.3. If the open and/or unlocked position is indicated, a red optical signal shall be used.

12.2.4. In the case of indicating the completion of the automatic coupling procedure, the remote indicator shall ensure that the coupling pin has reached the doubly locked end position.

12.2.5. The appearance of any fault in the remote indication system shall not indicate a closed and locked position during the coupling procedure if the end position has not been reached.

12.2.6. The disengagement of one of the two locking devices shall cause the green optical signal to extinguish and the red optical signal (if fitted) to show.

12.2.7. The mechanical indicators fitted directly to the coupling device shall be retained.

12.2.8. In order to avoid distracting the driver during normal driving, there shall be a provision for switching off the remote indication device but this shall be automatically reactivated when the coupling is next opened and closed - see paragraph 12.2.1.

12.2.9. The operating controls and indicators of the remote indication devices shall be mounted within the driver's field of vision and be permanently and clearly identified.

12.3. Remote control

12.3.1. If a remote control device, as defined in paragraph 2.8 of this Regulation, is employed, there shall also be a remote indication device as described in paragraph 12.2 which shall at least indicate the open condition of the coupling.

12.3.2. There shall be a dedicated switch (i. e. master switch, lever or valve) to enable the coupling to be opened or closed by means of the remote control device. If this master switch is not located in the driving cab it shall not be in a position where it is freely accessible to unauthorized persons or it shall be lockable. The actual operation of the coupling from the driving cab may only be possible when inadvertent operation has been precluded, for example by an operation requiring the use of two hands.

It shall be possible to ascertain whether opening of the coupling under remote control has been completed or not.

- 12.3.3. If remote control involves the coupling being opened by external force, the condition under which the external force acts on the coupling shall be indicated appropriately to the driver. This is not necessary if the external force is only operative while the remote control is operating.
- 12.3.4. If the actuating device for opening the coupling under remote control is mounted externally on the vehicle it shall be possible to oversee the area between the coupled vehicles, but it shall not be necessary, however, to enter this area in order to operate it.
- 12.3.5. Any single error in operation or the occurrence of any single fault in the system shall not result in accidental opening of the coupling during normal road use. Any faults in the system shall be indicated directly or be immediately obvious at the next operation e.g. by a malfunction.
- 12.3.6. In the event of a failure of the remote control it shall be possible, in an emergency, to open the coupling in at least one other way. If this requires the use of a tool then this shall be included in vehicle's tool kit. The requirements of paragraph 3.6 of this annex are not applicable to hand levers used exclusively for opening the coupling in an emergency.
- 12.3.7. The operating controls and indicators for the remote control devices shall be permanently and clearly identified.

Annex 6

TESTING OF MECHANICAL COUPLING DEVICES OR COMPONENTS

1. GENERAL TESTING REQUIREMENTS

- 1.1. Samples of coupling devices shall be tested for both strength and function. Physical testing shall be carried out wherever possible but unless stated otherwise the type approval authority or technical service may waive a physical strength test if the simple design of a component makes a theoretical check possible. Theoretical checks may be carried out to determine worst case conditions. In all cases, theoretical checks shall ensure the same quality of results as with dynamic or static testing. In cases of doubt it is the results of physical testing that are overriding.

See also paragraph 4.8 of this Regulation.

- 1.2. With coupling devices the strength shall be verified by a dynamic test (endurance test). In certain cases additional static tests may be necessary (see paragraph 3 of this annex).
- 1.3. The dynamic test shall be performed with approximately sinusoidal load (alternating and/or pulsating) with a number of stress cycles appropriate to the material. No cracks or fractures shall occur.
- 1.4. Only slight permanent deformation is permitted with the static tests prescribed. Unless stated otherwise the permanent, plastic, deformation after releasing shall not be more than 10 per cent of the maximum deformation measured during the test. In the case where measurement of deformation during the test puts the tester at risk then, provided that the same parameter is checked during other tests, such as the dynamic test, then this part of the static test may be omitted.
- 1.5. The loading assumptions in the dynamic tests are based on the horizontal force component in the longitudinal axis of the vehicle and the vertical force component. Horizontal force components transverse to the longitudinal axis of the vehicle, and moments, are not taken into account provided they are of only minor significance.

If the design of the coupling device or its attachment to the vehicle or the attachment of additional systems (such as stabilizers, close coupling devices, etc.) generate additional forces or moments, additional tests may be required by the type approval authority or technical service.

The horizontal force component in the longitudinal axis of the vehicle is represented by a theoretically determined reference force, the D or D_c value. The vertical force component, where applicable, is represented by the static vertical bearing load, S , at the point of coupling and the assumed vertical load, V , or by the static vertical bearing load, U , in the case of fifth wheel couplings.

- 1.6. The characteristic values D , D_c , S , V and U , on which the tests are based and which are defined in paragraph 2.11. of this Regulation, shall be taken from the manufacturer's information given in the application for type approval - see communication form shown in annexes 1 and 2.
- 1.7. Any positive locking device, which is retained in position by spring force, shall remain in its secured position when subjected to a force applied in the least favourable direction and equivalent to three times the mass of the locking mechanism.

2. TEST PROCEDURES

- 2.1. For the dynamic tests and static tests, the sample shall be placed in a suitable rig with a means of force application, such that it is not subjected to any additional forces or moments apart from the specified test force. In the case of alternating tests, the direction of force application shall not deviate by more than $\pm 1^\circ$ from the specified direction. In the case of pulsating and static tests, the angle shall be set for the maximum test force. This will normally require a joint at the point of force application (i.e. the point of coupling) and a second joint an adequate distance away.
- 2.2. The test frequency shall not exceed 35 Hz. The selected frequency shall be well separated from resonance frequencies of the test set up including the tested device. With asynchronous testing the frequencies of the two force components shall be between approximately 1 per cent and a maximum of 3 per cent apart. For coupling devices made from steel the number of stress cycles is 2×10^6 . For devices made from materials other than steel a higher number of cycles may be necessary. The dye-penetration method of crack testing or an equivalent method shall be used to determine any cracking during test.
- 2.3. With pulsating tests, the test force varies between the maximum test force and a lower, minimum, test force, which may not be greater than 5 per cent of the maximum test force unless otherwise stated in the specific testing procedure.
- 2.4. With static tests, other than the special tests required by paragraph 3.2.3 of this annex, the test force shall be applied smoothly and quickly and be maintained for at least 60 seconds.
- 2.5. The coupling devices or component on test should normally be mounted as rigidly as possible on a test rig in the actual position in which they will be used on the vehicle. The fixing devices should be those specified by the manufacturer or applicant and should be those intended for the attachment of the coupling device or component to the vehicle and/or shall have identical mechanical characteristics.
- 2.6. Coupling devices or components shall be tested in the form used on the road. However, at the discretion of the manufacturer, and in agreement with the technical service, flexible components may be neutralized if this

is necessary for the test procedure and if this will not have any unrealistic influence on the test result.

Flexible components which are overheated during these accelerated test procedures may be replaced during the test. The test loads may be applied by means of special slack-free devices.

3. SPECIFIC TESTING REQUIREMENTS

3.1. Coupling balls and towing brackets

3.1.1. Mechanical coupling devices with coupling balls may be of the following types:

(i) one-piece coupling balls including devices with non- interchangeable detachable balls (see Figures 20a and 20b),

(ii) coupling balls, comprising a number of parts which can be dismantled (see Figures 20c, 20d and 20e),

(iii) towing brackets without ball fitted (see Figure 20f).

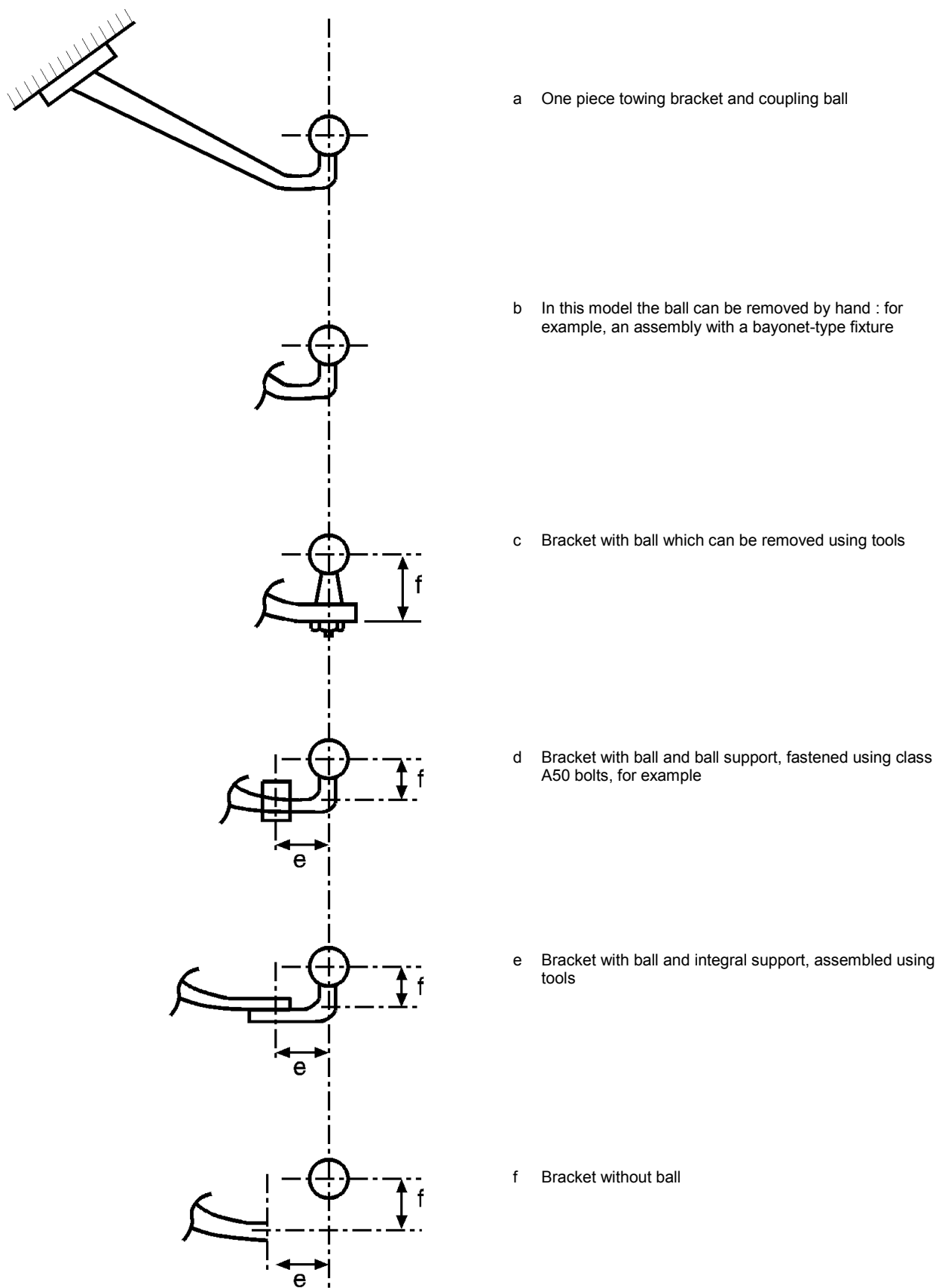


Figure 20 - Arrangements of ball type towing brackets

- 3.1.2. The basic test is a dynamic endurance test. The test sample comprises the coupling ball, the ball neck and the mountings necessary for attaching the assembly to the vehicle. The coupling ball and towing bracket shall be rigidly mounted to a test rig, capable of producing an alternating force, in the actual position in which it is intended for use.
- 3.1.3. The positions of the fixing points for attaching the coupling ball and towing bracket are specified by the vehicle manufacturer (see paragraph 5.3.2. of this Regulation).
- 3.1.4. The devices submitted for test shall be provided with all parts and design details which may have an influence on the strength criteria (for example electrical socket plate, any marking, etc.). The test sample shall include all parts up to the anchorage points or fitting points to the vehicle. The geometric location of the coupling ball and the fixing points of the coupling device related to the reference line shall be provided by the vehicle manufacturer and shall be shown in the test report. All relative positions of the anchorage points with respect to the reference line, for which the towing vehicle manufacturer shall provide all the necessary information to the towing device manufacturer, shall be repeated on the test bed.
- 3.1.5. The sample mounted on the test rig shall be subjected to an alternating stress test applied at an angle to the ball as shown in Figure 21 or 22.

The direction of the angle of test shall be determined by the vertical relationship between a horizontal reference line passing through the centre of the ball and a horizontal line passing through the fixing point of the coupling device which is the highest of the nearest, when measured in a horizontal plane, to a transverse vertical plane passing through the centre of the ball. If the fixing point line is above the horizontal reference line, the test shall be carried out at an angle of $\alpha = +15^\circ \pm 1^\circ$ and if it is below then the test shall be carried out at an angle of $\alpha = -15^\circ \pm 1^\circ$ (see Figure 21). The fixing points to be considered in determining the angle of test shall be those declared by the vehicle manufacturer and which transmit the major towing forces to the structure of the towing vehicle.

This angle is chosen in order to take account of the vertical static and dynamic load and is only applicable for a permitted static vertical load not exceeding:

$$S = 120 \times D \text{ [N]}$$

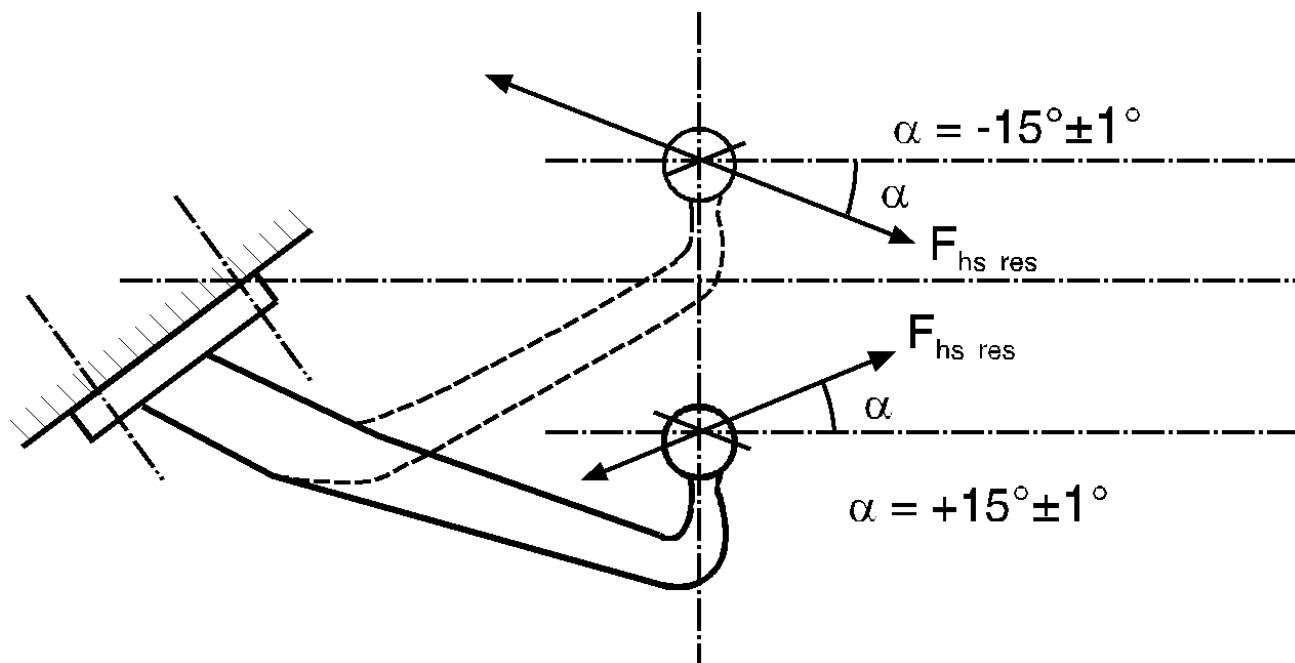
Where the static vertical load exceeds that calculated above, the angle shall, in both conditions, be increased to 20° .

The dynamic test shall be performed with the following test force:

$$F_{hs \text{ res}} = \pm 0.6 D$$

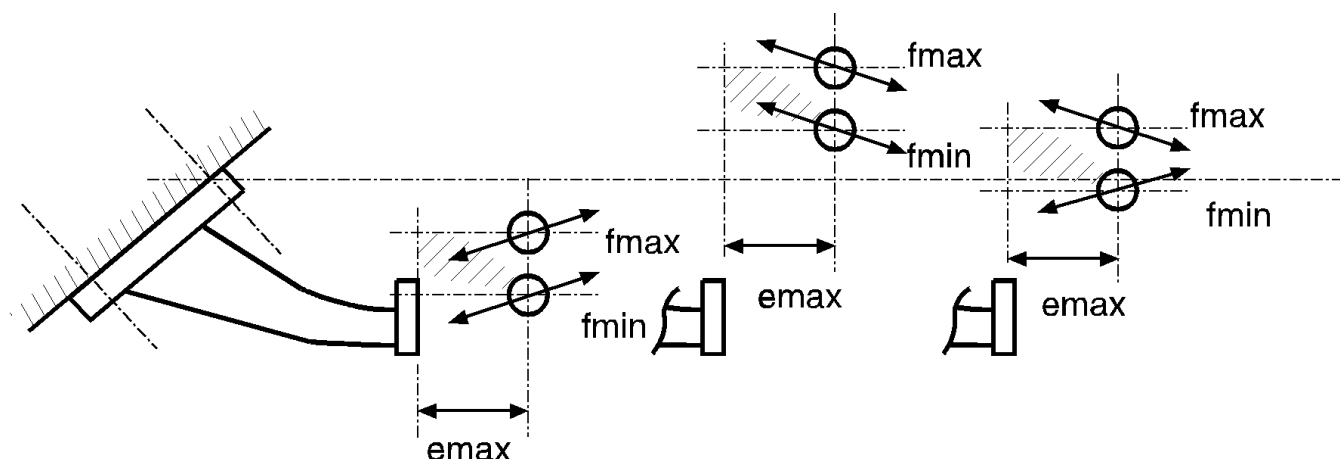
- 3.1.6. The test procedure is applicable to the different types of coupling devices (see paragraph 3.1.1 of this annex) as follows:

- 3.1.6.1. one piece coupling balls including devices with non-interchangeable detachable balls (see Figures 20a and 20b).
- 3.1.6.1.1. the strength test for the devices shown in Figures 20a and 20b shall be carried out according to the requirements of paragraph 3.1.5;



Note: The line parallel to the reference line passes through the centre of the highest and nearest point for mounting the towing bracket to the vehicle - see annex 6, paragraph 3.1.5.

Figure 21 - Angles of application of test force



Note:

Direction of alternating test force, $F_{hs\ res}$, depending on the location of the ball centre horizontal reference line in relation to the line parallel to this reference line - see Figure 21

Figure 22 - Angles of application of test force

3.1.6.2. coupling balls, comprising parts which can be dismantled.

The following categories are defined:

- (a) towing bracket and ball (see Figure 20c),
- (b) towing bracket and ball on integral support (see Figure 20d),
- (c) towing bracket with detachable ball (see Figure 20e),
- (d) towing bracket without ball (see Figure 20f).

3.1.6.2.1. The strength test for the devices shown in Figures 20c to 20f shall be carried out according to the requirements of paragraph 3.1.5. Dimensions e and f , shall have a manufacturing tolerance of ± 5 mm, and shall be stated in the test report.

The test of the towing bracket (see Figure 20f) shall be carried out with a mounted ball (on support). Account will be taken only of the result of the test on the towing bracket between the fixing points and the mounting surface of the ball support.

The dimensions e and f shall have a manufacturing tolerance of ± 5 mm and shall be specified by the coupling device manufacturer.

3.1.6.3. Coupling devices with variable dimensions e and f for demountable and interchangeable coupling balls - see Figure 22.

3.1.6.3.1. The strength tests for such towing brackets shall be carried out to the requirements of paragraph 3.1.5.

3.1.6.3.2. If a worst case configuration can be defined by agreement between the manufacturer and the type approval authority or technical service, then testing of this one configuration alone shall be sufficient.

Otherwise, several ball positions shall be tested in a simplified test programme according to paragraph 3.1.6.3.3.

3.1.6.3.3. In a simplified test programme, the value for f shall be between a defined value of $f_{\min}$ and a value of $f_{\max}$ which does not exceed 100 mm. The ball shall be at a distance, $e_{\max}$, of 130 mm from the support. To cover all possible positions of the ball, in the field given by the horizontal distance from the mounting surface and the vertical range of f ($f_{\min}$ to $f_{\max}$), two devices are to be tested:

(i) one with a ball in the upper ($f_{\max}$) position, and

(ii) one with a ball in the lower ($f_{\min}$) position.

The angle of application of the test force will vary, positive or negative, depending on the relationship of the ball centre horizontal reference line to the parallel line passing through the highest and nearest coupling device fixing point. The angles to be used are shown in Figure 22.

3.1.7. In the case where detachable ball units are retained using fixing arrangements other than screwed fittings, for example, spring clips, and where the positive mechanical engagement aspect of the arrangement is not tested during the dynamic test, then the arrangement shall be subject to a static test applied to the ball or to the positive mechanical engagement arrangement in an appropriate direction. Where the positive mechanical engagement arrangement retains the ball unit vertically, the static test shall be to apply an upwards vertical force to the ball equivalent to the "D" value. Where the positive mechanical engagement arrangement retains the ball unit by means of a transverse horizontal design, the static test shall be to apply a force in this direction equivalent to 0.25 D. There shall not be any failure of the positive mechanical engagement device or any distortion likely to have an adverse effect on its function.

3.1.8. The attachment points for the secondary coupling referred to in annex 5, paragraph 1.5 shall withstand a horizontal static force equivalent to 2D with a maximum of 15 kN. Where there is a separate attachment point for a breakaway cable this shall withstand a horizontal static force equivalent to D.

3.2. Coupling heads

- 3.2.1. The basic test is an endurance test using an alternating test force followed by a static test (lifting test) on the same test sample.
- 3.2.2. The dynamic test shall be performed with a Class A coupling ball of appropriate strength. On the test rig the coupling ball and coupling head shall be arranged as instructed by the manufacturer and orientated in a way corresponding to the relative positions in normal use. There should be no possibility of extra forces in addition to the test force acting on the specimen. The test force shall be applied along a line passing through the centre of the ball and inclined downwards to the rear at 15° (see Figure 23). An endurance test must be performed on a test specimen with the following test force:

$$F_{hs\ res\ w} = \pm 0.6 D$$

Where the maximum permissible static vertical mass, S , exceeds 120 D , then the angle of test shall be increased to 20°.

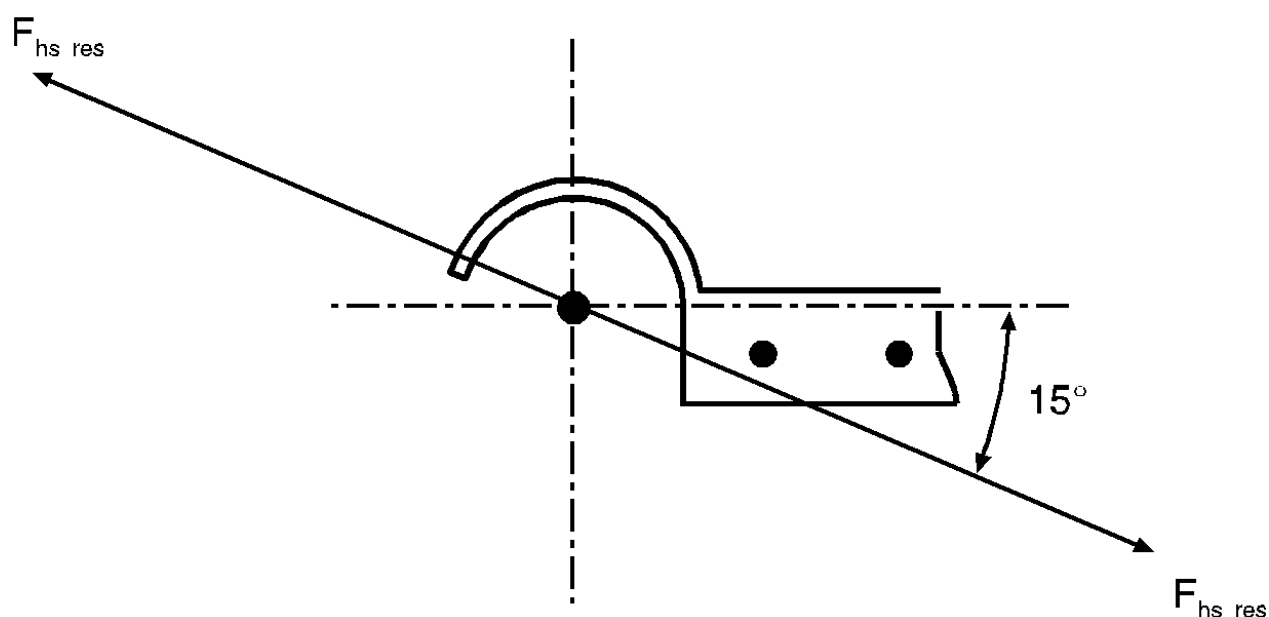


Figure 23 - Dynamic test

- 3.2.3. A static separation test shall also be performed. The coupling ball used for the test shall have a diameter of 49.00 to 49.13 mm in order to represent a worn coupling ball. The separation force, F_a , shall be applied perpendicular to both the transverse and longitudinal centre line axes of the coupling head and shall be increased smoothly and quickly to a value of:

$$F_a = g(C + S/1000) \quad \text{kN}$$

and be held for 10 seconds.

The coupling head shall not separate from the ball nor shall any component of the coupling head exhibit any permanent distortion which could have an adverse effect on its functional capability.

3.3. Drawbar couplings and drawbeams

3.3.1. An endurance test shall be performed on a test sample. The coupling device shall be equipped with all the fixings needed to attach it to the vehicle. Any intermediate devices fitted between the drawbar couplings and the vehicle frame (i. e. drawbeams) shall be tested with the same forces as the coupling. When testing drawbeams intended for standard drawbar couplings, the vertical load shall be applied at a longitudinal distance from the vertical plane of the fixing points that is equal to the position of the corresponding standard coupling.

3.3.2. Drawbar couplings for hinged drawbars ($S=0$)

The dynamic test shall be performed with a horizontal alternating force of $F_{hw} = \pm 0.6 D$ acting in a line parallel to the ground and in the longitudinal median plane of the towing vehicle passing through the centre of the coupling pin.

3.3.3. Drawbar couplings for use with centre-axle trailers ($S>0$).

3.3.3.1. Centre axle trailer masses up to and including 3.5 tonnes:

Drawbar couplings for use with centre axle trailers up to and including a mass of 3.5 tonnes shall be tested in the same way as coupling balls and towing brackets described in 3.1 of this annex.

3.3.3.2. Centre axle trailer masses exceeding 3.5 tonnes:

The test forces are applied to the specimen in both horizontal and vertical directions in an asynchronous endurance test. The horizontal line of action shall be equivalent to being parallel to the ground and along the longitudinal median plane of the towing vehicle and pass through the centre of the coupling pin. The vertical line of action shall be perpendicular to the horizontal line of action and shall act along the longitudinal centre line of the coupling pin.

The fixing arrangements for the drawbar coupling and the drawbar eye on the test rig shall be those intended for its attachment to the vehicle in accordance with the manufacturer's fitting instructions.

The following test forces shall be applied:

TABLE 14 - Test forces

Test force	Mean Value (kN)	Amplitude (kN)
Horizontal force	0	$\pm 0.6D_c$ (See Note)
Vertical force	$S \times g/1000$	$\pm 0.6V$ (See Note)

Note: In the case of Class T dedicated drawbar couplings these values shall be reduced to $\pm 0.5D_c$ and $\pm 0.5V$.

The vertical and the horizontal components shall be sinusoidal in shape and shall be applied asynchronously, where the difference of their frequencies shall be between 1 per cent and 3 per cent.

3.3.4. Static test on coupling pin locking device

With drawbar couplings it is also necessary to test the closure and any locking devices by means of a static force of $0.25 D$ acting in the direction of opening. The test shall not cause the closure to open and it shall not cause any damage. A test force of $0.1 D$ is sufficient in the case of cylindrical coupling pins.

3.4. Drawbar eyes

3.4.1. Drawbar eyes shall be subjected to the same dynamic testing as drawbar couplings. Drawbar eyes used solely for trailers having hinged drawbars allowing free vertical movement shall be subjected to an alternating force as described in paragraph 3.3.2. Drawbar eyes also intended for use on centre axle trailers shall be tested in the same way as ball coupling heads (paragraph 3.2) for trailer masses C up to and including 3.5 tonnes and in the same way as drawbar couplings (paragraph 3.3.3.2.) for centre axle trailers with a mass, C , exceeding 3.5 tonnes.

3.4.2. Toroidal eyes of Class L shall be tested in the same manner as standard drawbar eyes.

3.4.3. The testing of drawbar eyes shall be conducted in such a manner that the alternating force also acts on the parts used for attaching the drawbar eye to the drawbar. All flexible intermediate components shall be clamped.

3.5. Hook type couplings

3.5.1. Class K hook type couplings shall satisfy the dynamic test given in paragraph 3.5.2 of this annex.

3.5.2. Dynamic test:

3.5.2.1. The dynamic test shall be a pulsating test using a Class L toroidal eye and with the coupling mounted as it would be on a vehicle and with all of the

necessary parts for vehicle installation. However, any flexible components may be neutralized with the agreement of the type approval authority or technical service;

3.5.2.2. For hook type couplings intended for use with hinged drawbar trailers, where the imposed vertical load on the coupling, S , is zero, the test force shall be applied in a horizontal direction simulating a tensile force on the hook and varying between $0.05 D$ and $1.00 D$;

3.5.2.3. For hook type couplings intended for use with centre axle trailers the test force shall represent the resultant of the horizontal and vertical forces on the coupling and shall be applied along an angle, $-\alpha$, that is, from top front to bottom rear (see Figure 21), and equivalent to the calculated angle of the resultant between the horizontal and vertical forces on the coupling. The force, $F_{hs\ res}$ shall be calculated as:

$$F_{hs\ res} = \sqrt{F_h^2 + F_s^2} \text{ where } F_h = D_c \text{ and } F_s = \frac{9.81S}{1000} + 0.8 V$$

3.5.2.4. The applied force shall vary between $0.05 F_{hs\ res}$ and $1.00 F_{hs\ res}$.

3.5.3. Static test on coupling locking device

With hook type couplings it is also necessary to test the closure and any locking devices by means of a static force of $0.25 D$ acting in the direction of opening. The test shall not cause the closure to open and it shall not cause any damage.

3.6. Drawbars

3.6.1. Drawbars shall be tested in the same way as drawbar eyes (see paragraph 3.4.). The type approval authority or technical service may waive an endurance test if the simple design of a component makes a theoretical check of its strength possible. The design forces for the theoretical verification of the drawbar of centre axle trailers with a mass, C , of up to and including 3.5 tonnes shall be taken from ISO 7641/1:1983. The design forces for the theoretical verification of drawbars for centre axle trailers having a mass, C , over 3.5 tonnes shall be calculated as follows:

$$F_{sp} = (g \times S/1000) + V$$

where the force amplitude V is that given in paragraph 2.11.4. of this Regulation.

The permissible stresses based on the design masses for trailers having a total mass, C , over 3.5 tonnes shall be in accordance with paragraph 5.3. of ISO 7641/1:1983. For bent drawbars (e. g. swan neck) and for the drawbars of full trailers, the horizontal force component $F_{hp} = 1.0 \times D$ shall be taken into consideration.

3.6.2. For drawbars for full trailers with free movement in the vertical plane, in addition to the endurance test or theoretical verification of strength, the resistance to buckling shall be verified either by a theoretical calculation with a design force of $3.0 \times D$ or by a buckling test with a force of $3.0 \times D$. The permissible stresses in the case of calculation shall be in accordance with paragraph 5.3. of ISO 7641/1:1983.

3.6.3. In the case of steered axles, the resistance to bending shall be verified by theoretical calculations or by a bending test. A horizontal, lateral static force shall be applied in the centre of the coupling point. The magnitude of this force shall be chosen so that a moment of $0.6 \times A_v \times g$ (kNm) is exerted about the front axle centre. The permissible stresses shall be in accordance with paragraph 5.3. of ISO 7641/1:1983.

However, in the case where the steered axles form a twin, tandem, axle front carriage (steered bogie) the moment shall be increased to $0.95 \times A_v \times g$ (kNm)

3.7. Fifth wheel couplings

3.7.1. The basic strength tests are a dynamic test and a static test (lifting test). Fifth wheel couplings intended for the positive steering of semitrailers shall be subject to an additional static test (bending test). For the purpose of the tests the fifth wheel coupling shall be equipped with all the fixings needed to attach it to the vehicle. The method of mounting shall be identical to that employed on the vehicle itself. It is not permissible to use a calculation method as an alternative to physical testing.

3.7.2. Static tests

3.7.2.1. Standard fifth wheel couplings designed for a steering wedge or similar device for the positive steering of semitrailers (see paragraph 2.7 of this Regulation) shall be tested for adequate strength by means of a static bending test within the working range of the steering device with the simultaneous application of fifth wheel load. The maximum permitted imposed vertical load, U , for the fifth wheel shall be applied vertically to the coupling in its operating position by means of a rigid plate of sufficient size to cover the coupling completely.

The resultant of the applied load shall pass through the center of the horizontal joint of the fifth wheel coupling.

Simultaneously, a horizontal lateral force, representing the force needed for positive steering of the semitrailer, shall be applied to the flanks of the guide for the coupling pin. The magnitude of this force and the direction in which it acts shall be chosen so that a moment of $0.75m \times D$ is exerted about the center of the coupling pin by means of a force acting on a lever arm $0.5 \text{ m} \pm 0.1 \text{ m}$ long. Permanent, plastic deformation up to 0.5 per cent of all nominal dimensions is permitted. There shall not be any cracking.

- 3.7.2.2. A static lifting test shall be performed on all fifth wheel couplings. Up to a lifting force of $F_a = g \cdot U$ there shall not be any major permanent bending of the coupling plate over more than 0.2 per cent of its width.

In the case of Class G50 standard fifth wheel couplings and comparable couplings for the same coupling pin diameter, there shall not be any separation of the coupling pin from the coupling with a lifting force of $F_a = g \times 2.5 U$. In the case of non-standard couplings using a pin diameter greater than 50 mm, for example 90 mm pin diameter couplings, the lifting force shall be: $F_a = g \times 1.6 U$ with a minimum value of 500 kN.

The force shall be applied by means of a lever bearing on the coupling plate at one end and being raised at the other end at a distance of 1.0 to 1.5 m from the center of the coupling pin - see Figure 24.

The lever arm shall be at 90° to the direction of entry of the coupling pin into the coupling. If the worst case is obvious, this worst case has to be tested. If the worst case is not easy to determine, the type approval authority or technical service shall decide which side to test. Only one test is necessary.

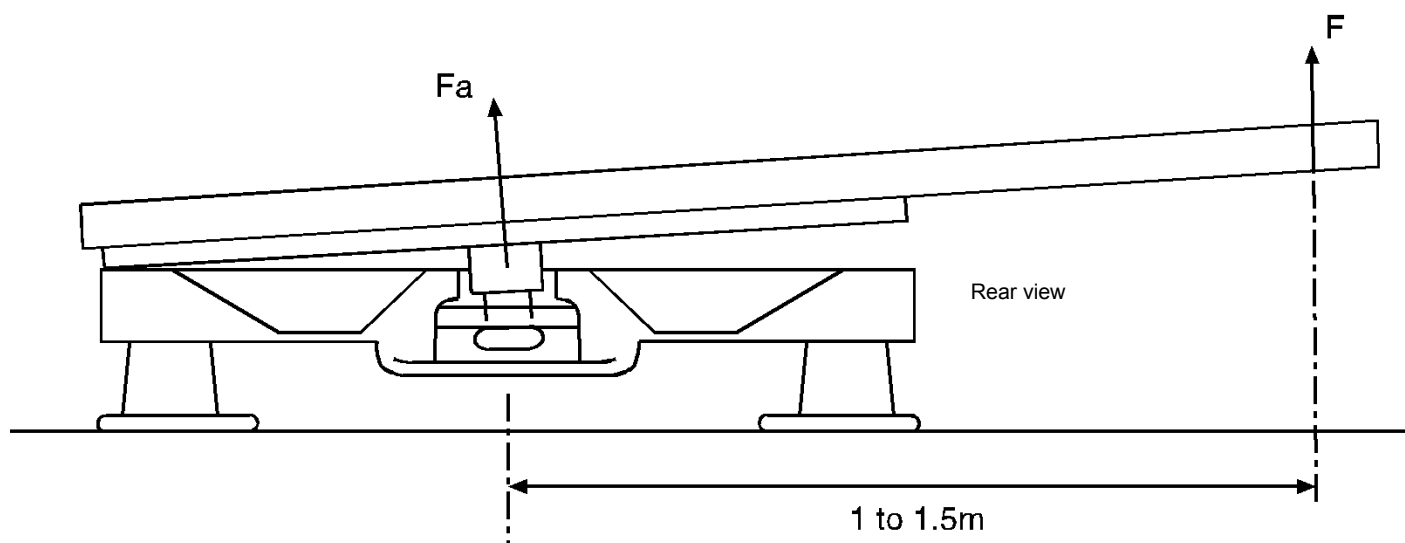


Figure 24 - Lifting test on fifth wheel couplings

- 3.7.3. Dynamic test

The fifth wheel coupling shall be subjected to alternating stress on a test rig (asynchronous dynamic test) with horizontal alternating and vertical pulsating forces acting simultaneously.

- 3.7.3.1. In the case of fifth wheel couplings not intended for the positive steering of semitrailers, the following forces shall be used:

$$\text{Horizontal: } F_{hw} = \pm 0.6 \times D$$

$$\text{Vertical: } F_{sO} = g \times 1.2 \times U$$

$$F_{sU} = g \times 0.4 \times U$$

These two forces shall be applied in the longitudinal median plane of the vehicle with the lines of action of both forces F_{sO} and F_{sU} passing through the centre of the joint of the coupling.

The vertical force F_s alternates between the limits $+g \times 1.2 \times U$ and $+g \times 0.4 \times U$ and the horizontal force between $\pm 0.6 \times D$.

- 3.7.3.2. In the case of fifth wheel couplings intended for the positive steering of semitrailers the following forces shall be used :

$$\text{Horizontal: } F_{hw} = \pm 0.675 \times D$$

$$\text{Vertical: } F_{sO} \text{ and } F_{sU} \text{ as in paragraph 3.7.3.1.}$$

The lines of action of the forces are as given in paragraph 3.7.3.1.

- 3.7.3.3. For the dynamic test of fifth wheel couplings, a suitable lubricating material shall be placed between the coupling plate and the trailer plate so that the maximum coefficient of friction, F , is 0.15.

3.8. Mounting plates for fifth wheel couplings

The dynamic test for fifth wheel couplings described in paragraph 3.7.3. and the static tests described in paragraph 3.7.2. shall also be applied to mounting plates. With mounting plates, it is sufficient to perform the lifting test on one side only. The test shall be based on the maximum designated installation height for the coupling, the maximum designated width and the minimum designated length of the mounting plate design. It is not necessary to carry out this test if the mounting plate in question is identical to one which has already undergone this test except that it is narrower and/or longer and the total height is lower. It is not permissible to use a calculation method as an alternative to physical testing.

3.9. Fifth wheel coupling pins of semitrailers

- 3.9.1. A dynamic test with alternating stress shall be performed on a sample mounted on a test rig. The testing of the coupling pin shall not be combined with the testing of the fifth wheel coupling. The test shall be conducted so that the force is also applied to the fixings needed for attaching the coupling pin to the semitrailer. It is not permissible to use a calculation method as an alternative to physical testing.

- 3.9.2. A dynamic test with an alternating horizontal force of $F_{hw} = \pm 0.6 D$ shall be applied to the coupling pin in the operating position.

The line of action of the force shall pass through the centre of the smallest diameter of the cylindrical part of the coupling pin having a diameter of 50.8 mm for Class H50 (see annex 5, Figure 18).

Annex 7

INSTALLATION AND SPECIAL REQUIREMENTS

1. Installation and special requirements

1.1. Attachment of coupling balls and towing brackets

- 1.1.1. Coupling balls and towing brackets shall be attached to vehicles of categories M1, M2 (below 3.5t maximum permissible mass) and N1¹ in a manner which conforms to the clearance and height dimensions given in Figure 25. The height shall be measured at the vehicle loading conditions given in appendix 1 to this annex.

The height requirement shall not apply in the case of category G off-road vehicles as defined in annex 7 of the Consolidated Resolution on the Construction of Vehicles (R.E.3)(document TRANS/WP.29/78/Rev.1/Amend.2).

- 1.1.1.1. The clearance space shown in Figures 25a and 25b may be occupied by non-demountable equipment, such as a spare wheel, provided that the distance from the centre of the ball to a vertical plane at the extreme rearmost point of the equipment does not exceed 300 mm. The equipment shall be mounted to allow adequate access for coupling and uncoupling without risk of injury to the user and without affecting articulation of the coupling.

- 1.1.2. For coupling balls and towing brackets the vehicle manufacturer shall supply mounting instructions and state whether any reinforcement of the fixing area is necessary.

- 1.1.3. It shall be possible to couple and uncouple ball couplings when the longitudinal axis of the ball coupling in relation to the centre line of the coupling ball and mounting:

is rotated horizontally 60° to right or left, ($\beta = 60^\circ$, see Figure 25);

is rotated vertically 10° up or down ($\alpha = 10^\circ$, see Figure 25);

is rotated axially 10° to right or left.

¹ See definitions in Regulation N°. 13 annexed to the 1958 Agreement concerning the Adoption of Uniform Technical Prescriptions for wheeled vehicles, Equipment and Parts which can be Fitted and/or be Used on Vehicles and Conditions for Reciprocal Recognition of Approvals granted on the Basis of these Prescriptions. The definition is also contained in annex 7 of Consolidated Resolution on the Construction vehicles (R. E. 3) (document TRANS/ WP. 29/ 78/ Rev. 1/ Amend. 2).

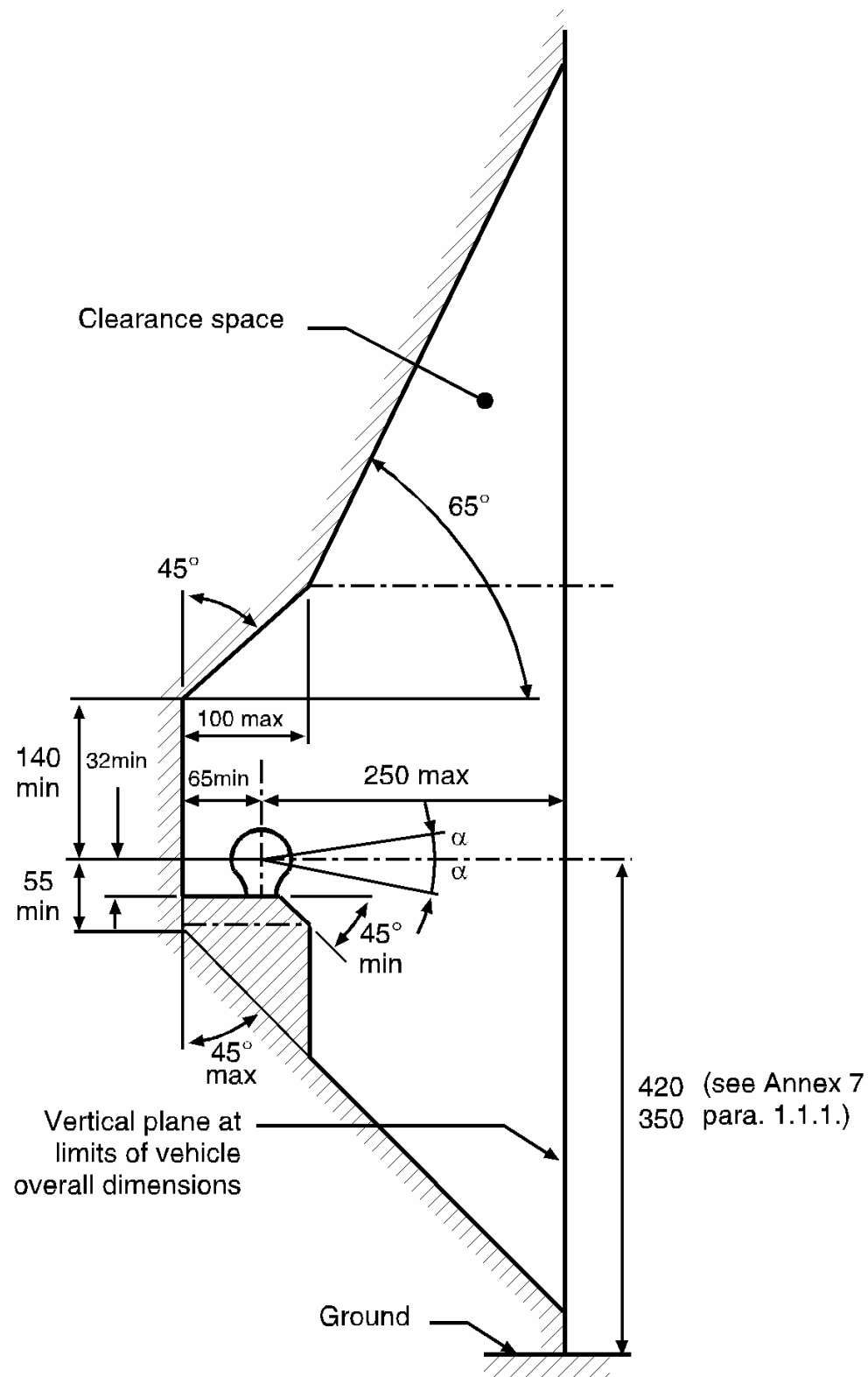


Figure 25 (a) - Clearance space for, and height of, coupling ball - side view

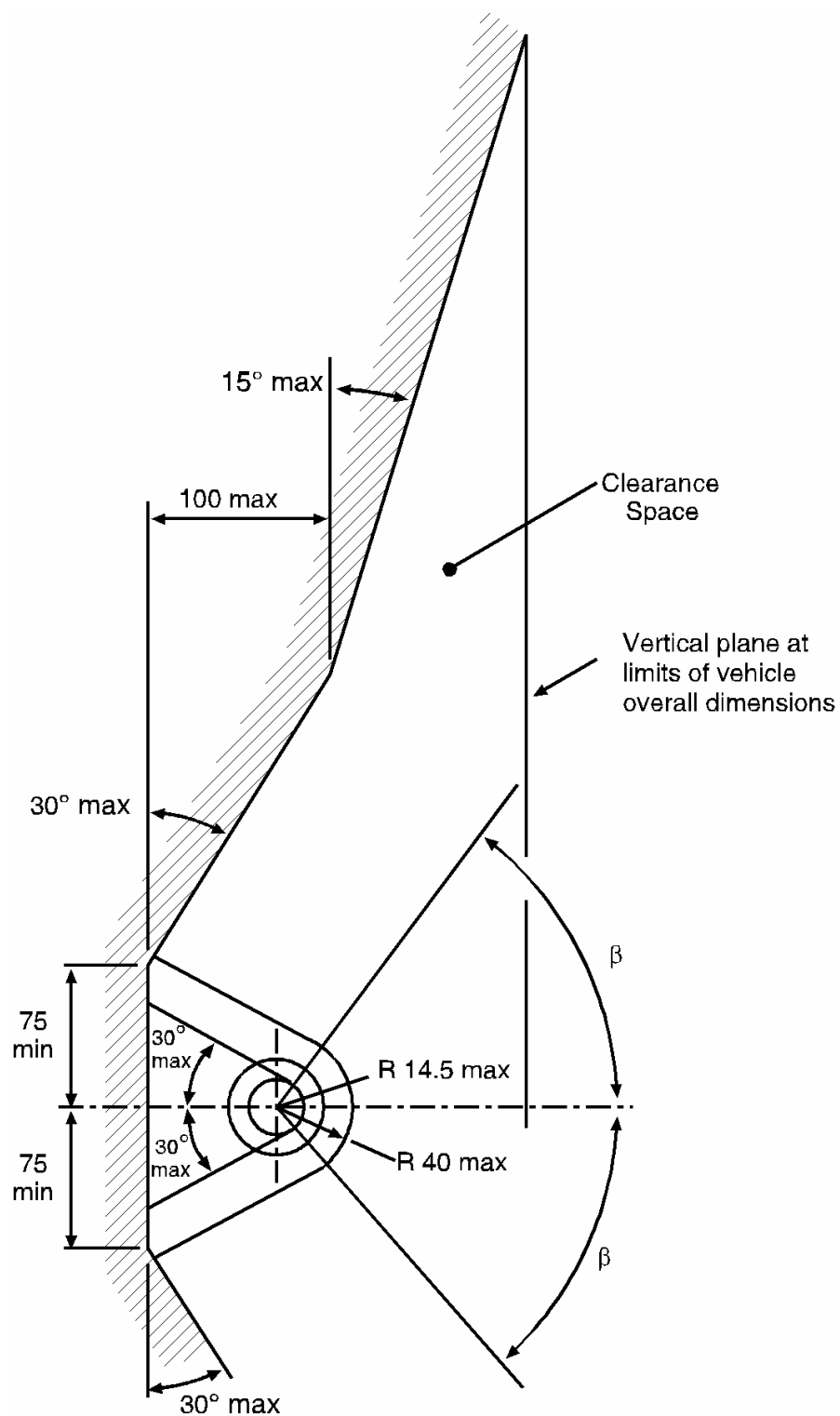


Figure 25 (b) - Clearance space for coupling ball - plan view

- 1.1.4. When the trailer is not coupled to the towing vehicle, the mounted towing bracket and coupling ball shall not obscure the mounting space provided for the rear registration plate or affect the visibility of the rear registration/licence plate of the towing vehicle. If the coupling ball or other items do obscure the rear registration plate they shall be removable or repositionable without the use of tools except, for example, an easily operated (i.e. an effort not exceeding 20 Nm) release key which is carried in the vehicle.

1.2. Attachment of coupling heads

- 1.2.1. Class B coupling heads are permitted for trailers of maximum mass up to and including 3.5 tonnes. With the trailer horizontal and carrying the maximum permitted axle load, coupling heads shall be fitted so that the centre line of the spherical area into which the ball fits is 430 ± 35 mm above the horizontal plane on which the wheels of the trailer rest.

In the case of caravans and goods trailers, the horizontal position is regarded as when the floor or loading surface is horizontal. In the case of trailers without such a reference surface (e.g. boat trailers or similar) the trailer manufacturer shall give an appropriate reference line defining the horizontal position. The height requirement shall apply only to trailers intended to be attached to vehicles mentioned in paragraph 1.1.1. of this annex.

In all cases the horizontal position shall be determined to within $\pm 1^\circ$.

- 1.2.2. It shall be possible to operate the coupling heads safely within the free space of the coupling ball given in Figures 25a and 25b, up to angles of $\alpha = 25^\circ$ and $\beta = 60^\circ$.

1.3. Attachment of drawbar couplings and mounting blocks

- 1.3.1. Mounting dimensions for standard drawbar couplings:

In the case of types of standard drawbar couplings the mounting dimensions on the vehicle given in Figure 15 and Table 10 must be met.

- 1.3.2. Need for remote controlled couplings

If one or more of the following requirements regarding easy and safe operation (paragraph 1.3.3.), accessibility (paragraph 1.3.5.) or clearance for the hand lever (paragraph 1.3.6.) cannot be met, a coupling with a remote control device as described in annex 5, paragraph 12.3. shall be used.

- 1.3.3. Easy and safe coupling operation

Drawbar couplings shall be mounted on the vehicle in such a manner that they are easy and safe to operate.

In addition to the functions of opening (and closing, if applicable) this also includes checking the position of the indicator for the closed and locked positions of the coupling pin (by sight and touch).

In the area in which the person operating the coupling has to stand, there shall not be any points of possible danger such as sharp edges, corners, etc. inherent in the design unless these are protected so that injury is unlikely.

The way of escape from this area shall not be restricted or barred on either side by any objects attached to either the coupling or the vehicles.

Any underrun protection device shall not prevent the person adopting a suitable position to operate the coupling.

1.3.4. Minimum angle for coupling up and uncoupling

Coupling and uncoupling of the drawbar eye shall be possible when the longitudinal axis of the drawbar eye in relation to the centre line of the jaw is simultaneously rotated:

50° horizontally to right or left;

6° vertically up or down.

6° axially to right or left.

This requirement shall also apply to Class K hook type couplings.

1.3.5. Accessibility

The distance between the center of the coupling pin and the edge of the bodywork of the vehicle shall not exceed 550 mm. Where the distance exceeds 420 mm, the coupling shall be fitted with an actuation mechanism which will allow safe operation at a maximum distance of 420 mm from the outer board of the bodywork.

The distance of 550 mm may be exceeded as follows, provided that technical necessity can be demonstrated and that easy and safe actuation of the drawbar coupling is not adversely affected:

(i) to a distance of up to 650 mm for vehicles with tipping bodies or rear-mounted equipment;

(ii) to a distance of up to 1320 mm if the unobstructed height is at least 1150 mm;

(iii) in the case of car transporters with at least two loading levels when the trailer vehicle is not separated from the towing vehicle in normal transport operation.

1.3.6. Clearance for the hand lever

In order to permit safe operation of drawbar couplings there shall be adequate free space around the hand lever.

The clearance illustrated in Figure 26 is regarded as sufficient. If different types of standard drawbar couplings are intended to be fitted to the vehicle, the clearance shall be such that the conditions are also satisfied for the largest size of coupling of the appropriate class given in annex 5, paragraph 3.

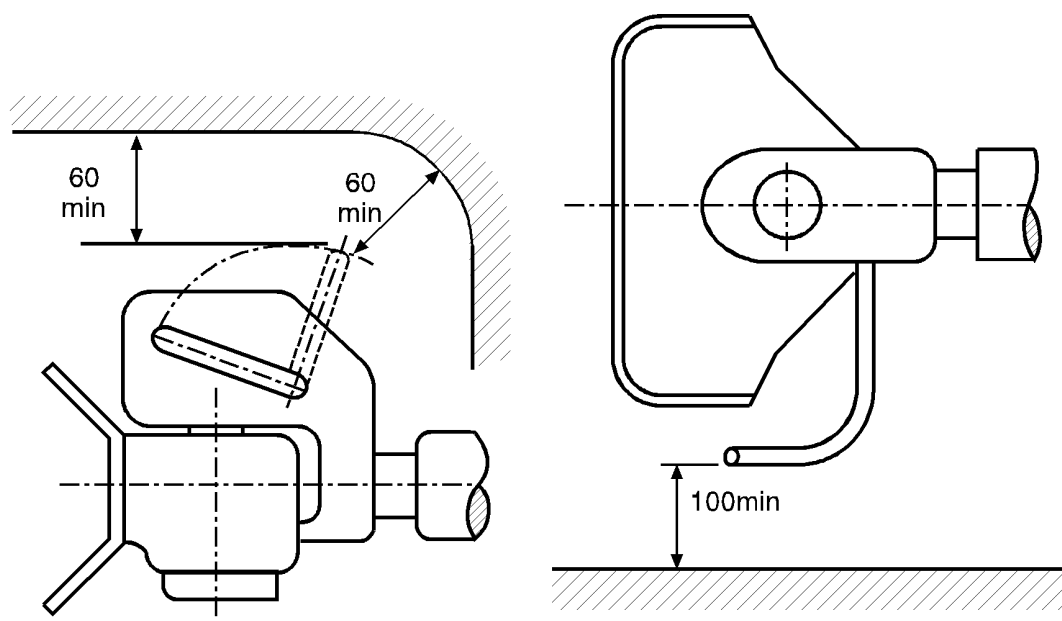


Figure 26 - Hand lever clearance

The clearance dimensions are also applicable as appropriate for drawbar couplings having hand levers pointing downwards or of a different design.

The clearance shall also be maintained within the specified minimum angle for coupling up and uncoupling given in paragraph 1.3.4. of this annex.

1.3.7. Clearance for free movement of drawbar coupling

The drawbar coupling attached to the vehicle shall have a minimum clear gap of 10 mm from every other part of the vehicle taking into account all possible geometrical positions given in annex 5, paragraph 3.

If different types of standard drawbar couplings are intended to be fitted to the vehicle type, the clearance shall be such that the conditions are also satisfied for the largest possible coupling of the appropriate class stated in annex 5, paragraph 3.

1.3.8. Acceptability of drawbar couplings with a special joint for vertical rotation - see annex 5, paragraph 3.4.

Couplings having a cylindrical pin and which achieve vertical rotation for the coupled drawbar eye by means of a special joint will only be permitted when technical necessity can be demonstrated. This may be the case, for example, on rear tippers when the coupling head shall be hinged, or with the couplings of heavy transporters when for strength reasons the use of a cylindrical coupling pin is necessary.

- 1.4. Attachment of drawbar eyes and drawbars on trailers.
 - 1.4.1. Drawbars for centre axle trailers shall have a support device which is adjustable in height if vertical bearing mass at the drawbar eye on the trailer exceeds 50 kg, when the trailer is uniformly loaded to its technically permissible maximum mass.
 - 1.4.2. When attaching drawbar eyes and drawbar to centre-axle trailers with a maximum mass, C, of more than 3.5 tonnes and more than one axle, the trailers shall be equipped with device for axle load sharing.
 - 1.4.3. Hinged drawbars shall be clear of the ground. They shall not fall below a height of 200 mm from the ground when released from the horizontal position. See also annex 5, paragraphs 5.3. and 5.4.
- 1.5. Attachment of fifth wheel couplings, mounting plates and coupling pins on vehicles.
 - 1.5.1. Class G50 fifth wheel couplings shall not be mounted directly on the vehicle frame unless permitted by the vehicle manufacturer. They shall be fixed to the frame by means of a mounting plate and the installation instructions provided by the vehicle manufacturer and coupling manufacturer shall be followed.
 - 1.5.2. Semitrailers shall be equipped with landing gear or any other equipment which allows uncoupling and parking of the semitrailer. If semitrailers are equipped so that the connection of the coupling devices, the electrical systems and braking systems can be effected automatically, the trailer shall have landing gear which retracts from the ground automatically after the semitrailer has been coupled up.

These requirements shall not apply in the case of semitrailers designed for special operations where they are normally only separated in a workshop or when loading and unloading in specifically designed operating areas.
 - 1.5.3. The fixing of the fifth wheel coupling pin to the mounting plate on the semitrailer shall be as instructed by the vehicle manufacturer or the manufacturer of the fifth wheel coupling pin.
 - 1.5.4. If a semitrailer is equipped with a steering wedge it shall meet the requirements as described in annex 5, paragraph 7.8.

2. REMOTE INDICATION AND CONTROL

- 2.1. When installing remote indication and control devices any relevant requirements given in annex 5, paragraph 12 shall be taken into account.

Annex 7 - Appendix 1

LOADING CONDITIONS FOR MEASUREMENT OF COUPLING BALL HEIGHT

1. The height shall be as specified in annex 7, paragraph 1.1.1.
2. In the case of M1 category vehicles 1/ the vehicle mass at which this height shall be measured shall be declared by the vehicle manufacturer and shall be given in the Communication form (annex 2). The mass shall be either the maximum permissible mass, distributed between the axles as declared by the vehicle manufacturer or the mass given by loading the vehicle in accordance with paragraph 2.1. of this appendix.
 - 2.1. The maximum figure for the mass in running order as declared by the towing vehicle manufacturer (see paragraph 6. of the Communication form, annex 2); plus
 - 2.1.1. two masses, each of 68 kg, positioned in the outer seating position of each row of seats, with the seats in the rearmost adjustable position for normal driving and travel, and with the masses located:
 - 2.1.1.1. for original equipment coupling devices and components submitted for approval by the vehicle manufacturer, approximately at a point located at 100mm in front of the "R" point for adjustable seats and 50 mm in front of the "R" point for other seats, the "R" point being determined according to Regulation No. 14 paragraph 5.1.1.2.; or
 - 2.1.1.2. for coupling devices and components submitted for approval by an independent manufacturer and intended for replacement market fitting, approximately at the position of a seated person;
 - 2.1.2. In addition, for each mass of 68 kg, an additional mass of 7 kg allowance for personal luggage shall be distributed evenly in the luggage area of the vehicle;
3. In the case of N1 category vehicles 1/, the vehicle mass at which this height shall be measured shall be:
 - 3.1. The maximum permissible mass, distributed between the axles as declared by the towing vehicle manufacturer (see paragraph 6. of the Communication form, annex 2).

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/Rev.X, available at:
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29docstts.html>.

**Regulation No 107 of the Economic Commission for Europe of the United Nations
(UN/ECE) – Uniform provisions concerning the approval of category M₂ or M₃ vehicles
with regard to their general construction**

Addendum 106: Regulation No. 107

Revision 1

Incorporating all valid text up to:

01 series of amendments to the Regulation - Date of entry into force 12 August 2004

Corrigendum 1 – 19.10.2004

Corrigendum 2 – 25.01.2006

1. SCOPE
- 1.1. This Regulation applies to every single-deck, double-deck, rigid or articulated vehicle of category M₂ or M₃ ^{1/}
- 1.2. However, the requirements of this Regulation do not apply to the following vehicles:
 - 1.2.1. Vehicles designed for the secure transport of persons, for example prisoners;
 - 1.2.2. Vehicles specially designed for the carriage of injured or sick persons (ambulances);
 - 1.2.3. Off-road vehicles.
 - 1.2.4. Vehicles specially designed for the carriage of schoolchildren.
- 1.3. The requirements of this Regulation apply to the following vehicles only to the extent that they are compatible with their intended use and function:
 - 1.3.1. Vehicles designed for use by police, security and armed forces;
 - 1.3.2. Vehicles which contain seating intended solely for use when the vehicle is stationary, but which are not designed to carry more than 8 persons (excluding the driver) when in motion. Examples of these include mobile libraries, mobile churches and mobile hospitality units. The seats in such vehicles which are designated for use when the vehicle is in motion must be clearly identified to users.

^{1/} As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (TRANS/WP.29/78/Rev.1/Amend.2).

2. DEFINITIONS

For the purpose of this Regulation:

- 2.1. "Vehicle" means a vehicle of category M2 or M3 within the scope defined by paragraph 1. above.
 - 2.1.1. For vehicles having a capacity exceeding 22 passengers in addition to the driver, there are three classes of vehicles:
 - 2.1.1.1. "Class I": vehicles constructed with areas for standing passengers, to allow frequent passenger movement.
 - 2.1.1.2. "Class II": vehicles constructed principally for the carriage of seated passengers, and designed to allow the carriage of standing passengers in the gangway and/or in an area which does not exceed the space provided for two double seats.
 - 2.1.1.3. "Class III": vehicles constructed exclusively for the carriage of seated passengers.
 - 2.1.1.4. A vehicle may be regarded as belonging in more than one Class. In such a case it may be approved for each Class to which it corresponds.
 - 2.1.2. For vehicles having a capacity not exceeding 22 passengers in addition to the driver, there are two classes of vehicles:
 - 2.1.2.1. "Class A": vehicles designed to carry standing passengers; a vehicle of this class has seats and shall have provision for standing passengers.
 - 2.1.2.2. "Class B": vehicles not designed to carry standing passengers; a vehicle of this class has no provision for standing passengers.
 - 2.1.3. "Articulated vehicle" means a vehicle which consists of two or more rigid sections which articulate relative to one another; the passenger compartments of each section intercommunicate so that passengers can move freely between them; the rigid sections are permanently connected so that they can only be separated by an operation involving facilities which are normally only found in a workshop;
 - 2.1.3.1. "Double-decker articulated vehicle" means a vehicle which consists of two or more rigid sections which articulate relative to one another; the passenger compartments of each section intercommunicate on at least one deck so that passengers can move freely between them; the rigid sections are permanently connected so that they can only be separated by an operation involving facilities which are normally only found in a workshop.
 - 2.1.4. "Low floor bus" is a vehicle of class I, II or A in which at least 35 per cent of the area available for standing passengers (or in its forward section in the case of articulated vehicles, or in its lower deck in the case of double-decker vehicles) forms an area without steps and includes access to at least one service door.

- 2.1.5. "Bodywork" means a separate technical unit comprising all the special internal and external equipment of the vehicle.
- 2.1.6. "Double deck vehicle" means a vehicle where the provided spaces for passengers are arranged, at least in one part, in two superimposed levels and spaces for standing passengers are not provided in the upper deck.
- 2.1.7. "Separate technical unit" means a device intended to be part of a vehicle, which may be type-approved separately but only in relation to one or more specified types of vehicle;
- 2.2. "Definition of type(s)"
- 2.2.1. "Vehicle type" means vehicles, which do not differ in the following essential aspects:
- a) bodywork manufacturer,
 - b) chassis manufacturer;
 - c) vehicle concept (> 22 passengers or ≤ 22 passengers);
 - d) bodywork concept (single / double deck, articulated, low-floor).
 - e) bodywork type if the bodywork has been approved as a separate technical unit;
- 2.2.2. "Bodywork type" for the purposes of type-approval as a separate technical unit means a category of bodywork which do not essentially differ in the following aspects:
- a) bodywork manufacturer,
 - b) vehicle concept (> 22 passengers or ≤ 22 passengers);
 - c) bodywork concept (single/ double deck, articulated, low-floor).
 - d) mass of the completely equipped vehicle bodywork, differing by 10 per cent.
 - e) specified types of vehicle on which the type of the bodywork can be installed.
- 2.3. "Approval of a vehicle or a separate technical unit" means the approval of a vehicle type, or of a bodywork type as defined in paragraph 2.2. with regard to the constructional features specified in this Regulation;
- 2.4. "Superstructure" means the part of the bodywork which contributes to the strength of the vehicle in the event of a roll-over accident;
- 2.5. "Service door" means a door intended for use by passengers in normal circumstances with the driver seated;

- 2.6. "Double door" means a door affording two, or the equivalent of two, access passages;
- 2.7. "Sliding door" means a door which can be opened or closed only by sliding it along one or more rectilinear or approximately rectilinear rails.
- 2.8. "Emergency door" means a door intended for use by passengers as an exit only exceptionally, and in particular in an emergency;
- 2.9. "Emergency window" means a window, not necessarily glazed, intended for use as an exit by passengers in an emergency only.
- 2.10. "Double or multiple window" means an emergency window which, when divided into two or more parts by imaginary vertical line(s) (or plane(s)), exhibits two or more parts respectively, each of which complies as to dimensions and access with the requirements applicable to a normal emergency window;
- 2.11. "Escape hatch" means an opening in the roof or the floor intended for use as an emergency exit by passengers in an emergency only;
- 2.12. "Emergency exit" means an emergency door, emergency window or escape hatch.
- 2.13. "Exit" means a service door, intercommunication staircase, half-staircase or emergency exit;
- 2.14. "Floor or deck" means that part of the bodywork whose upper surface supports standing passengers, the feet of seated passengers and the driver and any crew member, and may support the seat mountings;
- 2.15. "Gangway" means the space providing access by passengers from any seat or row of seats to any other seat or row of seats or to any access passage from or to any service door or intercommunication staircase and any area for standing passengers; it does not include:
- 2.15.1. the space extending 300 mm in front of any seat, except where a sideways-facing seat is situated above a wheel arch, in which case this dimension may be reduced to 225 mm.
- 2.15.2. the space above the surface of any step or staircase, or
- 2.15.3. any space which affords access solely to one seat or row of seats or a facing pair of transverse seats or row of seats.
- 2.16. "Access passage" means the space extending inwards into the vehicle from the service door up to the outermost edge of the upper step (edge of the gangway), intercommunication staircase or half-staircase. Where there is no step at the door, the space to be considered as access passage shall be that which is measured according to annex 3, paragraph 7.7.1. up to a distance of 300 mm from the starting position of the inner face of the dual panel.

- 2.17. "Driver's compartment" means the space intended for driver's exclusive use except in the case of an emergency and containing the driver's seat, the steering wheel, controls, instruments and other devices necessary for driving or operating the vehicle.
- 2.18. "Mass of the vehicle in running order" means the mass of the unladen vehicle with bodywork, and with coupling device in the case of a towing vehicle, in running order, or the mass of the chassis with cab if the manufacturer does not fit the bodywork and/or coupling device (including coolant, oils, 90 per cent fuel, 100 per cent other liquids except used waters, tools, spare wheel and driver (75 kg), and, for buses and coaches, the mass of the crew member (75 kg) if there is a crew seat in the vehicle.
- 2.19. "Technically permissible maximum laden mass (M)" means the maximum mass of the vehicle based on its construction and performance, stated by the manufacturer. The technically permissible maximum laden mass is used to determine the vehicle category.
- 2.20. "Passenger" means a person, other than the driver or a member of the crew;
- 2.21. "Passenger with reduced mobility" means all passengers who have a difficulty when using public transport, such as disabled people (including people with sensory and intellectual impairments, and wheelchair users, people with limb impairments, people of small stature, people with heavy luggage, elderly people, pregnant women, people with shopping trolleys, and people with children (including children seated in pushchairs).
- 2.22. "Wheelchair user" means a person who due to infirmity or disability uses a wheelchair for mobility.
- 2.23. "Member of the crew" means a person assigned to operate as a co-driver or the possible assistant.
- 2.24. "Passenger compartment" means a space intended for passengers' use excluding any space occupied by fixed appliances such as bars, kitchenettes, toilets or baggage/goods compartments.
- 2.25. "Power-operated service door" means a service door which is operated exclusively by energy other than muscular energy and the opening and closing of which, if not automatically operated, is remotely controlled by the driver or a member of the crew.
- 2.26. "Automatically-operated service-door" means a power-operated service door which can be opened (other than by means of emergency controls) only after a control is operated by a passenger and after activation of the controls by the driver, and which closes again automatically.
- 2.27. "Starting prevention device" means a device which prevents the vehicle being driven away from rest;
- 2.28. "Driver operated service door" means a service door which normally is opened and closed by the driver.

- 2.29. "Priority seat" means a seat with additional space for a passenger with reduced mobility and marked accordingly.
- 2.30. "Boarding device" means a device to facilitate wheelchair access to vehicles, such as lifts, ramps, etc.
- 2.31. "Kneeling system" means a system which lowers and lifts totally or partially the body of a vehicle relative to the normal position of travel.
- 2.32. "Lift" means a device or system with a platform that can be raised and lowered to provide passenger access between the floor of a passenger compartment and the ground or kerb.
- 2.33. "Ramp" means a device to bridge the gap between the floor of a passenger compartment and the ground or kerb.
- 2.34. "Portable ramp" means a ramp that may be detached from the vehicle structure and capable of being deployed by a driver or crew member.
- 2.35. "Demountable seat" means a seat that can be easily detached from the vehicle.
- 2.36. "Front" and "rear" means the front or rear of the vehicle according to the normal direction of travel and the terms; "forward", "foremost", "rearward" and "rearmost" etc. shall be construed accordingly.
- 2.37. "Intercommunication staircase" means a staircase which allows communication between the upper and lower decks.
- 2.38. "Separate compartment" means a space in the vehicle which may be occupied by passengers or crew when the vehicle is in use and which is separated from any other passenger or crew space, except where any partition allows passengers to see into the next passenger space, and is connected by a gangway without doors.
- 2.39. "Half staircase" is a staircase from the upper deck which terminates in an emergency door.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of:

- a) a vehicle type or
- b) a separate technical unit type or
- c) a vehicle type fitted with bodywork type already approved as a separate technical unit

with regard to its constructional features shall be submitted by the responsible manufacturer or by his duly accredited representative.

- 3.2. In the case of an application for approval of a vehicle made by assembling a chassis with type-approved bodywork, the term manufacturer refers to the assembler.
- 3.3. A model for the information document relating to the constructional features is given in annex 1 Part 1.
- 3.3.1. Appendix 1: for a vehicle type,
- 3.3.2. Appendix 2: for a bodywork type,
- 3.3.3. Appendix 3: for a vehicle type fitted with bodywork already approved as a separate technical unit.
- 3.4. A vehicle(s) or a bodywork(s) representative of the type to be approved shall be submitted to the technical service responsible for conducting the type-approval tests.
4. APPROVAL
- 4.1. If the vehicle or bodywork submitted for approval pursuant to this Regulation meets the requirements of paragraph 5., approval of that vehicle or bodywork type shall be granted.
- 4.2. An approval number shall be assigned to each vehicle type approved. Its first two digits (at present 01, corresponding to the 01 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendment made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another vehicle or bodywork type within the meaning of paragraph 2.2.
- 4.3. Notice of approval or of extension of approval of a vehicle or bodywork type pursuant to this Regulation shall be communicated to the Contracting Parties to the Agreement applying this Regulation by means of a form conforming to the model in annex 1 to this Regulation.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle or bodywork conforming to a vehicle or bodywork type approved under this Regulation, an international approval mark consisting of:
- 4.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval 2/ and

2/ 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 and Montenegro, 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 and 50 for Malta. . Subsequent numbers shall be

- 4.4.2. 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 4.4.1.; and
- 4.4.3. an additional symbol consisting of the Roman numerals for the Class(es) in which the vehicle or bodywork has been approved. A bodywork approved separately shall additionally bear the letter S.
- 4.5. 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 4.4.1. need not be repeated; in such a case, the Regulation and approval numbers and the additional 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 4.4.1.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle or bodywork data plate affixed by the manufacturer.
- 4.8. Annex 2 to this Regulation gives examples of arrangements of approval marks.
5. REQUIREMENTS
- 5.1. All vehicles shall comply with the provisions set out in annex 3 to this Regulation (modified by annex 9 in the case of double-deck vehicles). Bodyworks approved separately shall comply with annex 5 and/or 10 as appropriate. The approval of a vehicle incorporating a bodywork approved in accordance with annex 10 shall be completed in accordance with that annex.
- 5.2. Vehicles of Class I shall be accessible for people with reduced mobility including wheelchair users according to the technical provisions laid down in annex 8.
- 5.3. Contracting Parties shall be free to choose the most appropriate solution to achieve improved accessibility in vehicles other than those of Class I. However, if vehicles other than those of Class I are equipped with devices for people with reduced mobility and/or wheelchair users, they shall comply with the relevant requirements of annex 8.
- 5.4. Nothing in this Regulation shall prevent the national authorities of a Contracting Party from specifying that certain types of operation are reserved for vehicles which are equipped for the transport of passengers with reduced mobility in accordance with annex 8.

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.

6. MODIFICATION AND EXTENSION OF APPROVAL OF A VEHICLE OR BODYWORK TYPE

6.1. Every modification of the vehicle or bodywork type shall be notified to the administrative department which approved the vehicle type. That department may then either:

6.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that, in any case, the vehicle or bodywork still complies with the requirements; or

6.1.2. require a further test report from the technical service responsible for conducting the tests.

6.2. Confirmation or refusal of approval, specifying the modifications, shall be communicated by the procedure specified in paragraph 4.3. to the Contracting Parties to the Agreement which apply this Regulation.

6.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1, appendix 2 to this Regulation.

7. 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:

7.1. Vehicles and bodyworks approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraph 5. above.

7.2. The competent authority which has granted type-approval may at any time verify the conformity control methods applicable to each production facility. The normal frequency of these verifications shall be once per two years.

8. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

8.1. The approval granted in respect of a vehicle or bodywork type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 5. above is not complied with.

8.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1, appendix 2 to this Regulation.

9. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle or bodywork under 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 1, part 1 to this Regulation.

10. TRANSITIONAL PROVISIONS

10.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 01 series of amendments.

10.2. No Contracting Party applying this Regulation shall refuse national type approval of a vehicle type approved to the 01 series of amendments to this Regulation.

10.3. As from 36 months after the date of entry into force, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 01 series of amendments.

10.4. Starting 72 months after the entry into force of the 01 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse first national registration (first entry into service) of a vehicle which does not meet the requirements of the 01 series of amendments to this Regulation.

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement which apply this Regulation shall communicate to the Secretariat of the United Nations 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.

12. REMARKS CONCERNING PERMISSIBLE AXLE LOADS OR TOTAL VEHICLE MASS

Contracting Parties to the Agreement are not precluded by article 3 of that Agreement from prohibiting the registration on their territory of vehicle types, approved by another Contracting Party in accordance with this Regulation whenever passenger and luggage capacities result in the axle loads or the technically permissible maximum laden mass of the vehicle being higher than the legal limits in force on their territory.

ANNEX

LIST OF ANNEXES

<u>Annex 1</u>	ECE Type-approval documentation
Part I	Model Information document
Part II	Type-approval certificate.
<u>Annex 2</u>	Arrangements of approval marks
<u>Annex 3</u>	Requirements to be met by all vehicles
	<u>Appendix</u> : Verification Of Static Tilting Limit By Means Of Calculation
<u>Annex 4</u>	Explanatory diagrams
<u>Annex 5</u>	Strength of Superstructure
<u>Annex 6</u>	Guidelines for measuring the closing forces of power operated doors
<u>Annex 7.</u>	Special requirements for vehicles having a capacity not exceeding 22 passengers
<u>Annex 8</u>	Requirements for technical devices facilitating access for passengers with reduced mobility.
<u>Annex 9.</u>	Special requirements for double-deck vehicles
<u>Annex 10</u>	Type approval for separate technical units and type approval of a vehicle fitted with a bodywork already approved as a separate technical unit.
<u>Annex 11</u>	Masses and dimensions.

ANNEX 1

ECE TYPE-APPROVAL DOCUMENTATION

Part 1Model Information documentsAppendix 1

MODEL INFORMATION DOCUMENT

pursuant to Regulation No. 107 relating to type-approval of Category M2 or M3 vehicles with regard to their general construction.

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

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

1. GENERAL
 - 1.1. Make (trade name of manufacturer):
 - 1.2. Type:
 - 1.2.1. Chassis:
 - 1.2.2. Bodywork/complete vehicle:
 - 1.3. Means of identification of type, if marked on the vehicle (b):
 - 1.3.1. Chassis:
 - 1.3.2. Bodywork/complete vehicle:
 - 1.3.3. Location of that marking
 - 1.3.3.1. Chassis:
 - 1.3.3.2. Bodywork/complete vehicle:
 - 1.4. Category of vehicle (c):
 - 1.5. Name and address of manufacturer:
 - 1.6. Address(es) of assembly plant(s):
2. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
 - 2.1. Photographs and/or drawings of a representative vehicle:

- 2.2. Dimensional drawing of the whole vehicle:
- 2.3. Number of axles and wheels:
 - 2.3.1. Number and position of axles with double wheels:
 - 2.3.2. Number and position of steered axles:
- 2.4. Chassis (if any) (overall drawing):
- 2.5. Material used for the side-members (d):
- 2.6. Position and arrangement of the engine:
- 2.7. Driving cab (forward, or normal) (z):
- 2.8. Hand of drive:
 - 2.8.1. Vehicle is equipped to be driven in right/left 1/ hand traffic.
- 2.9. Specify if the motor vehicle is intended to tow trailers and if the trailer is a semi-, drawbar or centre-axle trailer.
- 3. MASSES AND DIMENSIONS (e) (in kg and mm) (refer to drawing where applicable)
 - 3.1. Wheel base(s) (fully loaded) (f):
 - 3.2. Range of vehicle dimensions (overall)
 - 3.2.1. For chassis with bodywork
 - 3.2.1.1. Length (j):
 - 3.2.1.2. Width (k):
 - 3.2.1.3. Height (in running order) (l) (for suspension adjustable for height, indicate normal running position):
 - 3.2.1.4. Front overhang (m):
 - 3.2.1.5. Rear overhang (n):
 - 3.3. Position of centre of gravity of the vehicle at its technically permissible maximum laden mass in the longitudinal, transverse and vertical directions.
 - 3.4. Mass of the vehicle with bodywork, and in the case of a towing vehicle of a category other than M1, with coupling device, if fitted by the manufacturer, in running order, or the mass of the chassis or chassis with cab, without bodywork and/or coupling device if the manufacturer does not fit the bodywork and/or coupling device (including liquids, tools, spare wheel and driver, and, for buses and coaches, a crew member if there is a crew seat in the vehicle) (o) (maximum and minimum for each variant):

- 3.4.1. Distribution of this mass among the axles and, in the case of a semi-trailer or centre axle trailer, load on the coupling point (maximum and minimum for each variant):
- 3.5. Technically permissible maximum laden mass stated by the manufacturer (y) (maximum and minimum for each variant):
 - 3.5.1. Distribution of this mass among the axles (maximum and minimum for each variant):
- 3.6. Technically permissible maximum load/mass on each axle:
- 3.7. Technically permissible maximum mass on the coupling point:
 - 3.7.1. of the motor vehicle:
- 4. BODYWORK
 - 4.1. Type of bodywork: single deck / double deck / articulated / low floor 1"
 - 4.2. Materials used and methods of construction:
- 5. SPECIAL PROVISIONS FOR VEHICLES USED FOR THE CARRIAGE OF PASSENGERS COMPRISING MORE THAN EIGHT SEATS IN ADDITION TO THE DRIVER'S SEAT
 - 5.1. Class of vehicle (Class I, Class II, Class III, Class A, Class B):
 - 5.2. Area for passengers (m²):
 - 5.2.1. Total (S_o):
 - 5.2.2. Upper deck (S_{oa}): 1/
 - 5.2.3. Lower deck (S_{ob}): 1/
 - 5.2.4. For standing passengers (S₁):
 - 5.3. Number of passengers (seated and standing):
 - 5.3.1. Total (N):
 - 5.3.2. Upper deck (N_a): 1/
 - 5.3.3. Lower deck (N_b): 1/
 - 5.4. Number of passengers (seated):
 - 5.4.1. Total (A):
 - 5.4.2. Upper deck (A_a): 1/
 - 5.4.3. Lower deck (A_b): 1/

- 5.5. Crew seat: yes/no (1)
- 5.6. Number of service doors:
- 5.7. Number of emergency exits (doors, windows, escape hatches, intercommunication staircase and half staircase):
- 5.7.1. Total:
- 5.7.2. Upper deck: 1/
- 5.7.3. Lower deck: 1/
- 5.8. Volume of baggage compartments (m³):
- 5.9. Area for baggage transportation on the roof (m²):
- 5.10. Technical devices facilitating the access to vehicles (e.g. ramp, lifting platform, kneeling system), if fitted:
- 5.11. STRENGTH OF SUPERSTRUCTURE:
- 5.11.1. Regulation No. 66 type-approval number, if available:
- 5.11.2. For superstructures not yet approved:
- 5.11.2.1. Detailed description of the superstructure of the vehicle type including its dimensions, configuration and constituent materials and its attachment to any chassis frame:
- 5.11.2.2. Drawings of the vehicle and those parts of its interior arrangement which have an influence on the strength of the superstructure or on the residual space:
- 5.11.2.3. Position of centre of gravity of the vehicle in running order in the longitudinal, transverse and vertical directions:
- 5.11.2.4. Maximum distance between the centre lines of the outboard passenger seats.

Explanatory notes:

- 1/ Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable).
- (b) If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this information document, such characters shall be represented in the documentation by the symbol "?" (e.g. ABC??123??).
- (c) As defined in annex 7 to the Consolidated Resolution of Construction of Vehicles (R.E.3). (TRANS/WP.29/78/Rev.1/Amend.2)

- (d) If possible, designation according to Euro norm, otherwise give:
- a) description of the material,
 - b) yield point,
 - c) ultimate tensile stress,
 - d) elongation (in per cent),
 - e) Brinell hardness.
- (e) Where there is one version with a normal cab and another with a sleeper cab, both sets of masses and dimensions are to be stated.
- (f) ISO Standard 612 - 1978, term No 6.4.
- (j) Annex 11, paragraph 2.4.1.
- (k) Annex 11, paragraph 4.2.
- (l) Annex 11, paragraph 2.4.3.
- (m) ISO Standard 612 - 1978, Term No 6.6.
- (n) ISO Standard 612 - 1978, Term No 6.7.
- (o) The mass of the driver and, if applicable, of the crew member is assessed at 75 kg (subdivided into 68 kg occupant mass and 7 kg luggage mass according to ISO Standard 2416 : 1992), the fuel tank is filled to 90 per cent and the other liquid containing systems (except those for used water) to 100 per cent of the capacity specified by the manufacturer.
- (y) For trailer or a semi-trailer, which exert a significant vertical load on the coupling device or the fifth wheel, this load, divided by standard acceleration of gravity, is included in the maximum technically permissible mass.
- (z) Forward control means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub in the forward quarter of the vehicle length.

ANNEX 1

ECE TYPE-APPROVAL DOCUMENTATION

Part 1Model Information documentsAppendix 2

MODEL INFORMATION DOCUMENT

relating to Regulation No. 107 relating to type-approval of bodywork for Category M2 or M3 vehicles with regard to their general construction.

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

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

1. GENERAL
 - 1.1. Make (trade name of manufacturer):
 - 1.2. Type:
 - 1.3. Means of identification of type, if marked on the vehicle (b):
 - 1.3.1. Bodywork/complete vehicle:
 - 1.3.2. Location of that marking:
 - 1.3.3. Bodywork/complete vehicle:
 - 1.4. In the case of components and separate technical units, location and method of affixing of the ECE type-approval mark.
 - 1.5. Address(es) of assembly plant(s):
2. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
 - 2.1. Photographs and/or drawings of a representative vehicle:
 - 2.2. Dimensional drawing of the whole vehicle:
 - 2.3. Number of axles and wheels:
 - 2.4. Chassis (if any) (overall drawing):
 - 2.5. Material used for the side-members (d):

- 2.6. Position and arrangement of the engine:
- 2.7. Driving cab (forward control or bonneted) (z):
- 2.8. Hand of drive:
3. MASSES AND DIMENSIONS (e) (in kg and mm) (refer to drawing where applicable)
 - 3.1. Wheel base(s) (fully loaded) (f):
 - 3.2. Range of vehicle dimensions (overall)
 - 3.2.1. For bodywork approved without chassis:
 - 3.2.1.1. Length (j):
 - 3.2.1.2. Width (k):
 - 3.2.1.3. Height (in running order) (l) (for suspensions adjustable for height, indicate normal running position):
4. BODYWORK
 - 4.1. Type of bodywork: single deck / double deck / articulated / low floor 1/
 - 4.2. Materials used and methods of construction:
5. SPECIAL PROVISIONS FOR VEHICLES USED FOR THE CARRIAGE OF PASSENGERS COMPRISING MORE THAN EIGHT SEATS IN ADDITION TO THE DRIVER'S SEAT
 - 5.1. Class of vehicle (Class I, Class II, Class III, Class A, Class B):
 - 5.1.1. Chassis types where the type-approved body can be installed (manufacturer(s) and vehicle(s) types):
 - 5.2. Area for passengers (m²):
 - 5.2.1. Total (S₀):
 - 5.2.1.1. Upper deck (S_{0a}): 1/
 - 5.2.1.2. Lower deck (S_{0b}): 1/
 - 5.2.2. For standing passengers (S₁):
 - 5.3. Number of passengers (seated and standing):
 - 5.3.1. Total (N):
 - 5.3.2. Upper deck (N_a): 1/
 - 5.3.3. Lower deck (N_b): 1/

- 5.4. Number of passenger seats:
 - 5.4.1. Total (A):
 - 5.4.2. Upper deck (A_a): 1/
 - 5.4.3. Lower deck (A_b): 1/
- 5.5. Number of service doors:
- 5.6. Number of emergency exits (doors, windows, escape hatches, intercommunication staircase and half staircase):
 - 5.6.1. Total:
 - 5.6.2. Upper deck: 1/
 - 5.6.3. Lower deck: 1/
- 5.7. Volume of baggage compartments (m^3):
- 5.8. Area for baggage transportation on the roof (m^2):
- 5.9. Technical devices facilitating the access to vehicles (e.g. ramp, lifting platform, kneeling system), if fitted:
- 5.10. STRENGTH OF SUPERSTRUCTURE:
 - 5.10.1. Regulation No. 66 type-approval number, if available:
 - 5.10.2. For superstructures not yet approved:
 - 5.10.2.1. Detailed description of the superstructure of the vehicle type including its dimensions, configuration and constituent materials and its attachment to any chassis frame:
 - 5.10.2.2. Drawings of the vehicle and those parts of its interior arrangement which have an influence on the strength of the superstructure or on the residual space:
 - 5.10.2.3. Position of centre of gravity of the vehicle in running order in the longitudinal, transverse and vertical directions:
 - 5.10.2.4. Maximum distance between the centre lines of the outboard passenger seats.
- 5.11. Points of this Regulation to be accomplished and demonstrated for this separate technical unit:

Explanatory notes: See Appendix 1

ANNEX 1

ECE TYPE-APPROVAL DOCUMENTATION

Part 1Model Information documentsAppendix 3

MODEL INFORMATION DOCUMENT

Pursuant to Regulation No. 107 relating to type-approval of a M2 or M3 vehicle where the bodywork has previously obtained the type-approval as a separate technical unit, with respect to its general construction

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

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

1. GENERAL
 - 1.1. Make (trade name of manufacturer):
 - 1.2. Type:
 - 1.2.1. Chassis:
 - 1.2.2. Bodywork/complete vehicle:
 - 1.3. Means of identification of type, if marked on the vehicle (b):
 - 1.3.1. Chassis:
 - 1.3.2. Bodywork/complete vehicle:
 - 1.3.3. Location of marking:
 - 1.3.3.1. Chassis:
 - 1.3.3.2. Bodywork/complete vehicle:
 - 1.4. Category of vehicle (c):
 - 1.5. Name and address of manufacturer:
 - 1.6. Address(es) of assembly plant(s):
2. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

- 2.1. Photographs and/or drawings of a representative vehicle:
- 2.2. Dimensional drawing of the whole vehicle:
- 2.3. Number of axles and wheels:
 - 2.3.1. Number and position of axles with double wheels.
- 2.4. Chassis (if any) (overall drawing):
- 2.5. Material used for the side members (d):
- 2.6. Position and arrangement of the engine:
- 2.7. Hand of drive:
 - 2.7.1. Vehicle is equipped to be driven in right/left 1/ hand traffic.
3. Masses and Dimensions (e) (in kg and mm)
(Refer to drawing where applicable)
 - 3.1. Wheel base(s) (fully loaded) (f):
 - 3.2. Range of vehicle dimensions (overall)
 - 3.2.1. For chassis with bodywork
 - 3.2.1.1. Length (j):
 - 3.2.1.2. Width (k):
 - 3.2.1.2.1. Maximum width:
 - 3.2.1.3. Height (in running order) (l) (for suspensions adjustable for height, indicate normal running position):
 - 3.3. Mass of the vehicle with bodywork and, in the case of a towing vehicle of a category other than M1, with coupling device, if fitted by the manufacturer, in running order, or the mass of the chassis or chassis with cab, without bodywork and/or coupling device if the manufacturer does not fit the bodywork and/or coupling device (including liquids, tools, spare wheel and driver, and, for buses and coaches, a crew member if there is a crew seat in the vehicle): (o) (maximum and minimum for each variant).
 - 3.3.1. Distribution of this mass among the axles and, in the case of a semi-trailer or centre axle trailer, load on the coupling point (maximum and minimum for each variant):
 - 3.4. Technically permissible maximum laden mass stated by the manufacturer (y) (maximum and minimum):
 - 3.4.1. Distribution of this mass among the axles and, in the case of a semi-trailer or centre-axle trailer, load on the coupling point (maximum and minimum):

-
- 3.5. Technically permissible maximum mass/load on each axle:
 - 4. Strength of superstructure:
 - 4.1. Regulation No. 66 type-approval number, if available:
 - 4.2. For superstructures not yet approved:
 - 4.2.1. Detailed description of the superstructure of the vehicle type including its dimensions, configuration and constituent materials and its attachment to any chassis frame:
 - 4.2.2. Drawings of the vehicle and those parts of its interior arrangement which have an influence on the strength of the superstructure or on the residual space:
 - 4.3. Position of centre of gravity of the vehicle in running order in the longitudinal, transverse and vertical directions:
 - 4.4. Maximum distance between the centre lines of the outboard passenger seats.
-

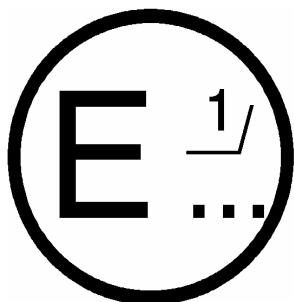
Explanatory notes: See Appendix 1

Annex 1, part 2, appendix 1COMMUNICATION
(maximum format: A4 (210 mm x 297 mm))

issued by: Name of administration

.....

.....



Communication concerning the

- type-approval 2/
- extension of type-approval 2/
- refusal of type-approval 2/
- withdrawal of type-approval 2/

of a type of a vehicle/component/separate technical unit 2/ with regard to Regulation No. 107

Approval number:

Reason for extension:

SECTION I

1. Make (trade name of manufacturer):
2. Type:
3. Means of identification of type if marked on the vehicle/ component/ separate technical unit 2/ 3/
- 3.1. Location of that marking:
4. Category of vehicle 2/ 4/
5. Name and address of manufacturer:
6. In the case of components and separate technical units, location and method of affixing of the type-approval mark:
7. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable): see addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see addendum
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

Addendum to type-approval certificate No.
concerning the type-approval of a vehicle with regard to Regulation No. 107.

1. Additional information
 - 1.1. Category of vehicle (M₂, M₃): 2/
 - 1.2. Bodywork concept (single/double deck, articulated, low-floor 2/
 - 1.3. Technically permissible maximum mass (kg):
 - 1.4. Length (overall): . . . mm
 - 1.5. Width (overall): . . . mm
 - 1.6. Height (overall): . . . mm
 - 1.7. Number of passengers (seated and standing):
 - 1.7.1. Total (N):
 - 1.7.2. Upper deck (N_a) 2/
 - 1.7.3. Lower deck (N_b) 2/
 - 1.7.4. Number of passengers seated:
 - 1.7.4.1. Total (A):
 - 1.7.4.2. Upper deck (A_a) 2/
 - 1.7.4.3. Lower deck (A_b) 2/

- 1.8. Volume of baggage compartments (m³):
- 1.9. Area for baggage transportation on the roof (m²):
- 1.10. Technical devices facilitating access to vehicles (ramp, lifting platform, kneeling-system):
- 1.11. Position of centre of gravity of the laden vehicle in the longitudinal, transverse and vertical directions:
- 1.12. Superstructure strength
- 1.12.1. type-approval number, if required:
- 1.13. Approval granted in accordance with annex 11, paragraph 7.6.3.1. (A) / paragraph 7.6.3.1. (B) 2/
2. Remarks:
- _____

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

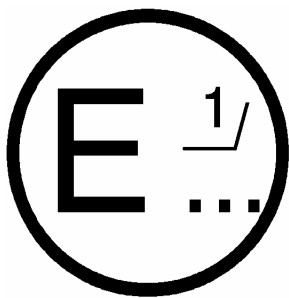
2/ Delete where not applicable.

3/ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate such characters shall be represented in the documentation by the symbol: "?" (e.g. ABC??123??).

4/ As defined in the Consolidated Resolution of Construction of Vehicles (R.E.3).

ANNEX 1Part 2Appendix 2

(maximum format: A4 (210 mm x 297 mm))

COMMUNICATION

issued by: Name of administration

.....
.....
.....

Communication concerning the

- type-approval 2/
- extension of type-approval 2/
- refusal of type-approval 2
- withdrawal of type-approval 2/

of a type of a vehicle/component/separate technical unit 2/ with regard to Regulation No. 107

Type-approval number:

Reason for extension:

SECTION I

1. Make (trade name of manufacturer):
2. Type:
3. Means of identification of type if marked on the vehicle/ component/ separate technical unit 2/ 3/
- 3.1. Location of that marking:
4. Category of vehicle 2/ 4/
5. Name and address of manufacturer:

6. In the case of components and separate technical units, location and method of fixing of the ECE approval mark:
7. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable): see addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see addendum
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

Addendum to type-approval certificate No.
concerning the type-approval of a bodywork as a separate technical unit with
regard to Regulation No. 107

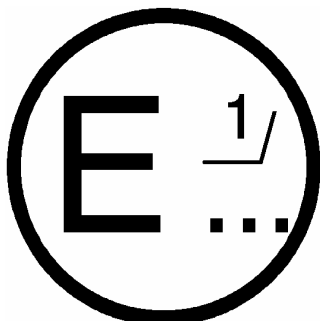
1. Additional information
 - 1.1. Category of vehicle where the body can be installed (M2, M3):
 - 1.2. Bodywork concept (single/double deck, articulated, low-floor):
 - 1.3. Chassis type(s) where the body can be installed:
 - 1.4. Number of passengers (seated and standing):
 - 1.4.1. Total (N):
 - 1.4.2. Upper deck (N_a):
 - 1.4.3. Lower deck (N_b):
 - 1.4.4. Number of passengers seated:

-
- 1.4.4.1. Total (A):
- 1.4.4.2. Upper deck (A_a): 2/
- 1.4.4.3. Lower deck (A_b): 2/
- 1.5. Volume of baggage compartments (m^3):
- 1.6. Area for baggage transportation on the roof (m^2):
- 1.7. Technical devices facilitating access to vehicles (ramp, lifting platform, kneeling-system):
- 1.8. Strength of superstructure
- 1.8.1. type-approval number, if required:
2. Remarks:
3. Points accomplished and demonstrated for this separate technical unit:
-

Annex 1, part 2, appendix 3

(maximum format: A4 (210 mm x 297 mm))

COMMUNICATION



issued by: Name of administration

.....
.....
.....

Communication concerning the

- type-approval 2/
- extension of type-approval 2/
- refusal of type-approval 2/
- withdrawal of type-approval 2/

of a type of a vehicle/component/separate technical unit 2/ with regard to Regulation No. 107

Type-approval number:

Reason for extension:

SECTION I

1. Make (trade name of manufacturer):
2. Type:
3. Means of identification of type if marked on the vehicle/ component/ separate technical unit 2/ 3/
 - 3.1. Location of that marking:
4. Category of vehicle 2/ 4/
5. Name and address of manufacturer:

6. In the case of components and separate technical units, location and method of fixing of the approval mark:
7. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable): See Addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): See Addendum
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

Addendum to type-approval certificate No.
concerning the type-approval for a vehicle type fitted with a bodywork
already approved as a separate technical unit with regard to Regulation No. 107.

1. Additional information
 - 1.1. Category of vehicle (M₂, M₃): 2/
 - 1.2. Technically permissible maximum mass (kg):
 - 1.3. Position of centre of gravity of the laden vehicle in the longitudinal, transverse and vertical directions:
 - 1.4. Superstructure strength
 - 1.4.1. type-approval number, if required:
 - 1.5. Approval granted in accordance with annex 11, paragraph. 7.6.3.1 (A) / paragraph 7.6.3.1. (B) 2/
 2. Remarks:
-

-
- 1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provision in the Regulation.)
 - 2/ Delete where not applicable.
 - 3/ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this type-approval certificate such characters shall be represented in the documentation by the symbol: "?" (e.g. ABC??123??).
 - 4/ As defined Consolidated Resolution R.E.3

Annex 2

ARRANGEMENTS OF APPROVAL MARKS

Model A

(See paragraph 4.4. of this Regulation)

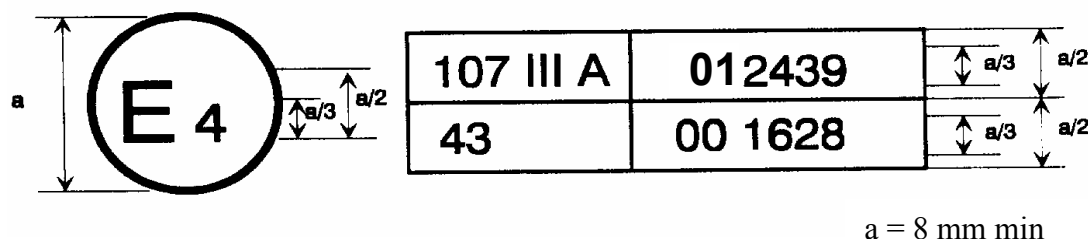


The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to its constructional features, been approved in the Netherlands (E 4) for Class III, pursuant to Regulation No. 107 under approval number 012439. The approval number indicates that the approval was granted according to the requirements of Regulation No. 107 as amended by the 01 series of amendments.

Model B

(See paragraph 4.5. of this Regulation)

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been



approved in the Netherlands (E 4) pursuant to Regulations Nos. 107 and 43.* The first two digits of the approval numbers indicate that, at the dates when the respective approvals were given, Regulation No. 107 included the 01 series of amendments and Regulation No. 43 was in its original form.

*/ This number is given merely as an example.

Model C

(See paragraph 4.4.3. of this Regulation)

The above approval mark affixed to a vehicle bodywork shows that the bodywork type



a = 8 mm min

concerned has, with regard to its constructional features, been approved separately in the Netherlands (E 4) for Class III as a separate bodywork (letter S), pursuant to Regulation No. 107 under approval number 012439. The approval number indicates that the approval was granted according to the requirements of Regulation No. 107 as amended by the 01 series of amendments.

ANNEX 3

REQUIREMENTS TO BE MET BY ALL VEHICLES

1.-6. (reserved)

7. REQUIREMENTS

7.1 General

7.1.1. Unless otherwise stated, all measurements shall be made when the vehicle is at its mass in running order and it is standing on a smooth and horizontal ground surface and in the normal condition for travel. If a kneeling system is fitted, it shall be set so the vehicle is at its normal ride height for travel. In the case of approval of bodywork as a separate technical unit the position of the body relative to the flat horizontal surface shall be specified by the manufacturer.

7.1.2. Wherever there is a requirement in this Regulation for a surface in the vehicle to be horizontal or at a specific angle when the vehicle is at its mass in running order, in the case of a vehicle with mechanical suspension, the surface may exceed this slope or possess a slope when the vehicle is at its mass in running order, provided that this requirement is met when the vehicle is in the loading condition declared by the manufacturer. If a kneeling system is fitted to the vehicle, it shall not be in operation.

7.2. Masses and dimensions

7.2.1. The vehicles shall comply with the requirements of annex 11.

7.2.2. Area available for passengers.

7.2.2.1. The total surface area S_0 available for passengers is calculated by deducting from the total area of the floor of the vehicle:

7.2.2.1.1. the area of the driver's compartment;

7.2.2.1.2. the area of steps at doors and the area of any other step with a depth of less than 300 mm and the area swept by the door and its mechanism when it is operated;

7.2.2.1.3. the area of any part over which the vertical clearance is less than 1350 mm measured from the floor disregarding permitted intrusion specified in paragraphs 7.7.8.6.3. and 7.7.8.6.4. In the case of vehicles of Class A or B, this dimension may be reduced to 1200 mm;

7.2.2.1.4. the area of any part of the vehicle to which access by passengers is prevented as defined in paragraph 7.9.4.;

- 7.2.2.1.5. the area of any space reserved solely for the carriage of goods or baggage and from which passengers are excluded.
- 7.2.2.1.6. the area required to provide a clear working area at serveries;
- 7.2.2.1.7. the floor area occupied by any staircase, half staircase, intercommunication staircase or the surface of any step.
- 7.2.2.2. The surface area S_1 available for standing passengers is calculated by deducting from S_0 :
- 7.2.2.2.1. the area of all parts of the floor in which the slope exceeds the maximum permissible values as determined in paragraph 7.7.6.;
- 7.2.2.2.2. the area of all parts which are not accessible to a standing passenger when all the seats are occupied, with the exception of folding seats;
- 7.2.2.2.3. the area of all parts where the clear height above the floor is less than the gangway height specified in paragraph 7.7.5.1. (handholds shall not be taken into account in this connection);
- 7.2.2.2.4. the area forward of a transverse vertical plane passing through the centre of the seating surface of the driver's seat (in its rearmost position).
- 7.2.2.2.5. the area 300 mm in front of all seats other than folding seats, except where a sideways-facing seat is situated above the wheel arch, in which case this dimension may be reduced to 225 mm. In the case of variable seating arrangements, of any seat when considered to be in use, see paragraph 7.2.2.4.
- 7.2.2.2.6. any surface not being excluded by the provisions in paragraphs 7.2.2.2.1. to 7.2.2.2.5. above, on which it is not possible to place a rectangle of 400 mm x 300 mm;
- 7.2.2.2.7. in vehicles of Class II, the area in which standing is not allowed.
- 7.2.2.2.8. in double deck vehicles, any area of the upper deck.
- 7.2.2.2.9. the surface of the wheelchair space(s) when considered occupied by a wheelchair user(s), see paragraph 7.2.2.4.
- 7.2.2.3. There shall be on the vehicle a number (P) of seating places, other than folding seats, which conform to the requirements of paragraph 7.7.8. If the vehicle is of Class I, II or A the number of seating places on each deck shall be at least equal to the number of square metres of floor on that deck available for passengers and crew (if any) rounded down to the nearest whole number; this number may, in vehicles of Class I, excluding the upper deck, be reduced by 10 per cent.
- 7.2.2.4. In the case of a vehicle equipped with a variable seating capacity the area available for standing passengers (S_1) and the provisions of paragraph 7.2.3. shall be determined for each of the following conditions as applicable;

- 7.2.2.4.1. with all possible seats occupied followed by the remaining area for standing passengers and, if space remains, any wheelchair spaces occupied;
- 7.2.2.4.2. with all possible standing areas occupied followed by the remaining seats available for seated passengers and, if space remains, any wheelchair spaces occupied;
- 7.2.2.4.3. with all possible wheelchair spaces occupied followed by the remaining area for standing passengers and then the remaining seats available for use occupied.
- 7.2.3. Marking of vehicles.
- 7.2.3.1. The vehicle shall be clearly marked in a manner visible on the inside in the vicinity of the front door in letters or pictograms not less than 15 mm high and numbers not less than 25 mm high, with:
 - 7.2.3.1.1. the maximum number of seating places the vehicle is designed to carry;
 - 7.2.3.1.2. the maximum number of standing places, if any, the vehicle is designed to carry;
 - 7.2.3.1.3. the maximum number of wheelchairs which the vehicle is designed to carry, if any.
- 7.2.3.2. If a vehicle is designed to have a variable number of seating places, area available for standing passengers or number of wheelchairs carried, the requirements of paragraph 7.2.3.1. shall apply to each maximum seating capacity and the corresponding number of wheelchairs and standing passengers as appropriate.
- 7.2.3.3. Space shall be provided in the driver's area, in a position clearly visible to the driver, in letters or pictograms not less than 10 mm high and numbers not less than 12 mm high, with:
 - 7.2.3.3.1. the mass of baggage which may be carried when the vehicle is loaded with the maximum numbers of passengers and crew and the vehicle is not exceeding the technically permissible maximum mass, or the permissible mass of any axle. This shall include the mass of baggage:
 - 7.2.3.3.1.1. in baggage compartments (mass B, paragraph 7.4.3.3.1. of annex 11);
 - 7.2.3.3.1.2. on the roof if equipped for the carriage of baggage (mass BX, paragraph 7.4.3.3.1. of annex 11).
- 7.3. Strength of the superstructure.
- 7.3.1. All single-deck Class II and III vehicles shall have superstructures which comply with the requirements of annex 5.
- 7.4. Stability Test

- 7.4.1. The stability of a vehicle shall be such that the point at which overturning occurs would not be passed if the surface on which the vehicle stands were tilted to both sides in turn to an angle of 28 degrees from the horizontal.
- 7.4.2. For the purposes of the above test, the vehicle shall be at its mass in running order as described in paragraph 2.18. of this Regulation, with the addition of:
- 7.4.2.1. Loads equal to Q (as defined in paragraph 7.4.3.3.1. of annex 11) shall be placed on each passenger seat. If the vehicle is intended for standees or with a crew member who is not seated, the centre of gravity of the loads Q or 75kg representing them, shall be uniformly distributed over the standee or crew area respectively, at a height of 875 mm. Where a vehicle is equipped to carry luggage on the roof, a uniformly distributed mass (BX) of not less than that declared by the manufacturer in accordance with paragraph 7.4.3.3.1. of annex 11, representing such baggage shall be secured to the roof. The other baggage compartments shall not contain any baggage.
- 7.4.2.2. If the vehicle has a variable seating capacity, standing capacity or is designed to carry one or more wheelchairs, in respect of any area of the passenger compartment in which such variations occur, the loads in paragraph 7.4.2.1. shall be the greater of:
- a) the mass represented by the number of seated passengers that may occupy the area including the mass of any demountable seats; or
 - b) the mass represented by the number of standing passengers that may occupy the area; or
 - c) the mass of wheelchairs and users that may occupy the area at a total mass of 250 kg each placed at a height of 500 mm above the floor in the centre of each wheelchair space; or
 - d) the mass of seated passengers, standing passengers and wheelchairs users and any combination of these that may occupy the area.
- 7.4.3. The height of any step used to prevent a wheel of the vehicle from slipping sideways on a tilt test rig shall not be greater than two-thirds of the distance between the surface upon which the vehicle stands before it is tilted and that part of the rim of that wheel which is nearest to the surface when the vehicle is loaded in accordance with paragraph 7.4.2.
- 7.4.4. During the test, no parts of vehicle which are not intended to come into contact in normal use shall not do so, nor shall any part become damaged or deranged.
- 7.4.5. Alternatively, a calculation method can be used to show that the vehicle will not overturn under the conditions described in paragraphs 7.4.1. and 7.4.2. Such a calculation shall take into account the following parameters:
- 7.4.5.1. masses and dimensions;
- 7.4.5.2. height of centre of gravity;

- 7.4.5.3. spring rates;
- 7.4.5.4. vertical and horizontal tyre rates;
- 7.4.5.5. characteristics of the control of air pressure in the air springs;
- 7.4.5.6. position of the centre of moments;
- 7.4.5.7. torsion resistance of the body.

The method of calculation is described in appendix 1 to this annex.

7.5. Protection against fire risks

7.5.1. Engine compartment

- 7.5.1.1. No flammable sound-proofing material or material liable to become impregnated with fuel, lubricant or other combustible material shall be used in the engine compartment unless the material is covered by an impermeable sheet.
- 7.5.1.2. Precautions shall be taken, either by a suitable layout of the engine compartment or by the provision of drainage orifices, to avoid, so far as possible, the accumulation of fuel, lubricating oil or any other combustible material in any part of the engine compartment.
- 7.5.1.3. A partition of heat-resisting material shall be fitted between the engine compartment or any other source of heat (such as a device designed to absorb the energy liberated when a vehicle is descending a long gradient, e.g. a retarder, or a device for heating the interior of the body other, however, than a device functioning by warm water circulation) and the rest of the vehicle. All fixings, clips, gaskets, etc., used in conjunction with the partition shall be fire resistant.
- 7.5.1.4. A heating device operating other than by hot water may be provided in the passenger compartment if it is encased in material designed to resist the temperatures generated by the device, emits no toxic fumes and is positioned such that no passenger is likely to come into contact with any hot surface.

7.5.2. Electrical equipment and wiring

- 7.5.2.1. All cables shall be well insulated and all cables and electrical equipment shall be able to withstand the temperature and humidity conditions to which they are exposed. In the engine compartment, particular attention shall be paid to their suitability to withstand the environmental temperature and the effects of all likely contaminants.
- 7.5.2.2. No cable used in an electrical circuit shall carry a current in excess of that acceptable for such a cable in the light of its mode of installation and the maximum ambient temperature.
- 7.5.2.3. Every electrical circuit feeding an item of equipment other than the starter, the ignition circuit (positive ignition), the glow-plugs, the engine-stopping device,

the charging circuit and the battery earth connection shall include a fuse or a circuit breaker. They may, however, be protected by a common fuse or a common circuit-breaker, provided that its rated capacity does not exceed 16A.

7.5.2.4. All cables shall be well protected and shall be held securely in position in such a way that they cannot be damaged by cutting, abrasion or chafing.

7.5.2.5. Where the voltage exceeds 100 Volts RMS (root mean square) in one or more electrical circuits in a vehicle, a manually-operated isolating switch which is capable of disconnecting all such circuits from the main electrical supply shall be connected in each pole of that supply which is not electrically connected to earth, and shall be located inside the vehicle in a position readily accessible to the driver, provided that no such isolating switch shall be capable of disconnecting any electrical circuit supplying the mandatory external vehicle lights. This paragraph does not apply to high tension ignition circuits nor to self-contained circuits within a unit of equipment in the vehicle.

7.5.2.6. All electrical cables shall be so located that no part can make contact with any fuel line or any part of the exhaust system, or be subjected to excessive heat, unless suitable special insulation and protection is provided, as for example to a solenoid-operated exhaust valve.

7.5.3. Batteries

7.5.3.1. All batteries shall be well secured and easily accessible.

7.5.3.2. The battery compartment shall be separated from the passenger compartment and driver's compartment and ventilated to outside air.

7.5.3.3. The battery terminals shall be protected against the risk of short circuit.

7.5.4. Fire extinguishers and first-aid equipment

7.5.4.1. Space shall be provided for the fitting of one or more fire extinguishers, one being near the driver's seat. In vehicles of Class A or B the space shall be not less than 8 dm³ and in Class I, II or III not less than 15 dm³.

7.5.4.2. Space shall be provided for the fitting of one or more first-aid kits. The space provided shall be not less than 7 dm³, the minimum dimension shall not be less than 80 mm.

7.5.4.3. Fire extinguishers and first aid kits may be secured against theft or vandalism (e.g. in an internal locker or behind breakable glass), provided that the locations of these items are clearly marked and means are provided for persons to extract them easily in an emergency.

7.5.5. Materials

No flammable material shall be permitted within 100 mm of the exhaust system or any other significant source of heat unless the material is effectively shielded. Where necessary, shielding shall be provided to prevent grease or

other flammable materials coming into contact with exhaust system or other significant heat sources. For the purposes of this paragraph, a flammable material is considered to be one which is not designed to withstand the temperatures likely to be encountered in that location.

7.6. Exits

7.6.1. Number of exits

7.6.1.1. The minimum number of doors in a vehicle shall be two, either two service doors or one service door and one emergency door. The minimum number of service doors required is as follows:

Number of passengers	Number of service doors		
	CLASS I & A	CLASS II	CLASS III & B
9 - 45	1	1	1
46 - 70	2	1	1
71 - 100	3	2	1
> 100	4	3	1

7.6.1.2. The minimum number of service doors in each rigid section of an articulated vehicle shall be one except that this minimum number shall be two in the case of front section of an articulated vehicle of Class I.

7.6.1.3. For the purpose of this requirement, service doors equipped with a power-operated control system shall not be deemed to be emergency doors unless they can be readily opened by hand, once the control prescribed in paragraph 7.6.5.1. has been actuated, if necessary.

7.6.1.4. The minimum number of exits shall be such that the total number of exits in a separate compartment is as follows:

Number of passengers and crew to be accommodated in each compartment	Minimum total number of exits
1 - 8	2
9 - 16	3
17 - 30	4
31 - 45	5

Number of passengers and crew to be accommodated in each compartment	Minimum total number of exits
46 - 60	6
61 - 75	7
76 - 90	8
91 - 110	9
111 - 130	10
>130	11

Escape hatches can only count as one of the above-mentioned number of emergency exits.

- 7.6.1.5. Each rigid section of an articulated vehicle shall be treated as a separate vehicle for the purpose of determining the minimum number and the position of exits, except for paragraph 7.6.2.4. Toilet compartments or galleys are not considered to be separate compartments for the purposes of defining the number of emergency exits. A number of passengers shall be determined for each rigid section.
- 7.6.1.6. A double service door shall count as two doors and a double or multiple window as two emergency windows.
- 7.6.1.7. If the driver's compartment does not provide access to the passenger compartment by means of a passageway complying with one of the conditions described in paragraph 7.7.5.1.1., the following conditions shall be met:
- 7.6.1.7.1. The driver's compartment shall have two exits, which shall not both be in the same lateral wall; when one of the exits is a window, it shall comply with the requirements set out in paragraphs 7.6.3.1. and 7.6.8. for emergency windows.
- 7.6.1.7.2. One or two seats are permitted alongside the driver for additional people, in which case both of the exits referred to in paragraph 7.6.1.7.1. shall be doors. The driver's door shall be accepted as the emergency door for the occupants of those seats, provided that the driver's seat, the steering wheel, the engine housing, the gear lever, the hand brake control, etc., do not constitute too great an obstruction. The door provided for those additional people shall be accepted as the emergency door for the driver. Up to five additional seats may be fitted in a compartment incorporating the driver's compartment, provided that the additional seats and the space for these seats comply with all requirements of this Regulation and at least one door giving access to the passenger compartment complies with the requirements of paragraph 7.6.3. for emergency doors.

- 7.6.1.7.3. In the circumstances described in paragraphs 7.6.1.7.1. and 7.6.1.7.2., the exits provided for the driver's compartment shall not count as one of the doors required by paragraphs 7.6.1.1. to 7.6.1.2., nor as one of the exits required by paragraph 7.6.1.4., except in the case mentioned in paragraphs 7.6.1.7.1. and 7.6.1.7.2. Paragraphs from 7.6.3. to 7.6.7., 7.7.1., 7.7.2. and 7.7.7. shall not apply to such exits.
- 7.6.1.8. If the driver's compartment and seats adjacent to it are accessible from the main passenger compartment by means of a passageway complying with one of the conditions described in paragraph 7.7.5.1.1., no external exit is required from the driver's compartment.
- 7.6.1.9. If a driver's door or other exit from the compartment is provided in the circumstances described in paragraph 7.6.1.8. it may only count as an exit for passengers provided:
- 7.6.1.9.1. it is not necessary to squeeze between the steering wheel and the driver's seat in order to make use of that exit;
- 7.6.1.9.2. it satisfies the requirements relating to the dimensions of emergency door indicated in paragraph 7.6.3.1.
- 7.6.1.10. Paragraphs 7.6.1.8. and 7.6.1.9. do not preclude there being a door or other barrier between the driver's seat and the passenger compartment provided that this barrier can be released quickly by the driver in an emergency. A driver's door in a compartment protected by such a barrier shall not be counted as an exit for passengers.
- 7.6.1.11. Escape hatches, additional to the emergency doors and windows, shall be fitted in vehicles of Class II, III and B. They may also be fitted in the case of Class I and A vehicles. The minimum number of hatches shall be:

Number of passengers	Number of hatches
not exceeding 50	1
exceeding 50	2

7.6.2. Siting of exits

Vehicles having a capacity exceeding 22 passenger seats shall meet the requirements shown below. Vehicles having a capacity not exceeding 22 passengers may meet either the requirements shown below or those contained in annex 7, paragraph 1.2.

- 7.6.2.1. The service door(s) shall be situated on the side of the vehicle that is nearer to the side of the road corresponding to the direction of traffic in the country in

which the vehicle is to be licensed for operation and at least one of them shall be in the forward half of the vehicle. This does not preclude the provision of a door in the rear face of a vehicle for use by wheelchair passengers.

7.6.2.2. Two of the doors referred to in paragraph 7.6.1.1. shall be separated such that the distance between transverse vertical planes through their centres of area is not less than 40 percent of the overall length of the passenger compartment. If one of these two doors forms part of a double door this distance shall be measured between the two doors which are furthest apart.

7.6.2.3. The exits shall be placed in such a way that their number on each of the two sides of the vehicle is substantially the same.

7.6.2.4. At least one emergency exit shall be situated either in the rear face or in the front face of the vehicle respectively. For Class I vehicles and for vehicles with a rear part permanently closed off from the passenger compartment, this provision is fulfilled if an escape hatch is fitted.

7.6.2.5. The exits on the same side of the vehicle shall be suitably spaced out along the length of the vehicle.

7.6.2.6. A door shall, provided that it is not a service door, be permitted in the rear face of the vehicle.

7.6.2.7. If escape hatches are fitted, they shall be positioned as follows: if there is only one hatch, it shall be situated in the middle third of the vehicle; if there are two hatches, they shall be separated by a distance of at least 2 m measured between the nearest edges of the apertures in a line parallel to the longitudinal axis of the vehicle.

7.6.3. Minimum dimensions of exits

7.6.3.1. The several kinds of exit shall have the following minimum dimensions:

			Class I	Class II and III	Remarks
Service door	Door Aperture	Height (mm)	1800	1650	-
		Width (mm)	single door: 650 double door: 1200		This dimension may be reduced by 100 mm when the measurement is made at the level of the handholds.
Emergency		Height (mm)	1250		-
Door		Width (mm)	550		
Emergency window	Area: (mm ²)		400 000		It shall be possible to inscribe in this area a rectangle 500 mm x 700 mm.
Emergency window situated in the rear face of the vehicle, if the manufacturer does not provide an emergency window of the minimum dimensions prescribed above.			It shall be possible to inscribe in the emergency window aperture a rectangle 350 mm high and 1550 mm wide. The corners of the rectangle may be rounded to a radius of curvature not exceeding 250 mm.		
Escape Hatch	Hatch Aperture	Area (mm ²)	400 000		It shall be possible to inscribe in this area a rectangle measuring 500 mm x 700 mm.

7.6.3.2. Vehicles having a capacity not exceeding 22 passengers may meet either the requirements shown in paragraph 7.6.3.1. or those contained in annex 7, paragraph 1.1.

7.6.4. Technical requirements for all service doors

7.6.4.1. Every service door shall be capable of being easily opened from inside and from outside the vehicle when the vehicle is stationary (but not necessarily when the vehicle is moving). However, this requirement shall not be construed as precluding the possibility of locking the door from the outside, provided that the door can always be opened from the inside.

7.6.4.2. Every control or device for opening a door from the outside shall be between 1000 mm and 1500 mm from the ground and not more than 500 mm from the door. In vehicles of Class I, II and III every control or device for opening a door from the inside shall be between 1000 mm and 1500 mm from the upper surface of the floor or step nearest the control and be not more than 500 mm from the door. This shall not apply to controls located within the driver's area.

- 7.6.4.3. Every one-piece manually-operated service door which is hinged or pivoted shall be so hinged or pivoted that if the open door comes into contact with a stationary object while the vehicle is moving forwards it tends to close.
- 7.6.4.4. If a manually-operated service door is fitted with a slam lock it shall be of the two-stage type.
- 7.6.4.5. On the inside of a service door there shall not be any device intended to cover the inside steps when the door is closed. This does not exclude the presence in the step well, when the door is closed, of the door operating mechanism and other equipment attached to the inside of the door which does not form an extension of the floor on which passengers may stand. This mechanism and equipment should not be dangerous for the passengers.
- 7.6.4.6. If the direct view is not adequate, optical or other devices shall be installed to enable the driver to detect from his seat the presence of a passenger in the immediate interior and exterior vicinity of every side service door which is not an automatically-operated service door.
- In the case of a service door in the rear face of the vehicle not exceeding 22 passengers, this requirement is satisfied if the driver is able to detect the presence of a person 1.3m tall standing 1m behind the vehicle.
- 7.6.4.7. Every door which opens towards the interior of the vehicle and its mechanism shall be so constructed that its movement is not likely to cause injury to passengers in normal conditions of use. Where necessary, appropriate protection devices shall be fitted.
- 7.6.4.8. If a service door is located adjacent to a door to a toilet or other internal compartment the service door shall be proofed against unintentional operation. However, this requirement shall not apply if the door is locked automatically when the vehicle is moving at a speed exceeding 5 km/h.
- 7.6.4.9. In the case of vehicles having a capacity not exceeding 22 passengers, the service doors of which are in the rear face of the vehicle, the leaves shall not be capable of being opened more than 115° nor less than 85° and, when open, shall be capable of being held automatically in that position. This does not preclude the ability to override that stop and open the door beyond that angle when it is safe to do so; for example, to enable reversing against a high platform for loading or to open the doors through 270° to allow a clear loading area behind the vehicle.
- 7.6.5. Additional technical requirements for power-operated service doors
- 7.6.5.1. In the event of an emergency every power-operated service door shall be capable, when the vehicle is stationary (but not necessarily when the vehicle is moving), of being opened from inside and, when not locked, from outside by controls which, whether or not the power supply is operating:
- 7.6.5.1.1. override all other door controls;

- 7.6.5.1.2. in the case of interior controls, are placed on, or within 300 mm of, the door, at a height of not less than 1600 mm above the first step;
- 7.6.5.1.3. can be easily seen and clearly identified when approaching the door and when standing in front of the door and, if additional to the normal opening controls, be clearly marked for emergency use;
- 7.6.5.1.4. can be operated by one person when standing immediately in front of the door;
- 7.6.5.1.5. cause the door to open, or enable the door to be easily opened by hand;
- 7.6.5.1.6. may be protected by a device which can be easily removed or broken to gain access to the emergency control; the operation of the emergency control, or the removal of a protective cover over the control, shall be indicated to the driver both audibly and visually, and
- 7.6.5.1.7. in the case of a driver-operated door which does not comply with the requirements of paragraph 7.6.5.6.2., it shall be such that after they have been operated to open the door and returned to their normal position, the door will not close again until the driver subsequently operates a closing control.
- 7.6.5.2. A device may be provided which is operated by the driver from the driving seat to deactivate the outside emergency controls in order to lock the service doors from outside. In this case, the outside emergency controls shall be reactivated automatically either by the starting of the engine or before the vehicle reaches a speed of 20km/h. Subsequently, deactivation of the outside emergency controls shall not occur automatically, but shall require a further action by the driver.
- 7.6.5.3. Every driver-operated service door shall be capable of operation by the driver when in the driving seat using controls which, except in the case of a foot control, are clearly and distinctively marked.
- 7.6.5.4. Every power-operated service door shall activate a visual tell-tale, which shall be plainly visible to the driver when seated in the normal driving position in any ambient lighting condition, to warn that a door is not fully closed. This tell-tale shall signal whenever the rigid structure of the door is between the fully open position and a point 30 mm from the fully closed position. One tell-tale may serve for one or more doors. However, no such tell-tale shall be fitted in respect of a front service door which does not comply with the requirements of paragraphs 7.6.5.6.1.1. and 7.6.5.6.1.2.
- 7.6.5.5. Where controls are provided for the driver to open and close a power-operated service door, they shall be such that the driver is able to reverse the movement of the door at any time during the closing or opening process.
- 7.6.5.6. The construction and control system of every power-operated service door shall be such that a passenger is unlikely to be injured by the door or trapped in the door as it closes.

- 7.6.5.6.1. This requirement shall be considered satisfied if the following two requirements are met:
- 7.6.5.6.1.1. The first requirement is that when the closing of the door at any measuring point described in annex 6 is resisted by a clamping force not exceeding 150 N, the door shall reopen automatically to its fullest extent and, except in the case of an automatically-operated service door, remain open until a closing control is operated. The clamping force may be measured by any method to the satisfaction of the competent authority. Guidelines are given in annex 6 to this Regulation. The peak force may be higher than 150 N for a short time provided that it does not exceed 300 N. The reopening system may be checked by means of a test bar having a section of height 60 mm, width 30 mm with corners radiused to 5 mm.
- 7.6.5.6.1.2. The second requirement is that whenever the doors are closed onto the wrist or fingers of a passenger:
- 7.6.5.6.1.2.1. the door reopens automatically to its fullest extent and, except in the case of an automatically-operated service door, remains open until a closing control is operated, or
- 7.6.5.6.1.2.2. the wrist or fingers can be readily extracted from the doors without risk of injury to the passenger. This requirement may be checked by hand, or by means of the test bar mentioned in paragraph 7.6.5.6.1.1., tapered at one end over a length of 300 mm from a thickness of 30 mm to a thickness of 5 mm. It shall not be treated with polish nor lubricated. If the door traps the bar it shall be capable of being easily removed, or
- 7.6.5.6.1.2.3. the door is maintained at a position allowing the free passage of a test bar having a section of height 60 mm, width 20 mm, with corners radiused to 5 mm. This position shall not be more than 30 mm distant from the fully closed position.
- 7.6.5.6.2. In the case of a front service door the requirement of paragraph 7.6.5.6. shall be considered satisfied if the door:
- 7.6.5.6.2.1. fulfils the requirements of paragraphs 7.6.5.6.1.1. and 7.6.5.6.1.2., or
- 7.6.5.6.2.2. is fitted with soft edges; these shall not, however be so soft that if the doors are closed on the test bar mentioned in paragraph 7.6.5.6.1.1. the rigid structure of the doors will reach the fully closed position.
- 7.6.5.7. Where a power-operated service door is held closed only by the continued application of the power supply there shall be provided a visual warning device to inform the driver of any failure in the power supply to the doors.
- 7.6.5.8. A starting prevention device, if fitted, shall be effective only at speeds of less than 5 km/h and shall be incapable of operation above that speed.
- 7.6.5.9. If the vehicle is not fitted with a starting prevention device, an audible warning to the driver shall be activated if the vehicle is driven away from rest when any power-operated service door is not fully closed. This audible

warning shall be activated at a speed exceeding 5 km/h for doors complying with the requirements of paragraph 7.6.5.6.1.2.3.

7.6.6. Additional technical requirements for automatically-operated service doors

7.6.6.1. Activation of the opening controls.

7.6.6.1.1. Except as provided in paragraph 7.6.5.1., the opening controls of every automatically-operated service door shall be capable of being activated and deactivated only by the driver from his seat.

7.6.6.1.2. Activation and deactivation may be either direct, by means of a switch, or indirect, for example by opening and closing the front service door.

7.6.6.1.3. Activation of the opening controls by the driver shall be indicated inside and, where a door is to be opened from outside, also on the outside of the vehicle; the indicator (e.g. illuminated push-button, illuminated sign) shall be on or adjacent to the door to which it relates.

7.6.6.1.4. In the case of direct actuation by means of a switch the functional state of the system shall be clearly indicated to the driver, by, for example, the position of the switch or an indicator lamp or an illuminated switch. The switch shall be specially marked and arranged in such a way that it cannot be confused with other controls.

7.6.6.2. Opening of automatically-operated service doors.

7.6.6.2.1. After activation of the opening controls by the driver it shall be possible for passengers to open the door as follows:

7.6.6.2.1.1. from inside, for example by pressing a push-button or passing a light barrier, and

7.6.6.2.1.2. from outside, except in the case of a door intended only as an exit and marked as such, by, for example, pressing an illuminated push-button, a push-button beneath an illuminated sign, or a similar device marked with a suitable instruction.

7.6.6.2.2. The pressing of the push-buttons mentioned in paragraph 7.6.6.2.1.1., and the use of the means of communication with the driver mentioned in paragraph 7.7.9.1., may send a signal which is stored and which, after the activation of the opening controls by the driver, effects the opening of the door.

7.6.6.3. Closing of automatically-operated service doors.

7.6.6.3.1. When an automatically-operated service door has opened it shall close again automatically after a time interval has elapsed. If a passenger enters or leaves the vehicle during this time interval, a safety device (e.g. a footboard contact, light barrier, one-way gate) shall ensure that the time until the door closes is sufficiently extended.

7.6.6.3.2. If the passenger enters or leaves the vehicle while the door is closing, the closing process shall be interrupted automatically and the door shall return to

the open position. The reversal may be actuated by one of the safety devices referred to in paragraph 7.6.6.3.1. or by any other device.

7.6.6.3.3. A door that has closed automatically in accordance with paragraph 7.6.6.3.1. shall be capable of being opened again by a passenger in accordance with paragraph 7.6.6.2.; this shall not apply if the driver has deactivated the opening controls.

7.6.6.3.4. After deactivation of the opening controls of the automatically-operated service doors by the driver, open doors shall close in accordance with paragraphs 7.6.6.3.1. and 7.6.6.3.2.

7.6.6.4. Inhibition of the automatic closing process on doors marked for special service, e.g. for passengers with prams, passengers with reduced mobility, etc.

7.6.6.4.1. The driver shall be able to inhibit the automatic closing process by actuation of a special control. A passenger shall also be able to inhibit the automatic closing process directly by pressing a special push-button.

7.6.6.4.2. The inhibition of the automatic closing process shall be indicated to the driver, e.g. by a visual tell-tale.

7.6.6.4.3. Re-establishment of the automatic closing process shall in any case be capable of being done by the driver.

7.6.6.4.4. Paragraph 7.6.6.3. shall apply to the subsequent closing of the door.

7.6.7. Technical requirements for emergency doors

7.6.7.1. Emergency doors shall be capable of being easily opened from inside and from outside when the vehicle is stationary. However, this requirement shall not be construed as precluding the possibility of locking the door from the outside, provided that the door can always be opened from the inside by the use of the normal opening mechanism.

7.6.7.2. Emergency doors, during their use as such, shall not be of the power-operated type unless, once the control prescribed in paragraph 7.6.5.1. has been actuated and returned to its normal position, the doors do not close again until the driver subsequently operates a closing control. They shall also not be of the sliding type except in the case of vehicles having a capacity not exceeding 22 passengers. For these vehicles a sliding door, which has been shown to be capable of being opened without the use of tools after a frontal barrier collision test in accordance with Regulation No. 33, can be accepted as an emergency door.

7.6.7.3. Every control or device for opening an emergency door from the outside shall be between 1000 mm and 1500 mm from the ground and not more than 500 mm from the door. In vehicles of Classes I, II and III every control or device for opening an emergency door from the inside shall be between 1000 mm and 1500 mm from the upper surface of the floor or step nearest to the control and be not more than 500 mm from the door. This shall not apply to controls located within the driver's area.

- 7.6.7.4. Hinged emergency doors fitted to the side of the vehicle shall be hinged at their forward edge and shall open outwards. Check straps, chains or other restraining devices shall be permitted, provided that they do not prevent the door from opening to, and remaining open at, an angle of at least 100 degrees. If a means is provided sufficient to give free passage to the emergency door access gauge, the 100 degrees minimum angle requirement shall not apply.
- 7.6.7.5. Emergency doors shall be proofed against unintentional operation. However, this requirement shall not apply if the emergency door is locked automatically when the vehicle is moving at a speed exceeding 5 km/h.
- 7.6.7.6. All emergency doors shall be provided with an audible device to warn the driver when they are not securely closed. The warning device shall be operated by movement of the door catch or handle and not by movement of the door itself.
- 7.6.8. Technical requirements for emergency windows.
- 7.6.8.1. Every hinged or ejectable emergency window shall open outwards. Ejectable types shall not become totally detached from the vehicle when operated. The operation of ejectable windows shall be such that inadvertent ejection is effectively prevented.
- 7.6.8.2. Every emergency window shall:
- 7.6.8.2.1. either be capable of being easily and instantaneously operated from inside and from outside the vehicle by means of a device recognised as satisfactory, or
- 7.6.8.2.2. be made of readily-breakable safety glass. This latter provision precludes the possibility of using panes of laminated glass or of plastic material. A device shall be provided adjacent to each emergency window, readily available to persons inside the vehicle, to ensure that each window can be broken.
- 7.6.8.3. Every emergency window which can be locked from the outside shall be so constructed as to be capable of being opened at all times from inside the vehicle.
- 7.6.8.4. If the emergency window is of a type horizontally hinged at the top edge, an appropriate device shall be provided to hold it fully open. Every hinged emergency window shall operate so as not to obstruct clear passage from inside or outside the vehicle.
- 7.6.8.5. The height of the lower edge of an emergency window fitted in the side of the vehicle from the general level of the floor immediately below it (excluding any local variations such as the presence of a wheel or transmission housing) shall be not more than 1200 mm nor less than 650 mm in the case of a hinged emergency window, or 500 mm in the case of a window made of breakable glass.
- However, in the case of a hinged emergency window, the height of the lower edge may be reduced to a minimum of 500 mm provided that the window aperture is equipped with a guard up to a height of 650 mm to prevent the

possibility of passengers falling out of the vehicle. Where the window aperture is equipped with a guard, the size of the window aperture above the guard shall not be less than the minimum size prescribed for an emergency window.

- 7.6.8.6. Every hinged emergency window which is not clearly visible from the driver's seat shall be fitted with an audible warning device to warn the driver when it is not completely closed. The window lock, and not the movement of the window itself, shall actuate this device.

7.6.9. Technical requirements for escape hatches.

- 7.6.9.1. Every escape hatch shall operate so as not to obstruct the clear passage from inside or outside the vehicle.

- 7.6.9.2. Roof escape hatches shall be ejectable, hinged or made of readily-breakable safety glass. Floor hatches shall be either hinged or ejectable and shall be fitted with an audible warning device to warn the driver when it is not securely closed. The floor escape hatch lock, and not the movement of the hatch itself, shall actuate this device. Floor escape hatches shall be proofed against unintentional operation. However this requirement shall not apply if the floor hatch is locked automatically when the vehicle is moving at a speed exceeding 5 km/h.

- 7.6.9.3. Ejectable types shall not become totally detached from the vehicle when operated such that the hatch is not a danger to other road users. The operation of ejectable escape hatches shall be such that inadvertent operation is effectively prevented. Floor ejectable hatches shall eject only into the passenger compartment.

- 7.6.9.4. Hinged escape hatches shall hinge along the edge towards the front or rear of the vehicle and shall hinge through an angle of at least 100 degrees. Hinged floor escape hatches shall hinge into the passenger compartment.

- 7.6.9.5. Escape hatches shall be capable of being easily opened or removed from the inside and from the outside. However, this requirement shall not be construed as precluding the possibility of locking the escape hatch for the purpose of securing the vehicle when unattended, provided that the escape hatch can always be opened or removed from the inside by the use of the normal opening or removal mechanism. In the case of a readily-breakable hatch, a device shall be provided adjacent to the hatch, readily available to persons inside the vehicle, to ensure that the hatch can be broken.

7.6.10. Technical requirements for retractable steps

Retractable steps if fitted shall comply with the following requirements:

- 7.6.10.1. the operation of retractable steps may be synchronised with that of the corresponding service or emergency door;
- 7.6.10.2. when the door is closed no part of the retractable step shall project more than 10 mm beyond the adjacent line of the body work;

- 7.6.10.3. when the door is open and the retractable step is in the extended position, the surface area shall conform to the requirements of paragraph 7.7.7. of this annex;
- 7.6.10.4. in the case of a power-operated step, it shall not be possible for the vehicle to move from rest, under its own power, when the step is in the extended position. In the case of a manually operated step, an audible indication shall alert the driver when the step is not fully retracted.
- 7.6.10.5. a power-operated step shall not be capable of being extended when the vehicle is in motion. If the device to operate the step fails, the step shall retract and remain in the retracted position. However, the operation of the corresponding door shall not be hindered in the event of such a failure or by the step being damaged or obstructed.
- 7.6.10.6. when a passenger is standing on a power-operated retractable step, the corresponding door shall be incapable of being closed. Compliance with this requirement shall be checked by placing a mass of 15 kg, representing a small child, at the centre of the step. This requirement shall not apply to any door within the driver's direct field of view.
- 7.6.10.7. the movement of the retractable step shall not be liable to cause any bodily harm either to passengers or to persons waiting at bus stops;
- 7.6.10.8. the corners of retractable steps facing forwards or rearwards shall be rounded to a radius of not less than 5 mm; the edges shall be rounded to a radius of not less than 2.5 mm;
- 7.6.10.9. when the passenger door is open, the retractable step shall be securely held in the extended position. When a mass of 136 kg is placed in the centre of a single step or a mass of 272 kg is placed in the centre of a double step the deflection at any point on the step shall not exceed 10 mm.
- 7.6.11. Markings
- 7.6.11.1. Each emergency exit shall be marked, inside and outside the vehicle, by an inscription reading "Emergency exit" supplemented, where appropriate, by an international representative symbol.
- 7.6.11.2. The emergency controls of service doors and of all emergency exits shall be marked as such inside and outside the vehicle either by a representative symbol or by a clearly-worded inscription.
- 7.6.11.3. Clear instructions concerning the method of operation shall be placed on or close to every emergency control of an exit.
- 7.6.11.4. The language in which any textual markings intended to comply with paragraphs 7.6.11.1. to 7.6.11.3. are to be inscribed shall be determined by the approving authority bearing in mind the country / countries in which the applicant intends to market the vehicle in liaison if necessary with the competent authorities of the country / countries concerned. If the authority of

the country / countries where the vehicle is to be registered has the language changed, this change shall imply no new type-approval process.

7.7. Interior arrangements

7.7.1. Access to service doors (see annex 4, figure 1)

7.7.1.1. The free space extending inwards into the vehicle from the side wall in which the door is mounted shall permit the free passage of a vertical rectangular panel 20 mm thick, 400 mm wide and 700 mm in height above the floor, having a second panel 550 mm wide superimposed symmetrically above it; the height of the second panel being as prescribed for the relevant class of vehicle. The dual panel shall be maintained parallel with the door aperture as it is moved from the starting position, where the plane of the face nearest to the interior of the vehicle is tangential to the outermost edge of the aperture, to the position where it touches the first step, after which it shall be kept at right angles to the probable direction of motion of a person using the entrance.

7.7.1.2. The height of the upper rectangular panel shall be for the relevant class of vehicle and category as prescribed in the table below. As an alternative, a trapezoidal section, having a height of 500 mm, forming the transition between the width of the upper and the lower panel, may be used. In this case, the total height of the rectangular section and this trapezoidal section of the upper panel shall be 1100 mm for all classes of vehicles with a capacity exceeding 22 passengers, and 950 mm for the classes of vehicle with a capacity not exceeding 22 passengers.

Vehicle Class	Height of the upper panel (mm) (Dimension 'A' figure 1)		Total height	Width
		Alternative trapezoidal section		550 **/
Class A ₁ */	950	950	1650	
Class B ₁ */	700	950	1400	
Class I	1100	1100	1800	
Class II	950	1100	1650	
Class III	850	1100	1550	

*/ For vehicles having a capacity not exceeding 22 passengers, the lower panel may be displaced relative to the upper panel provided that it is in the same direction.

**/ The width of the upper panel may be reduced at the top to 400 mm when a chamfer not exceeding 30 degrees from the horizontal is included.

- 7.7.1.3. When the centre line of this dual panel has traversed a distance of 300 mm from its starting position and the dual panel is touching the step surface it shall be retained in that position.
- 7.7.1.4. The cylindrical figure (see annex 4, figure 6) used for testing the gangway clearance shall then be moved starting from the gangway, in the probable direction of motion of a person leaving the vehicle, until its centre line has reached the vertical plane which contains the top edge of the uppermost step, or until a plane tangential to the upper cylinder touches the dual panel, whichever occurs first, and retained in that position (see annex 4, figure 2).
- 7.7.1.5. Between the cylindrical figure, at the position set out in paragraph 7.7.1.4., and the dual panel, at the position set out in paragraph 7.7.1.3., there shall be a free space whose upper and lower limits are shown in annex 4, figure 2. This free space shall permit the free passage of a vertical panel whose form and dimensions are the same as the cylindrical form (paragraph 7.7.5.1.), central section and a thickness of no more than 20 mm. This panel shall be moved, from the cylindrical form tangential position, until its external side is in contact with the dual panel interior side, touching the plane or planes defined by the step upper edges, in the probable direction of motion of a person using the entrance (see annex 4, figure 2).
- 7.7.1.6. The free passage clearance for this figure shall not include any space extending to 300 mm in front of any uncompressed seat cushion of a forward or rearward facing seat, or 225 mm in the case of seats fitted at wheel arches, and to the height of the top of the seat cushion.
- 7.7.1.7. In the case of a folding seat, this space shall be determined with the seat in the position of use.
- 7.7.1.8. However, a folding seat for use by the crew may obstruct the access passage to a service door when in the position of use provided that:
- 7.7.1.8.1. it is clearly indicated, both in the vehicle itself and on the communication form (see annex 1), that the seat is for the use of crew only,
- 7.7.1.8.2. when the seat is not in use it folds automatically as necessary to enable the requirements of paragraphs 7.7.1.1. or 7.7.1.2. and 7.7.1.3., 7.7.1.4. and 7.7.1.5. to be met;
- 7.7.1.8.3. the door is not considered to be a mandatory exit for the purpose of paragraph 7.6.1.4.,
- 7.7.1.8.4. when the seat is in the position of use, and when it is in the folded position, no part of it shall be forward of a vertical plane passing through the centre of the seating surface of the driver's seat in its rearmost position and through the centre of the exterior rear-view mirror mounted on the opposite side of the vehicle.
- 7.7.1.9. In the case of vehicles having a capacity not exceeding 22 passengers a doorway and the route by which passengers gain access to it shall be considered unobstructed if they have:

- 7.7.1.9.1. measured parallel with the longitudinal axis of the vehicle, there is a clearance of not less than 220 mm at any point and 550 mm at any point being more than 500 mm above the floor or steps (annex 4, figure 3).
- 7.7.1.9.2. measured perpendicular to the longitudinal axis of the vehicle, there is a clearance of not less than 300 mm at any point and 550 mm at any point being more than 1200 mm above the floor or steps or less than 300 mm below the ceiling (annex 4, figure 4).
- 7.7.1.10. The service door and emergency door dimensions in paragraph 7.6.3.1. and the requirements of paragraphs 7.7.1.1. to 7.7.1.7., 7.7.2.1. to 7.7.2.3., 7.7.5.1. and 7.7.8.5. shall not apply to a vehicle of class B with a technically permissible maximum mass not exceeding 3.5 tonnes and up to 12 passenger seats in which each seat has unobstructed access to at least two doors.
- 7.7.1.11. The maximum slope of the floor in the access passage shall not exceed 5 percent when measured with the vehicle at its mass in running order standing on a horizontal surface. Any kneeling device shall not be engaged.
- 7.7.2. Access to emergency doors (see annex 4, figure 5)
- The following requirements shall not apply to driver's doors used as emergency exits in vehicles having a capacity not exceeding 22 passengers.
- 7.7.2.1. The free space between the gangway and the emergency door aperture shall permit the free passage of a vertical cylinder 300 mm in diameter and 700 mm high from the floor and supporting a second vertical cylinder 550 mm in diameter, the aggregate height of the assembly being 1400 mm.
- The diameter of the upper cylinder may be reduced at the top to 400 mm when a chamfer not exceeding 30 degrees from the horizontal is included.
- 7.7.2.2. The base of the first cylinder shall be within the projection of the second cylinder.
- 7.7.2.3. Where folding seats are installed alongside this passage, the free space for the cylinder shall be required to be determined when the seat is in the position for use.
- 7.7.2.4. As an alternative to the dual cylinder, the gauging device described in paragraph 7.7.5.1. may be used (see annex 4, figure 6).
- 7.7.3. Access to emergency windows
- 7.7.3.1. It shall be possible to move a test gauge from the gangway to the exterior of the vehicle through every emergency window.
- 7.7.3.2. The direction of motion of the test gauge shall be in the direction in which a passenger evacuating the vehicle would be expected to move. The test gauge shall be kept perpendicular to that direction of motion.
- 7.7.3.3. The test gauge shall be in the form of a thin plate having a size of 600 mm x 400 mm with corners radiused by 200 mm. However, in the case of an

emergency window in the rear face of the vehicle, the test gauge may alternatively have a size of 1400 mm x 350 mm with corners radiused by 175 mm.

7.7.4. Access to escape hatches

7.7.4.1. Escape hatches in the roof

7.7.4.1.1. Except in the case of Class I vehicles, at least one escape hatch shall be located such that a four-sided truncated pyramid having a side angle of 20 degrees and a height of 1600 mm touches part of a seat or equivalent support. The axis of the pyramid shall be vertical and its smaller section shall contact the aperture area of the escape hatch. Supports may be foldable or movable provided they can be locked in their position of use. This position shall be taken for verification.

7.7.4.1.2. When the structural thickness of the roof is more than 150 mm, the smaller section of the pyramid shall contact the aperture area of the escape hatch at the level of the outside surface of the roof.

7.7.4.2. Escape hatches in the floor.

In the case of an escape hatch fitted in the floor, the hatch shall give direct and free access to the exterior of the vehicle and be fitted where there is a clear space above the hatch equivalent to the height of the gangway. Any heat source or moving components shall be at least 500 mm from any part of the hatch aperture.

It shall be possible to move a test gauge in the form of a thin plate having dimensions 600 mm x 400 mm with corners radiused by 200 mm in a horizontal position from a height above the floor of the vehicle of 1 m to the ground.

7.7.5. Gangways (see annex 4, figure 6)

- 7.7.5.1. The gangway of a vehicle shall be so designed and constructed as to permit the free passage of a gauging device consisting of two co-axial cylinders with an inverted truncated cone interposed between them, the gauging device having the following dimensions (in mm):

	Class I	Class II	Class III	Class A	Class B
Diameter of lower cylinder 'A'	450	350	300	350	300
Height of lower cylinder	900	900	900	900	900
Diameter of upper cylinder 'C'	550	550	450	550	450
Height of upper cylinder 'B'	500 */	500 */	500 */	500 */	300
Overall height 'H'	1900 */	1900 */	1900 */	1900 */	1500

*/ The height of the upper cylinder and herewith the overall height may be reduced by 100 mm in any part of the gangway to the rear of:

- a) a transverse plane situated 1.5 m forward of the centre line of the rear axle (foremost rear axle in the case of vehicles with more than one rear axle), and
- b) a transverse vertical plane situated at the rear edge of the service door or of the rearmost service door if there are more than one service door.

The diameter of the upper cylinder may be reduced at the top to 300 mm when a chamfer not exceeding 30 degrees from the horizontal is included.

The gauging device may come into contact with strap hangers, if fitted, or other flexible objects such as seat belt components and move them away.

- 7.7.5.1.1. If there is no exit forward of a seat or row of seats:
- 7.7.5.1.1.1. In the case of forward-facing seats, the front edge of the cylindrical gauge defined in paragraph 7.7.5.1. shall reach at least until the transverse vertical plane tangential to the foremost point of the foremost front row seat back and be retained in that position. From this plane, it must be possible to move the panel shown in annex 4, figure 7, in such a way that starting from the contact position with the cylindrical gauge, the panel side facing the exterior of the vehicle is displaced forwards a distance of 660 mm.
- 7.7.5.1.1.2. In the case of sideways facing seats, the forward part of the cylindrical gauge must reach at least the transversal plane which coincides with a vertical plane passing through the centre of the forward seat. (annex 4, figure 7).
- 7.7.5.1.1.3. In the case of rearward facing seats, the forward part of the cylindrical gauge shall reach at least the transverse vertical plane tangential to the face of the seat cushions of the forward row or seat (annex 4, figure 7).
- 7.7.5.2. On vehicles of Class I, the diameter of the lower cylinder may be reduced from 450 mm to 400 mm in any part of the gangway to the rear of:
- 7.7.5.2.1. a transverse vertical plane situated 1.5 m forward of the centre line of the rear axle (foremost rear axle in the case of vehicles with more than one rear axle); and
- 7.7.5.2.2. a transverse vertical plane situated at the rear edge of the rearmost service door.
- 7.7.5.3. On vehicles of Class III the seats on one side or on both sides of the gangway may be movable laterally, it being then possible to reduce the width of the gangway to a figure corresponding to a lower cylinder diameter of 220 mm, on condition that the operation of a control on each seat, readily accessible to a person standing in the gangway, shall be sufficient to cause the seat to return easily and, if possible, automatically, even when it is loaded, to the position corresponding to a minimum width of 300 mm.
- 7.7.5.4. On articulated vehicles, the gauging device defined in paragraph 7.7.5.1. shall be able to pass unobstructed through the articulated section. No part of the soft covering of that section, including parts of bellows, shall project into the gangway.
- 7.7.5.5. Steps may be fitted in the gangways. The width of such steps shall not be less than the width of the gangway at the top of the steps.
- 7.7.5.6. Folding seats allowing passengers to sit in the gangway shall not be permitted.
- 7.7.5.7. Laterally-sliding seats which in one position encroach on the gangway shall not be permitted except on vehicles of Class III and subject to the conditions prescribed in paragraph 7.7.5.3.

7.7.5.8. In the case of vehicles to which paragraph 7.7.1.9. applies, a gangway shall not be necessary provided the access dimensions specified in that paragraph are respected.

7.7.5.9. The surface of gangways and access passages shall be slip-resistant.

7.7.6. Slope of gangway

The slope of the gangway, measured with the vehicle unladen on a horizontal surface, and with the kneeling system not activated, shall not exceed:

7.7.6.1. 8 per cent in the case of a vehicle of Class I, II or A, or

7.7.6.2. (reserved)

7.7.6.3 12.5 percent in the case of a vehicle of Class III and B, and

7.7.6.4. 5 percent in the case of the plane perpendicular to the longitudinal axis of symmetry of vehicle.

7.7.7. Steps (see annex 4, figure 8)

7.7.7.1. The maximum and minimum height, with the kneeling system not activated, and the minimum depth of steps for passengers at service and emergency doors and within the vehicle shall be as follows:

Classes		I and A	II, III and B
First step from ground 'D'	Max height (mm)	340 <u>1/</u>	380 <u>1/</u> <u>2/</u> <u>5/</u>
	Min depth (mm)	300 <u>*/</u>	
Other steps 'E'	Max height (mm)	250 <u>3/</u>	350 <u>4/</u>
	Min height (mm)	120	
	Min depth (mm)	200	

*/ 230 mm for vehicles having a capacity not exceeding 22 passengers.

1/ 700 mm in the case of an emergency door.

1500 mm in the case of an emergency door in the upper deck of a double-deck vehicle.

2/ 430 mm in the case of a vehicle with solely mechanical suspension.

3/ 300 mm in the case of steps at a door behind the rearmost axle.

4/ 250 mm in gangways for vehicles having a capacity not exceeding 22 passengers.

5/ for at least one service door; 400 mm for other service doors.

Note: 1. At a double doorway the steps in each half of the access passage shall be treated separately.

2. Annex 4, Figure 8, dimension E, need not be the same for each step.

7.7.7.1.1. Any transition from a sunken gangway to a seating area shall not be considered to be a step. However, the vertical distance between the gangway surface and the floor of the seating area shall not exceed 350 mm.

7.7.7.2. For the purpose of paragraph 7.7.7., the height of a step shall be measured at the centre of its width. Furthermore, manufacturers should specifically take account of access by passengers with reduced mobility, particularly in relation to a step height to be kept to a minimum.

7.7.7.3. The height of the first step in relation to the ground shall be measured with the vehicle on level ground, at its mass in running order as defined in paragraph 2.18. of this Regulation, and the tyre equipment and pressure being as specified by the manufacturer for the technically permissible maximum laden mass (M) declared in accordance with paragraph 2.19. of this Regulation.

7.7.7.4. Where there is more than one step, each step may extend into the area of the vertical projection of the next step by up to 100 mm and the projection over the tread below shall leave a free surface of at least 200 mm (see annex 4, figure 8) with all step nosings being designed such as to minimise the risk of tripping and being in a contrasting colour or colours.

7.7.7.5. The width and shape of every step shall be such that a rectangle as indicated in the table below can be placed on that step with not more than 5 percent of the area of the appropriate rectangle overhanging the step. At a double doorway each half of the doorway shall fulfil this requirement.

Number of passengers		> 22	≤ 22
Area	First step (mm)	400 x 300	400 x 200
	Other steps (mm)	400 x 200	400 x 200

7.7.7.6. All steps shall have a slip-resistant surface.

7.7.7.7. The maximum slope of the step in any direction shall not exceed 5 percent when the unladen vehicle is standing on a smooth and horizontal surface in its normal condition of travel (in particular any kneeling device shall not be engaged).

7.7.8. Passenger seats and space for seated passengers

7.7.8.1. Minimum seat width

- 7.7.8.1.1. The minimum width of the seat cushion, dimension F (annex 4, figure 9), measured from a vertical plane passing through the centre of that seating position, shall be:
- | | |
|-------------------|---------|
| Class I, II, A, B | 200 mm. |
| Class III | 225 mm. |
- 7.7.8.1.2. The minimum width of the available space for each seating position, dimension G (annex 4, figure 9), measured from a vertical plane passing through the centre of that seating position at height between 270 mm and 650 mm above the uncompressed seat cushion, shall be not less than:
- | | |
|---|---------|
| individual seats: | 250 mm |
| continuous rows of seats for two or more passengers | 225 mm. |
- 7.7.8.1.3. For vehicles 2.35 m in width or less, the width of the available space for each seating position, measured from a vertical plane passing through the centre of that seating position at heights between 270 mm and 650 mm above the uncompressed seat cushion shall be 200 mm (see annex 4, figure 9A). In case of compliance with this paragraph the requirements of paragraph 7.7.8.1.2. shall not apply.
- 7.7.8.1.4. For vehicles having a capacity not exceeding 22 passengers, in the case of seats adjacent to the wall of the vehicle, the available space does not include, in its upper part, a triangular area 20 mm wide by 100 mm high (see annex 4, figure 10). In addition, the space needed for safety belts and their anchorages and for the sun visor should be considered as exempted.
- 7.7.8.2. Minimum depth of seat cushion (dimension K, see annex 4, figure 11)
- The minimum depth of a seat cushion shall be:
- | | |
|------------|---|
| 7.7.8.2.1. | 350 mm in vehicles of Classes I, A and B, and |
| 7.7.8.2.2. | 400 mm in vehicles of Class II and Class III. |
- 7.7.8.3. Height of seat cushion (dimension H, see annex 4, figure 11)
- The height of the uncompressed seat cushion relative to the floor shall be such that the distance from the floor to a horizontal plane tangential to the front upper surface of the seat cushion is between 400 mm and 500 mm: this height may however be reduced to not less than 350 mm at the wheel arches and at the engine compartment.
- 7.7.8.4. Seat spacing (see annex 4, figure 12)
- 7.7.8.4.1. In the case of seats facing in the same direction, the distance between the front of a seat squab and the back of the squab of the seat preceding it (dimension H), shall, when measured horizontally and at all heights above the floor between the level of the top surface of the seat cushion and a point 620 mm above the floor, not be less than:

H	
Class I, A and B	650 mm
Class II and III	680 mm

- 7.7.8.4.2. All measurements shall be taken, with the seat cushion and squab uncompressed, in a vertical plane passing through the centreline of the individual seating place.
- 7.7.8.4.3. Where transverse seats face one another the minimum distance between the front faces of the seat squabs of facing seats, as measured across the highest points of the seat cushions, shall be not less than 1300 mm.
- 7.7.8.4.4. Measurements shall be taken with reclining passenger seats and adjustable driving seats with their seat backs and other seat adjustments in the normal position of use specified by the manufacturer.
- 7.7.8.4.5. Measurements shall be taken with any folding table fitted to a seat back in the folded position.
- 7.7.8.4.6. Seats which are mounted on a track or other system which permits the operator or the user to easily vary the interior configuration of the vehicle shall be measured in the normal position of use specified by the manufacturer in the application for approval.
- 7.7.8.5. Space for seated passengers (see annex 4, figure 13)
- 7.7.8.5.1. A minimum clear space in front of each passenger seat shall be provided as shown in annex 4, figure 13. The seat-back of another preceding seat or a partition whose contour corresponds approximately to that of the inclined seat back may intrude into this space as provided by paragraph 7.7.8.4. The local presence in this space of seat legs shall also be permitted provided that adequate space remains for the passenger's feet. In the case of seats alongside the driver's seat in vehicles with up to 22 passengers, intrusion of the dashboard, instrument panel, windscreen, sun visor, seat belts and seat belt anchorages shall be allowed.
- 7.7.8.5.2. However, at least two in Class I and Class II and one in Class A forward or rearward facing seats specifically intended and marked for passengers with reduced mobility other than wheelchair users shall be provided in that part of the bus which is most suitable for boarding. These seats shall be designed for passengers with reduced mobility so as to provide enough space, shall have suitably designed and placed handholds to facilitate entry and exit of the seat and provide communication in accordance with paragraph 7.7.10. from the seated position.
- 7.7.8.5.2.1. These seats shall provide at least 110 percent of the space specified in paragraph 7.7.8.5.1.
- 7.7.8.6. Free height over seating positions

- 7.7.8.6.1. Over each seating position and, except in the case of the front row seats in a vehicle not exceeding 22 passengers, its associated foot space, there shall be measured a free space with a height of not less than 900 mm measured from the highest point of the uncompressed seat cushion and at least 1350 mm from the mean level of the floor in the foot space. In the case of vehicles to which paragraph 7.7.1.10. applies, this dimension may be reduced to 1200 mm measured from the floor.
- 7.7.8.6.2. This free space shall be extended over the zone defined:
- 7.7.8.6.2.1. by longitudinal vertical planes 200 mm either side of the median vertical plane of the seating position, and
- 7.7.8.6.2.2. by a transverse vertical plane through the rearmost upper point of the seat back and by a transverse vertical plane 280 mm in front of the foremost point of the uncompressed seat cushion, measured in each case at the median vertical plane of the seating position.
- 7.7.8.6.3. From the edges of the free space defined by paragraphs 7.7.8.6.1. and 7.7.8.6.2., the following zones may be excluded:
- 7.7.8.6.3.1. in the case of the upper part of the outboard seats, a zone with a rectangular cross-section 150 mm in height and 100 mm in width (see annex 4, figure 14).
- 7.7.8.6.3.2. in the case of the upper part of outboard seats, a zone with a triangular cross-section whose apex is situated 650 mm from the floor and whose base is 100 mm in width (see annex 4, figure 15);
- 7.7.8.6.3.3. in the case of the foot well of an outboard seat, a zone of a cross-sectional area not exceeding, 0.02 m² (0.03 m² for Class I low floor vehicles) and having a maximum width not exceeding 100 mm (150 mm for Class I low floor vehicles) (see annex 4, figure 16).
- 7.7.8.6.3.4. In the case of a vehicle for up to 22 passengers, in the case of the seating places nearest to the rear corners of the body, the outer rear edge of the free space, viewed in plan, may be rounded to a radius not exceeding 150 mm (see annex 4, figure 17).
- 7.7.8.6.4. In the free space defined by paragraphs 7.7.8.6.1., 7.7.8.6.2. and 7.7.8.6.3., the following additional intrusions shall be permitted:
- 7.7.8.6.4.1. intrusion of the back of another seat, its supports and its attachments (e.g. folding table);
- 7.7.8.6.4.2. In the case of a vehicle for up to 22 passengers, intrusion of a wheel arch provided that one of the following two conditions is fulfilled:
- 7.7.8.6.4.2.1. the intrusion does not extend beyond the median vertical plane of the seating position (see annex 4, figure 18), or
- 7.7.8.6.4.2.2. the nearest edge of the area 300 mm in depth available for the feet of the seated passenger is advanced no more than 200 mm from the edge of the

uncompressed seat cushion and to not more than 600 mm in front of the squab of the seat, these measurements being made in the median vertical plane of the seating position (see annex 4, figure 19). In the case of two seats facing each other this provision shall apply to only one of the seats and the remaining space for the feet of seated passengers must be at least 400 mm.

- 7.7.8.6.4.3. In the case of seats alongside the driver's seat in vehicles with up to 22 passengers, intrusion of hopper type windows when open and their fittings, of the dashboard / instrument panel, windscreen, sun visors, seat belts, seat belt anchorages and front dome.

7.7.9. Communication with the driver

- 7.7.9.1. On vehicles of Classes I, II and A, a means shall be provided to enable passengers to signal to the driver that she/he should stop the vehicle. The controls for all such communication devices shall have protruding buttons, in vehicles of Class I and A no more than 1200 mm from the floor, and shall be a contrasting colour or colours. Controls shall be distributed adequately and evenly throughout the vehicle. Activation of the control shall also be indicated to the passengers by means of one or more illuminated signs. The sign shall display the words "bus stopping" or equivalent, and/or a suitable pictogram and shall remain illuminated until the service door(s) open. Articulated vehicles shall have such signs in each rigid section of the vehicle. Double-deck vehicles shall have them on each deck.

7.7.9.2. Communication with the crew compartment

If a crew compartment is fitted without access to the driver or passenger compartments, a means of communication between the driver and this crew compartment shall be provided.

7.7.10. Hot drink machines and cooking equipment

- 7.7.10.1. Hot drink machines and cooking equipment shall be so installed or guarded that no hot food or drink is likely to be spilled on any passenger due to emergency braking or cornering forces.

- 7.7.10.2. On vehicles fitted with hot-drink machines or cooking equipment, all passenger seats shall have adequate provision for setting down hot food or drink whilst the vehicle is in motion.

7.7.11. Doors to interior compartments

Every door to a toilet or other interior compartment:

- 7.7.11.1. shall be self-closing, and shall not be fitted with any device to hold it open if, when open, it could obstruct passengers in an emergency,
- 7.7.11.2. shall, when open, not conceal any handle, control device for opening or obligatory marking associated with any service door, emergency door, emergency exit, fire extinguisher or first aid kit;

- 7.7.11.3. shall be provided with a means to enable the door to be opened from outside the compartment in an emergency,
- 7.7.11.4. shall not be capable of being locked from the outside unless it can always be opened from the inside.
- 7.8. Artificial lighting
- 7.8.1. Internal electrical lighting shall be provided for the illumination of:
- 7.8.1.1. all passenger compartments, crew compartments, toilet compartments and the articulated section of an articulated vehicle;
- 7.8.1.2. any step or steps;
- 7.8.1.3. the access to any exits and the area immediately around the service door(s);
- 7.8.1.4. the internal markings and internal controls of all exits;
- 7.8.1.5. all places where there are obstacles.
- 7.8.2. There shall be at least two internal lighting circuits such that failure of one will not affect the other. A circuit serving only permanent entry and exit lighting can be considered as one of these circuits.
- 7.8.3. Provisions shall be made to protect the driver from the effects of glare and reflections caused by artificial interior lighting.
- 7.9. Articulated section of articulated vehicles
- 7.9.1. The articulated section that interconnects rigid portions of the vehicle shall be so designed and constructed as to allow at least one rotary movement about at least one horizontal axis, and at least one vertical axis.
- 7.9.2. When the articulated vehicle at its mass in running order is stationary on a horizontal level surface, there shall not be between the floor of either of the rigid sections and the floor of the rotating base or of the element replacing that base an uncovered gap of a width exceeding:
- 7.9.2.1. 10 mm when all the wheels of the vehicle are on the same plane, or
- 7.9.2.2. 20 mm when the wheels of the axle adjacent to the articulated section are resting on a surface which is 150 mm higher than the surface on which the wheels of the other axles are resting.
- 7.9.3. The difference in level between the floor of the rigid portions and the floor of the rotating base, measured at the joint, shall not exceed:
- 7.9.3.1. 20 mm in the conditions described in paragraph 7.9.2.1., or
- 7.9.3.2. 30 mm in the conditions described in paragraph 7.9.2.2.

- 7.9.4. On articulated vehicles means shall be provided to physically prevent access by passengers to any part of the articulated section where:
- 7.9.4.1. the floor has an uncovered gap not complying with the requirements of paragraph 7.9.2.;
- 7.9.4.2. the floor cannot carry the mass of the passengers;
- 7.9.4.3. the movements of the walls constitute a danger to passengers.
- 7.10. Direction-holding of articulated vehicles
- When an articulated vehicle is moving in a straight line, the longitudinal median planes of its rigid portion shall coincide and form a continuous plane without any deflection.
- 7.11. Handrails and handholds
- 7.11.1. General requirements
- 7.11.1.1. Handrails and handholds shall be of adequate strength.
- 7.11.1.2. They shall be so designed and installed as to present no risk of injury to passengers.
- 7.11.1.3. Handrails and handholds shall be of a section enabling passengers to grasp them easily and firmly. Every handrail shall provide a length of at least 100 mm to accommodate a hand. No dimension of the section shall be smaller than 20 mm or greater than 45 mm except in the case of handrails on doors and seats and, in the case of a vehicle of Class II, III or B, in access passages. In these cases handrails having a minimum dimension of 15 mm shall be permitted provided that one other dimension is of at least 25 mm. Handrails shall not have sharp bends.
- 7.11.1.4. The clearance between a handrail or handhold and the adjacent part of the vehicle body or walls shall be of at least 40 mm. However, in the case of a handrail on a door or a seat, or in the access passage of a vehicle of Class II, III or B, a minimum clearance of 35 mm shall be permitted.
- 7.11.1.5. The surface of every handrail, handhold or stanchion shall be colour contrasting and slip-resistant.
- 7.11.2. Handrails and handholds for standing passengers
- 7.11.2.1. Handrails and/or handholds shall be provided in sufficient number for each point of the floor area intended, in conformity with paragraph 7.2.2. for standing passengers. For this purpose, strap hangers, if fitted, may be counted as handholds, provided that they are held in their position by suitable means. This requirement shall be deemed to be fulfilled if, for all possible sites of the testing device shown in annex 4, figure 20 hereto, at least two handrails or handholds can be reached by the device's moveable arm. The testing device may be freely turned about its vertical axis.

- 7.11.2.2. When applying the procedure described in paragraph 7.11.2.1., only such handrails and handholds shall be considered as are not less than 800 mm and not more than 1900 mm above the floor.
- 7.11.2.3. For every position that can be occupied by a standing passenger, at least one of the two required handrails or handholds shall be not more than 1500 mm above the level of the floor at that position. This does not apply to an area adjacent to a door where the door or its mechanism in open position would prevent the use of this handhold.
- 7.11.2.4. Areas which can be occupied by standing passengers and are not separated by seats from the side walls or rear wall of the vehicle shall be provided with horizontal handrails parallel to the walls and installed at a height of between 800 mm and 1500 mm above the floor.
- 7.11.3. Handrails and handholds for service doors
- 7.11.3.1. Door apertures shall be fitted with handrails and/or handholds on each side. In the case of double doors this requirement can be fulfilled by fitting one central stanchion or one central handrail.
- 7.11.3.2. Handrails and/or handholds to be provided for service doors shall be such that they include a grasping point available to a person standing on the ground adjacent to the service door or on any of the successive steps. Such points shall be situated, vertically, between 800 mm and 1100 mm above the ground or above the surface of each step, and horizontally:
- 7.11.3.2.1. for the position appropriate to a person standing on the ground, not more than 400 mm inwards from the outer edge of the first step; and
- 7.11.3.2.2. for the position appropriate to a particular step, not outwards from the outer edge of the step considered, and not more than 600 mm inwards from that same edge.
- 7.11.4. Handrails to priority seating.
- 7.11.4.1. A handrail at a height of between 800 mm and 900 mm above the floor level shall be provided between the priority seats as described in paragraph 7.7.8.5.2. and the service door suitable for boarding and alighting. A break is permitted where it is necessary to gain access to a wheelchair space, a seat located at a wheel arch, a staircase, an access passage or a gangway. Any break in the handrail shall not exceed 1050 mm and a vertical handrail shall be provided on at least one side of the break.

7.12. Guarding of step wells

- 7.12.1. Where any seated passenger is likely to be thrown forward into a step well as a result of heavy braking, a guard shall be fitted. The guard shall have a minimum height from the floor on which the passenger's feet rest of 800 mm and shall extend inwards from the wall of the vehicle at least as far as 100 mm beyond the longitudinal centre line of any seating position where the passenger is at risk or to the riser of the innermost step; whichever is the lesser dimension.

7.13. Baggage racks and occupant protection

The occupants of the vehicle shall be protected from objects liable to fall from baggage racks under braking or cornering forces. If baggage compartments are fitted, they must be designed in such a way that baggage is prevented from falling in the event of sudden braking.

7.14. Trap doors, if fitted

- 7.14.1. Every trap door, that is not an escape hatch, on the floor of a vehicle shall be so fitted and secured that it cannot be dislodged or opened without the use of tools or keys and no lifting or securing device shall project by more than 8 mm above floor level. Edges of projections shall be rounded.

7.15. Visual Entertainment

- 7.15.1. Forms of visual entertainment for passengers, for example television monitors or videos, shall be located out of the driver's view when the driver is seated in his normal driving position. This shall not preclude any television monitor or similar device used as part of the driver's control or guidance of the vehicle, for example to monitor service doors.

ANNEX 3Appendix

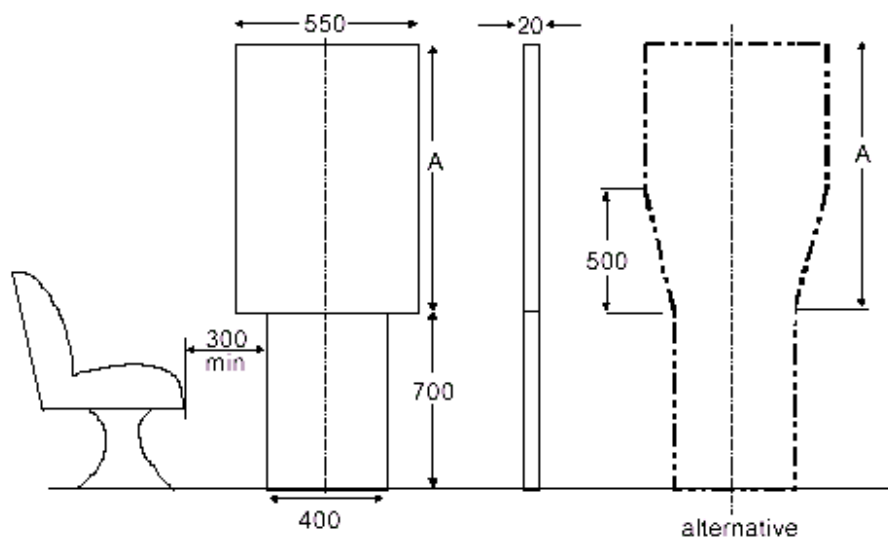
VERIFICATION OF STATIC TILTING LIMIT BY MEANS OF CALCULATION

1. A vehicle may be shown to meet the requirement specified in paragraph 7.4. of annex 3 by a calculation method approved by the technical service for conducting the tests.
2. The technical service responsible for conducting the tests may require tests to be carried out on parts of the vehicle to verify the assumptions made in the calculation.
3. Preparations for calculation.
 - 3.1. The vehicle shall be represented by a spatial system.
 - 3.2. Due to the location of the centre of gravity of the body of the vehicle and the different spring rates of the vehicle suspension and tyres, axles do not generally lift simultaneously on one side of the vehicle as a result of lateral acceleration. Therefore, lateral tilting of the body over each axle has to be ascertained on the supposition that the wheels of the other axle(s) remain on the ground.
 - 3.3. To simplify matters, it shall be assumed that the centre of gravity of the unsprung masses lies in the longitudinal plane of the vehicle on the line passing through the centre of the wheel rotation axle. The small shifting of the roll centre due to deflection of the axle can be neglected. The air suspension control should not be taken into account.
 - 3.4. The following parameters, at least, shall be taken into account:

vehicle data such as wheel base, tread width and sprung/unsprung masses, location of the centre of gravity of the vehicle, deflection and rebound and the spring rate of the vehicle suspension, considering also non-linearity, horizontal and vertical spring rate of the tyres, torsion of the superstructure, location of the roll centre of the axles.
4. Validity of the calculation method.
 - 4.1. The validity of the calculation method shall be established to the satisfaction of the technical service, e.g. on the basis of a comparative test with a similar vehicle.

ANNEX 4**EXPLANATORY DIAGRAMS**Figure 1ACCESS TO SERVICE DOORS

(see Annex 3, paragraph 7.7.1.)



alternatives

Classes I, II and III: A = 1100 mm

Classes A and B: A = 950 mm

Number of passengers	$\leq$ 22 ^{1/}		> 22		
Classes	A	B	I	II	III
Dimension A (mm)	950	700	1100	950	850
Total height of dual panel	1650	1400	1800	1650	1550

^{1/} See the respective footnote in annex 3, paragraph 7.7.1.2.

Figure 2

ACCESS TO SERVICE DOORS

(see annex 3, paragraph 7.7.1.4.)

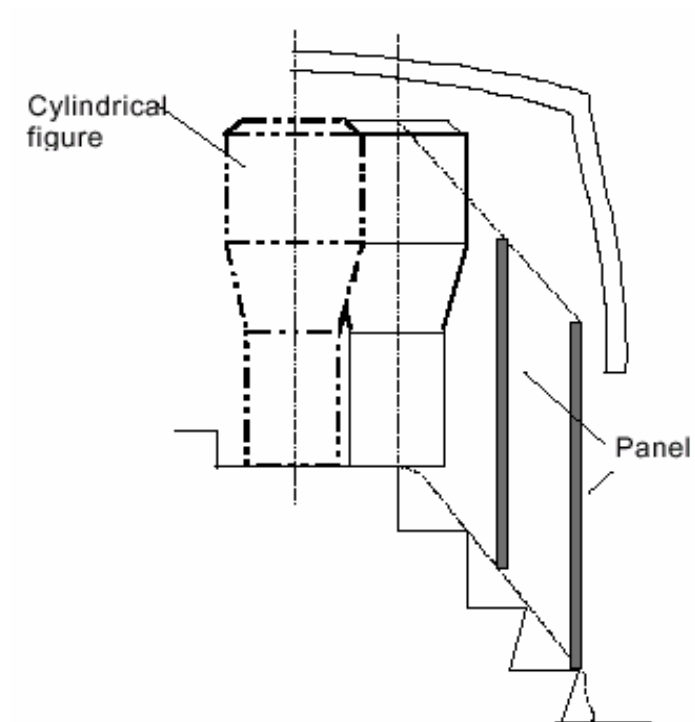


Figure 3

DETERMINATION OF UNOBSTRUCTED ACCESS TO DOOR

(see annex 3, paragraph 7.7.1.9.1.)

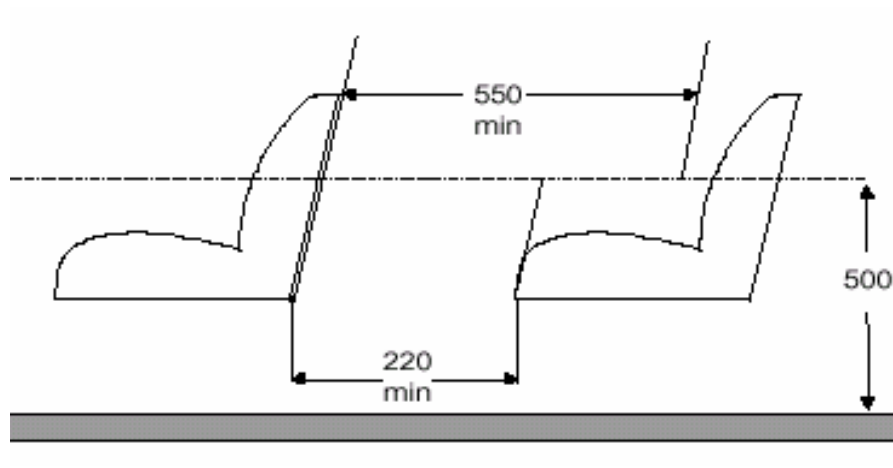


Figure 4

DETERMINATION OF UNOBSTRUCTED ACCESS TO DOOR

(see annex 3, paragraph 7.7.1.9.2.)

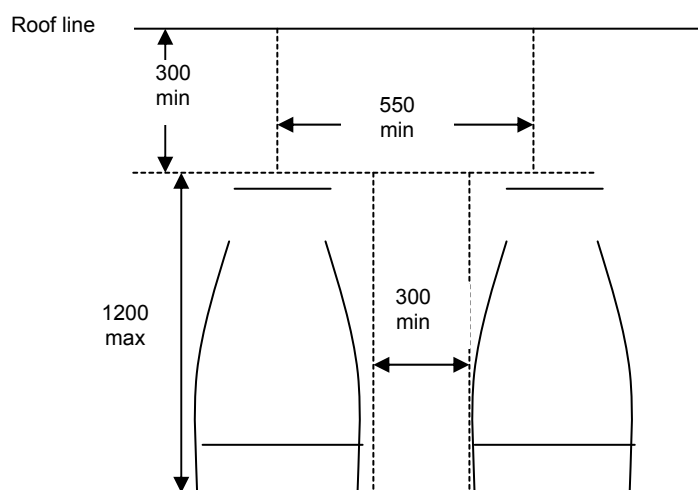


Figure 5ACCESS TO EMERGENCY DOORS

(see annex 3, paragraph 7.7.2.)

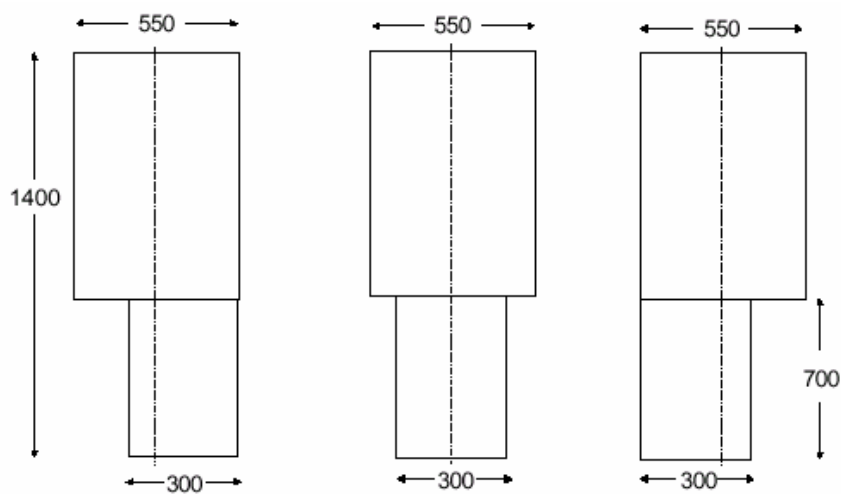
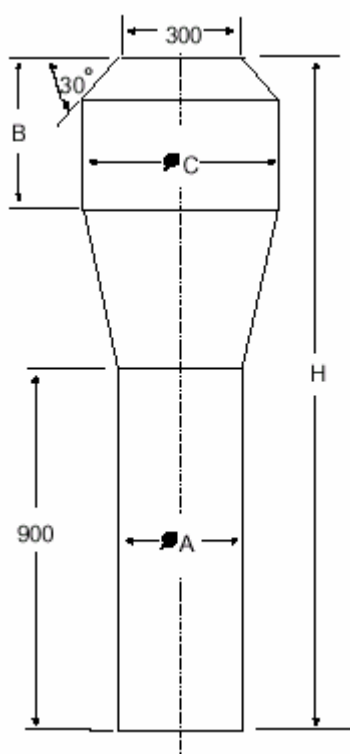


Figure 6

GANGWAYS

(see annex 3, paragraph 7.7.5.)



Classes		A	B	I	II	III
Dimensions (mm)	A	350	300	450	350	300
	C	550	450	550	550	450
	B	500 */	300	500 */	500 */	500 */
	H	1900 */	1500	1900 */	1900 */	1900 */

/ See the respective footnote ("") in annex 3, paragraph 7.7.5.1.

Figure 7

FORWARD LIMITATION OF THE GANGWAY

(see annex 3, paragraph 7.7.5.1.1.1.)

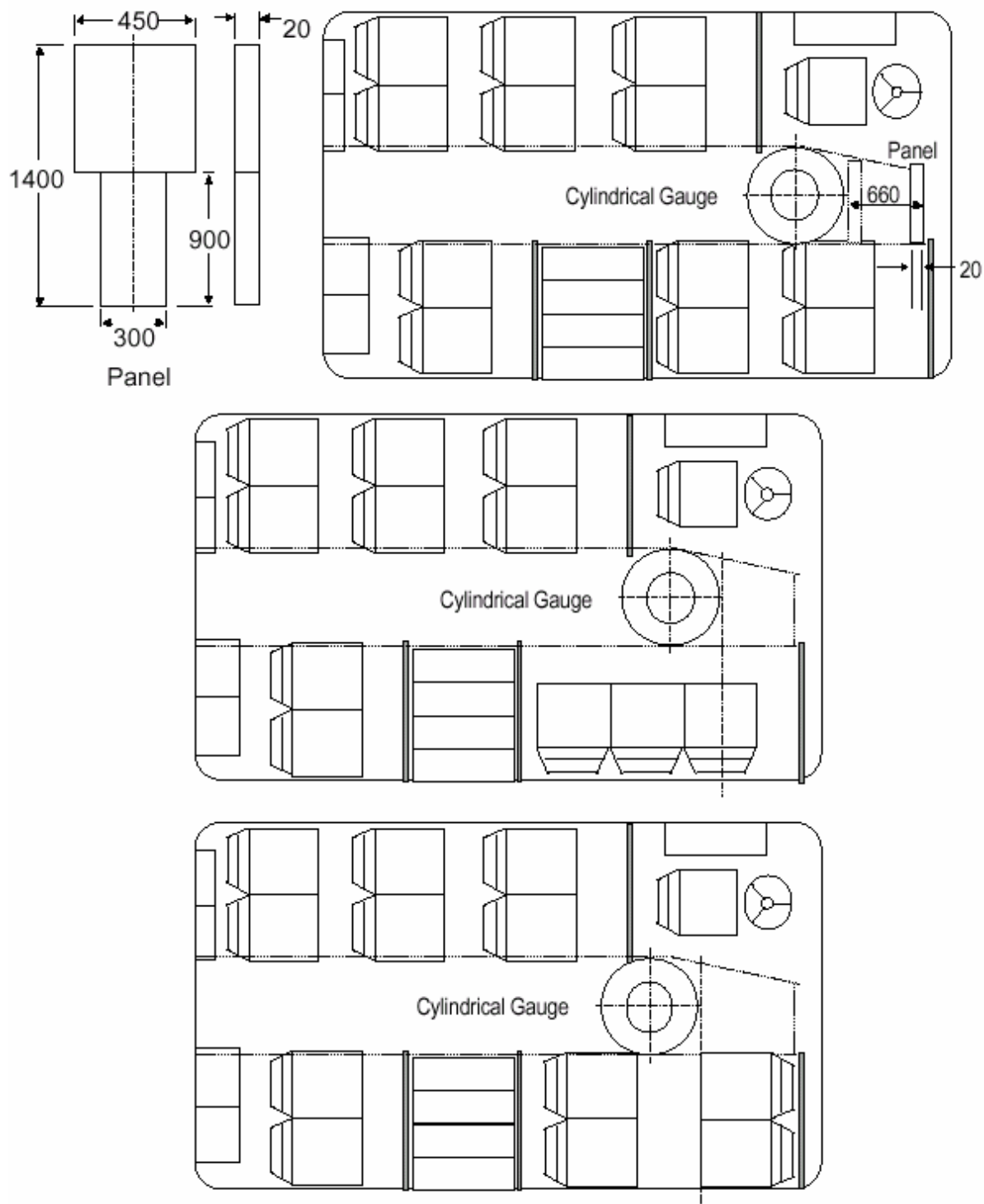
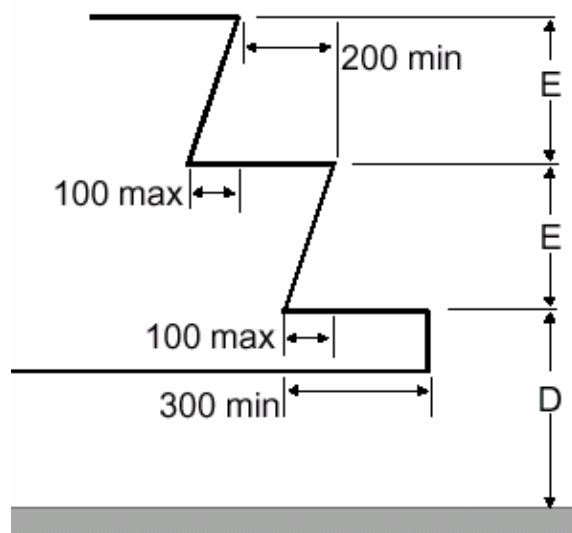


Figure 8

STEPS FOR PASSENGERS

(see annex 3, paragraph 7.7.7.)



Height above ground level, vehicle unladen

Classes		I & A	II, III and B
First step from ground 'D'	Max. height (mm)	340 (1)	380 (1)(2)(5)
	Min. depth (mm)	300 */	
Other steps 'E'	Max. height (mm)	250 (3)	350 (4)
	Min. height (mm)	120	
	Min. depth (mm)	200	

*/ 230 mm for vehicles having a capacity not exceeding 22 passengers.

(1) 700 mm in the case of an emergency door.

1500 mm in the case of an emergency door in the upper deck of a double deck vehicle.

(2) 430 mm in the case of a vehicle with solely mechanical suspension.

(3) 300 mm in the case of steps at a door behind the rearmost axle.

(4) 250 mm in gangways for vehicles having a capacity not exceeding 22 passengers.

(5) For at least one service door; 400 mm for other service doors.

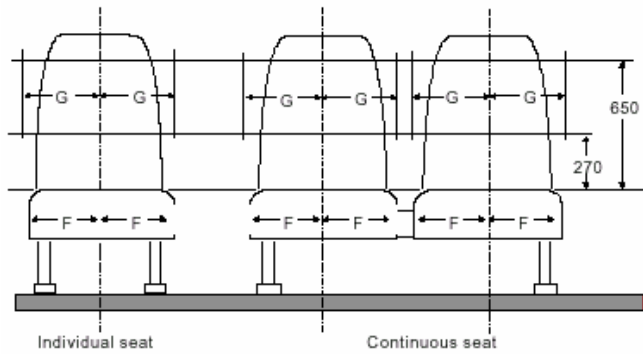
Note:

1. At a double doorway the steps in each half of the access passage shall be treated separately.
2. E need not be the same for each step.

Figure 9

DIMENSIONS OF PASSENGER SEATS

(see annex 3, paragraph 7.7.8.1.)



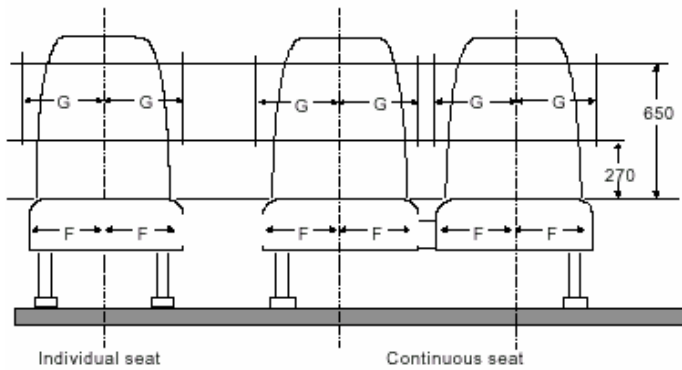
	G (mm) minimum	
F (mm) min	Continuous seats	Individual seats
200 */	225	250

* 225 for Class III.

Figure 9A

DIMENSIONS OF PASSENGER SEATS

(see annex 3, paragraph 7.7.8.1.3.)

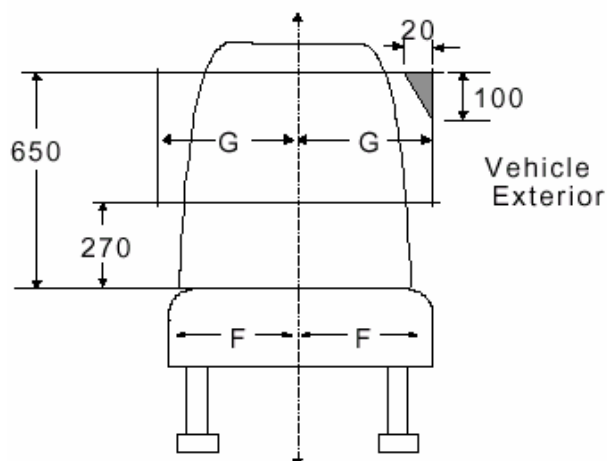


	G (mm) min	
F (mm) min	Continuous seats	Individual seats
200	200	200

Figure 10PERMITTED INTRUSION AT SHOULDER HEIGHT

Transversal section of the minimum available space at shoulder height for a seat adjacent to the wall of the vehicle

(see annex 3, paragraph 7.7.8.1.4.)



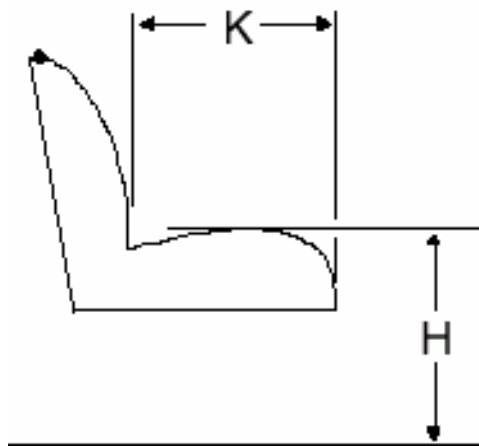
$G = 225$ mm if continuous seat

$G = 250$ mm if individual seat

$G = 200$ mm for vehicles less than 2.35 m wide

Figure 11SEAT-CUSHION DEPTH AND HEIGHT

(see annex 3, paragraphs 7.7.8.2. and 7.7.8.3.)



H = 400/500 mm (*)

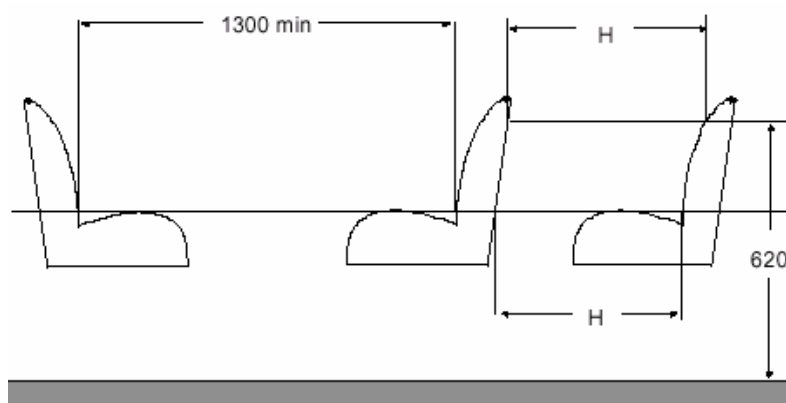
K = 350 mm min. (**)

(*) 350 mm at wheel arches and engine compartment.

(**) 400 mm in vehicles of Classes II and III.

Figure 12SEAT SPACING

(see annex 3, paragraph 7.7.8.4.)



	H
Classes I, A and B	650 mm
Classes II and III	680 mm

Figure 13

SPACE FOR SEATED PASSENGERS

(see annex 3, paragraph 7.7.8.5.)

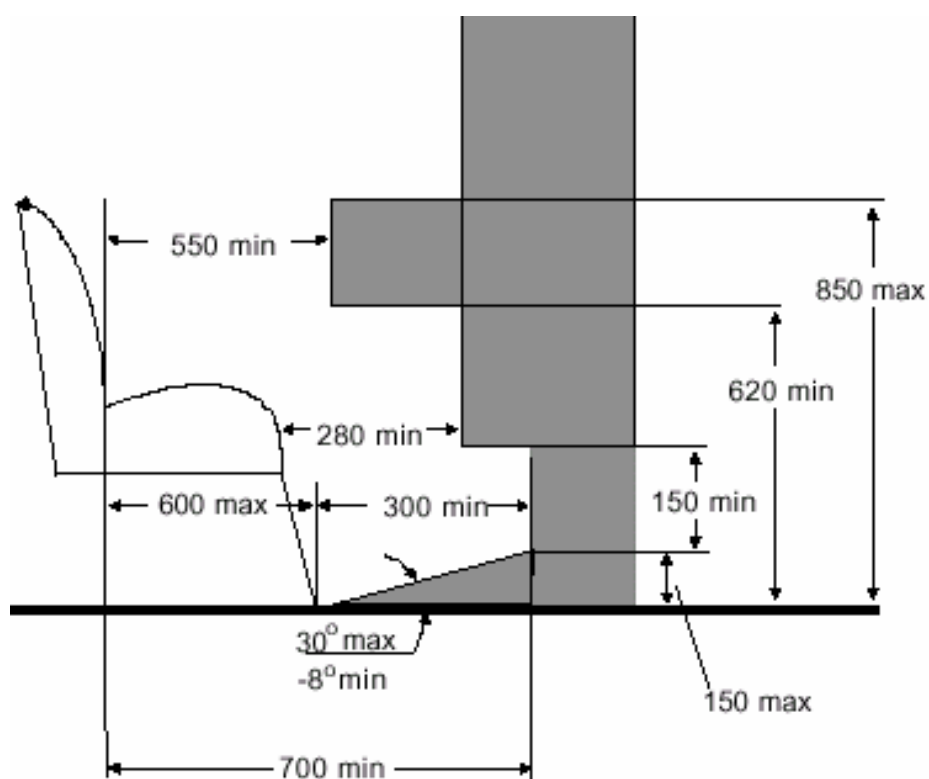


Figure 14

PERMITTED INTRUSION INTO SPACE ABOVE SEAT

Transversal section of the minimum free space above a seating place adjacent to the wall of the vehicle

(see annex 3, paragraph 7.7.8.6.3.1.)

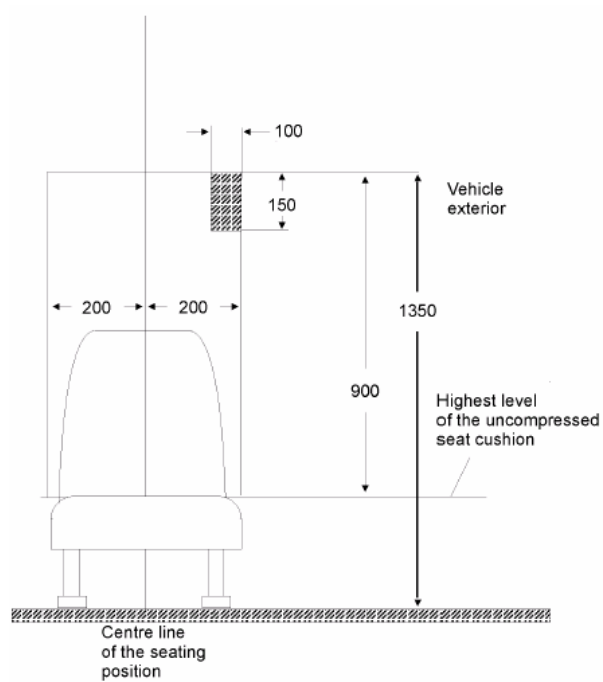


Figure 15**PERMITTED INTRUSION ABOVE A SEATING POSITION**

(see annex 3, paragraph 7.7.8.6.3.2.)

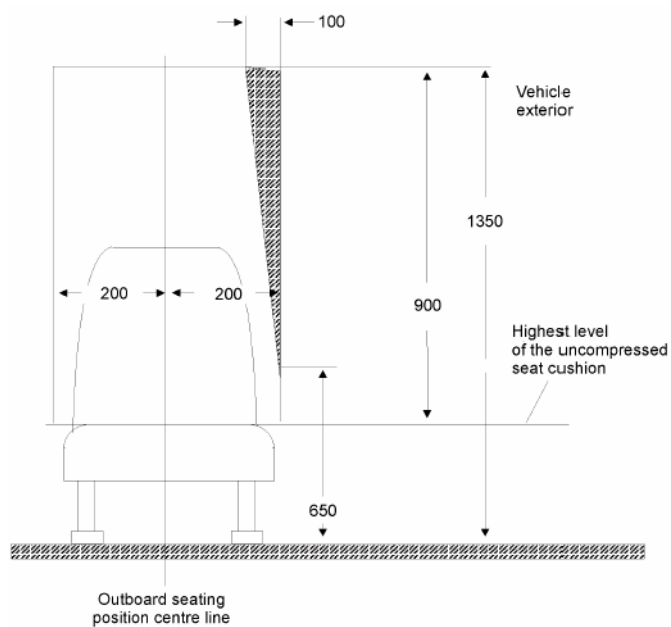
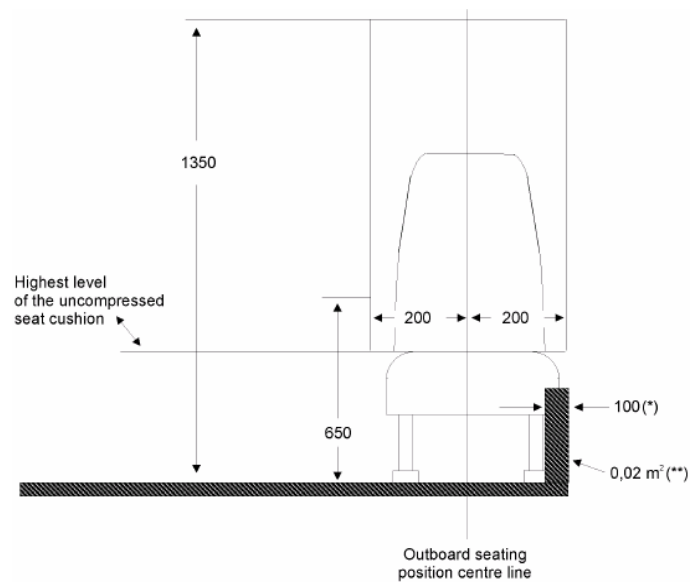


Figure 16PERMITTED INTRUSION IN LOWER PART OF PASSENGER SPACE

(see annex 3, paragraph 7.7.8.6.3.3.)



*/ 150 mm in the case of Class 1 low-floor vehicles.

(**) 0.03 m² in the case of Class I low floor vehicles.

Figure 17PERMITTED INTRUSION AT REAR CORNER SEATS

View of the prescribed area of the seat (two side seats at the rear)
(see annex 3, paragraph 7.7.8.6.3.4.)

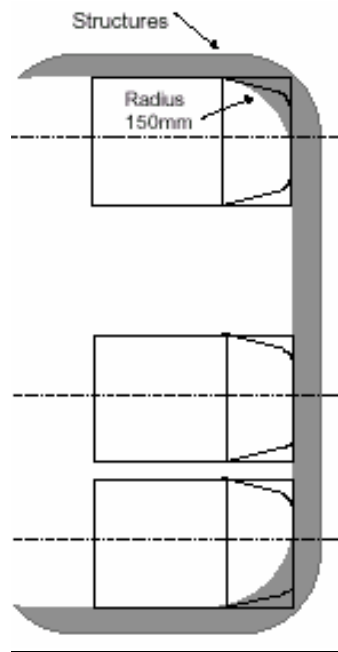


Figure 18

PERMITTED INTRUSION OF A WHEEL ARCH NOT EXTENDING BEYOND THE
VERTICAL CENTRE LINE OF THE SIDE SEAT

(see annex 3, paragraph 7.7.8.6.4.2.1.)

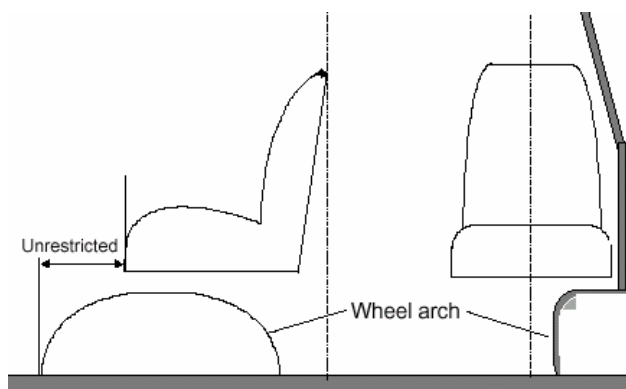


Figure 19

PERMITTED INTRUSION OF A WHEEL ARCH EXTENDING BEYOND THE
VERTICAL CENTRE LINE OF THE SIDE SEAT

(see annex 3, paragraph 7.7.8.6.4.2.2.)

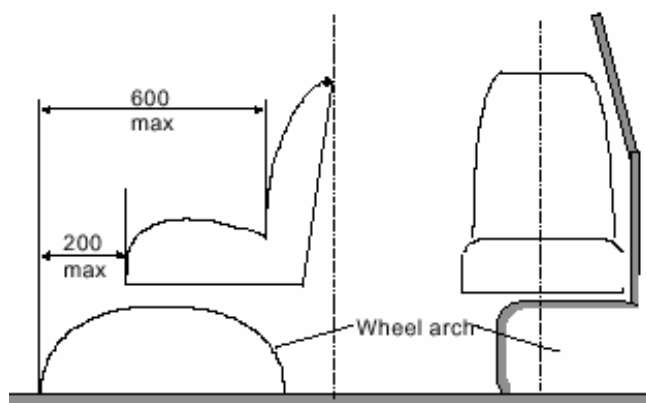


Figure 20

TESTING DEVICE FOR SITING OF HANDHOLDS

(see annex 3, paragraph 7.11.2.1.)

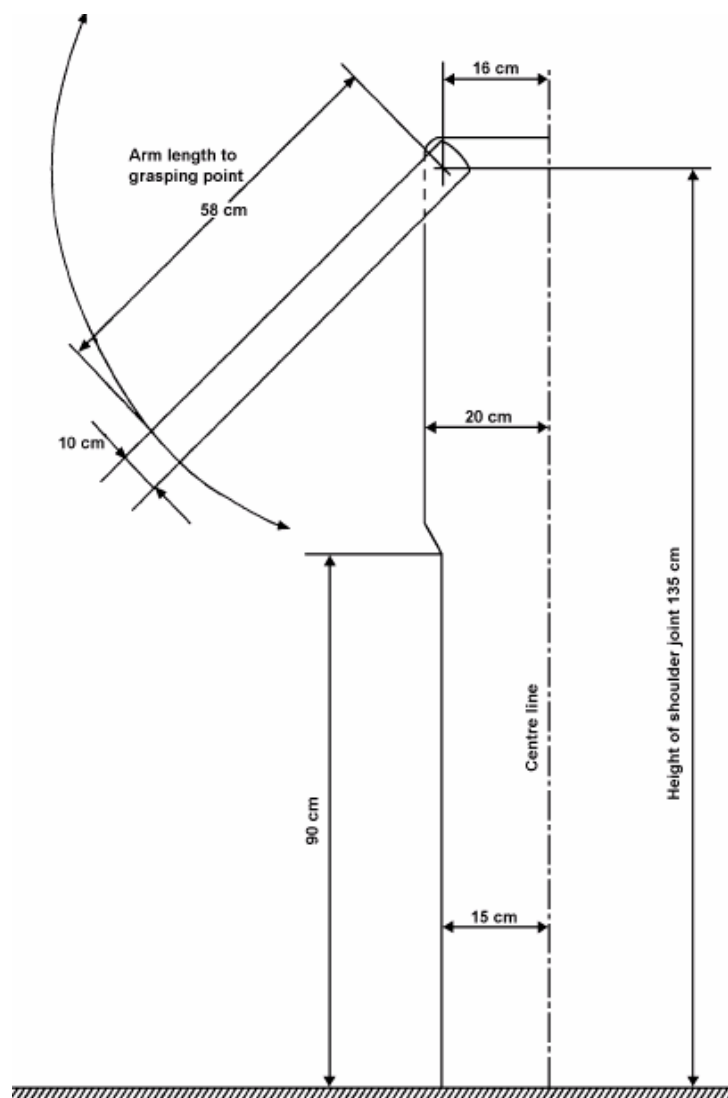
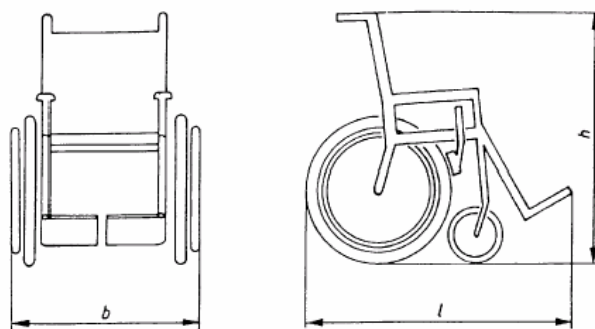


Figure 21REFERENCE WHEELCHAIR

(see annex 8, paragraph 3.6.4.)



Overall length, l: 1200 mm

Overall width, b: 700 mm

Overall height, h: 1090 mm

Note:

A wheelchair user seated in the wheelchair adds 50 mm to the overall length and makes a height of 1350 mm above the ground.

Figure 22

Minimum clear space for the wheelchair user at the wheelchair space

(see annex 8, paragraph 3.6.1.)

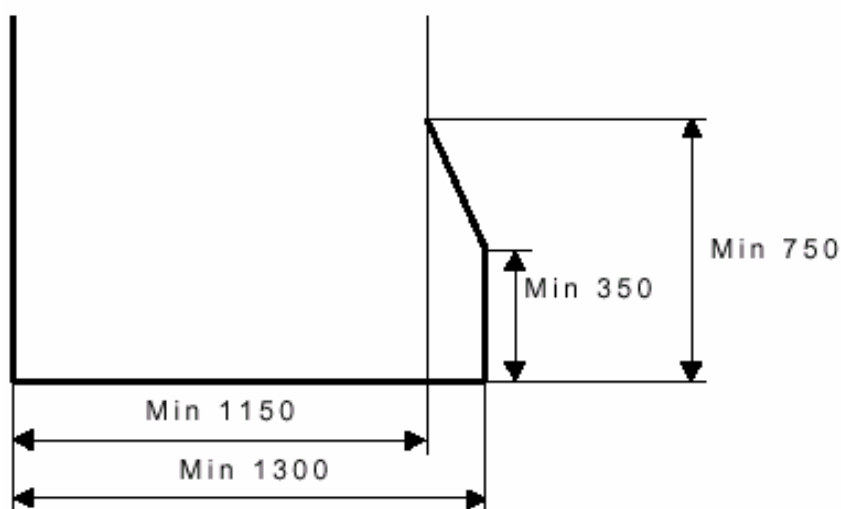


Figure 23

(see annex 8, paragraph 3.4.)

Figure 23A

Pictogram for wheelchair users



Figure 23B

Pictogram for passengers with reduced mobility others than wheelchair users



ANNEX 5

STRENGTH OF SUPERSTRUCTURE

(see annex 3, paragraph 7.3.)

1. SCOPE.

This annex applies to all single-deck Class II and III vehicles.

2. DEFINITIONS:

For the purposes of this annex:

2.1. "residual space" means the space to be preserved in the passenger compartment during and after the structure has been subjected to one of the tests prescribed in this annex;

2.2. "superstructure" means the part(s) of a vehicle structure which contribute to the strength of the vehicle in the event of a roll-over accident;

2.3. "body section" means a section containing at least two identical vertical pillars on each side representative of a part or parts of the structure of the vehicle;

2.4. "total energy" means the energy assumed to be absorbed by the complete structure of the vehicle. This may be determined as shown in this annex.

3. GENERAL SPECIFICATIONS AND REQUIREMENTS.

If the superstructure has obtained the approval according to Regulation No. 66, it is considered that it complies with these general specifications and requirements

3.1. The superstructure of the vehicle shall be of sufficient strength to ensure that during and after it has been subjected to one of the methods of test or calculation prescribed in paragraph 4.:

3.1.1. no displaced part of the vehicle intrudes into the residual space, as specified in paragraph 5., and

3.1.2. no part of the residual space projects outside the deformed structure

3.2. The requirements of paragraph 3.1. above shall apply to the vehicle including all its structural parts, members and panels and all projecting rigid parts such as baggage racks, ventilation equipment, etc. However, bulkheads, partitions, rings or other members reinforcing the superstructure of the vehicle and fixed appliances such as bars, kitchenettes or toilets shall be ignored for the purposes of paragraph 3.1.

3.3. In the case of an articulated vehicle, each part of the vehicle shall comply with the requirements specified in paragraph 3.1. above.

4. TEST METHODS.

4.1. Each type of vehicle shall be verified according to one of the following methods at the discretion of the manufacturer or according to an alternative method approved by the competent authority:

4.1.1. a roll-over test on a complete vehicle in accordance with the procedure set out in appendix 1;

4.1.2. a roll-over test on a body section or sections representative of a complete vehicle in accordance with appendix 2;

4.1.3. a pendulum test on a body section or sections in accordance with appendix 3; or

4.1.4. a verification of strength of superstructure by calculation in accordance with appendix 4.

4.2. If the methods prescribed in paragraphs 4.1.2., 4.1.3. or 4.1.4. cannot take account of a significant variation between one section of the vehicle and another, for example an air-conditioning installation on the roof, additional test methods or calculations shall be submitted to the technical service. In the absence of such additional information the vehicle may be required to undergo the method of test prescribed in paragraph 4.1.1.

5. RESIDUAL SPACE.

5.1. For the purpose of paragraph 2.1., the residual space means the volume within the passenger compartment which is swept when the transverse vertical plane defined in figure 1(a) is moved in a straight line or lines so that the point "R" in figure 1(a) passes from the "R" point of the rearmost outer seat, through the "R" point of every intermediate outer seat to the "R" point of the foremost outer passenger seats.

5.2. The position of the "R" point shown in figure 1(b) shall be assumed to be 500 mm above the floor under the passengers' feet, 300 mm from the inside surface of the side of the vehicle and 100 mm in front of the seat back in the centre line of the outboard seats.

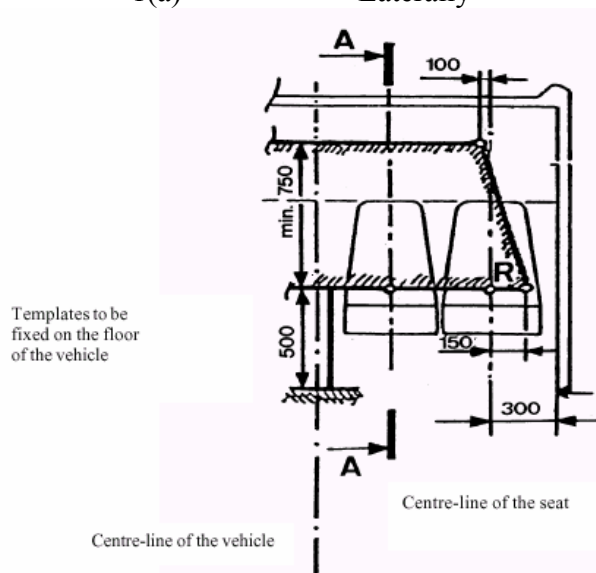
6. INTERPRETATION OF TEST RESULTS

6.1. If body sections are tested, the technical service responsible for conducting the test shall ensure that the vehicle complies with the conditions specified in Sub appendix 2 of appendix 3, which contains requirements for the distribution of the main energy absorbing parts of the superstructure of a vehicle.

Figure 1

Residual space
(All dimensions in millimetres)

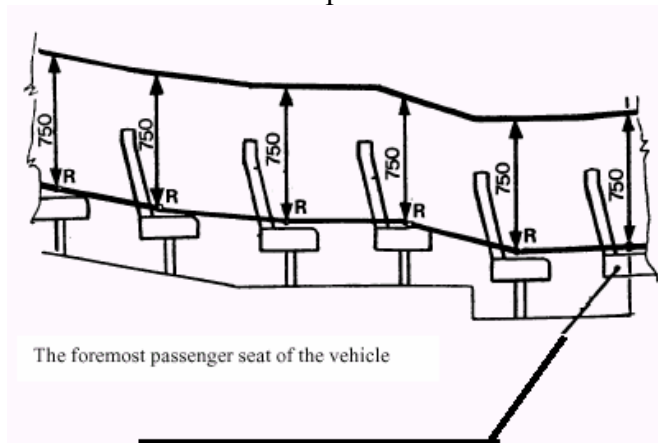
1(a) Laterally



Note: see requirement of paragraph 5.1.

1(b) Longitudinally

Section A-A of the vehicle in the vertical plane of the centre-line of the inboard seats.



Note: See requirement of paragraph 5.2.

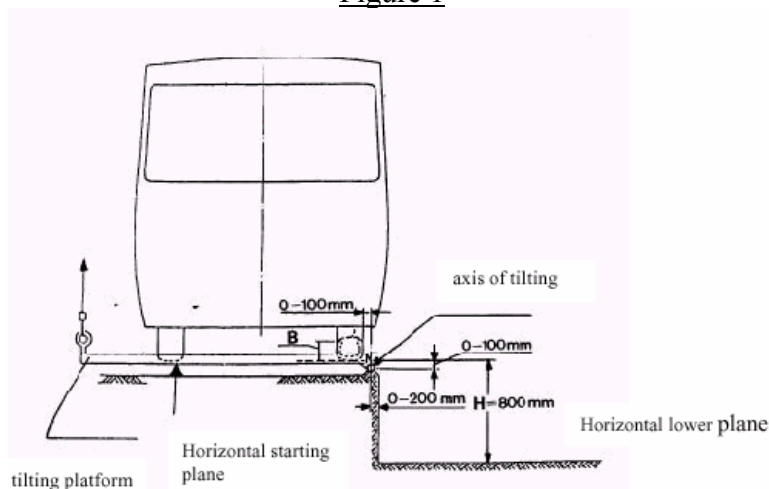
Annex 5 -Appendix 1

ROLL-OVER TEST ON A COMPLETE VEHICLE

1. Test condition.
 - 1.1. While the vehicle need not be in a fully finished condition it shall be representative of production vehicles in respect of the mass of the vehicle in running order, centre of gravity and distribution of mass as declared by the manufacturer.
 - 1.2. Driver and passenger seats shall be placed with their backs, if adjustable, in their most upright position. The height of the seats, if adjustable, shall be the highest position.
 - 1.3. Every door and opening window of the vehicle shall be closed and latched but not locked. Windows and glazed bulkheads or screens may be glazed or unglazed at the applicant's discretion. If they are unglazed, an equivalent weight shall be imposed on the vehicle at the appropriate positions.
 - 1.4. Tyres shall be inflated to the pressure prescribed by the vehicle manufacturer and, if the vehicle has an air-spring suspension system, the air supply to the air spring shall be ensured. Any automatic levelling system shall be adjusted with the vehicle on a flat, horizontal surface to the level specified by the manufacturer. Shock absorbers shall operate normally.
 - 1.5. Fuel, battery acid and other combustible, explosive or corrosive materials may be substituted by other materials provided that the conditions prescribed in paragraph 1.1. above are met.
 - 1.6. The impact area shall consist of concrete or other rigid material.
2. Test procedure (see figure 1)
 - 2.1. The vehicle shall be placed on a platform in order to be rolled over on one side. This side shall be specified by the manufacturer.
 - 2.2. the position of the vehicle on the platform shall be such that when the platform is horizontal:
 - 2.2.1. the axis of rotation is parallel to the longitudinal axis of the vehicle;
 - 2.2.2. the axis of rotation is 0 mm to 200 mm from the vertical step between the two levels.
 - 2.2.3. the axis of rotation is 0 mm to 100 mm from the side of the tyre at its widest axle,
 - 2.2.4. the axis of rotation is 0 mm to 100 mm below the horizontal starting plane on which the tyres stand, and

- 2.2.5. the difference between the height of the horizontal starting plane and the horizontal lower plane on which the impact takes place shall not be less than 800 mm.
- 2.3. Means shall be provided to prevent the vehicle moving along its longitudinal axis.
- 2.4. The test apparatus shall prevent the tyres from sliding sideways in the direction of roll-over by means of side walls.
- 2.5. The test apparatus shall ensure the simultaneous lifting of the axles of the vehicle.
- 2.6. The vehicle shall be tilted without rocking and without dynamic effects until it rolls over. The angular velocity shall not exceed 5 degrees per second (0,087 rad/sec).
- 2.7. High-speed photography, deformable templates or other suitable means shall be used to determine that the requirement of paragraph 3.1. of this annex has been met. This shall be verified at not less than two positions, nominally at the front and rear of the passenger compartment, the exact positions being at the discretion of the technical service. Templates shall be fixed to substantially non-deformable parts of the structure.

Figure 1



ANNEX 5

Appendix 2

ROLL-OVER TEST ON A BODYWORK SECTION

1. Test Conditions
 - 1.1. The bodywork section shall represent a section of the unladen vehicle.
 - 1.2. The geometry of the bodywork section, the axis of rotation and the position of the centre of gravity in the vertical and lateral directions shall be representative of the complete vehicle.
 - 1.3. The mass of the bodywork section, expressed as a percentage of the mass in running order of the vehicle, shall be specified by the manufacturer.
 - 1.4. The energy to be absorbed by the bodywork section, expressed as a percentage of the total energy which would be absorbed by a complete vehicle, shall be specified by the manufacturer.
 - 1.5. The percentage of total energy described in paragraph 1.4. shall not be less than the percentage of total kerb mass of the vehicle in running order described in paragraph 1.3.
 - 1.6. The test conditions specified in paragraph 1.6. of appendix 1 and in paragraphs 2.1. to 2.6. of appendix 3 shall apply.
2. Test procedure
 - 2.1. The test procedure shall be the same as the procedure described in appendix 1, except that the bodywork section described above shall be used instead of a complete vehicle.

ANNEX 5

Appendix 3

PENDULUM TEST ON A BODYWORK SECTION

1. Energy level and direction of impact
 - 1.1. The energy to be transmitted to a particular bodywork section shall be the sum of the energies declared by the manufacturer to be allocated to each of the cross-sectional rings included in that particular bodywork section.
 - 1.2. The appropriate proportion of the energy prescribed in Sub appendix 1 to this appendix shall be applied to the bodywork section by the pendulum such that at the moment of impact the direction of motion of the pendulum makes an angle of 25 degrees (+ 0°, - 5°) to the central longitudinal vertical plane of the bodywork section. The precise angle within this range shall be specified by the vehicle manufacturer.
2. Test conditions
 - 2.1. A sufficient number of tests shall be carried out for the technical service conducting the test to be satisfied that the requirement specified in paragraph 3.1. of this annex has been met.
 - 2.2. For the purposes of the test, bodywork sections shall have sections of the normal structure fitted between the pillars in relation to the floor, underframe, sides and roof. Sections of such components as baggage racks, ventilation ducting etc., where fitted, shall also be included.
 - 2.3. Every door and opening window of the bodywork section shall be closed and latched but not locked. Windows and glazed bulkheads or screens may be glazed or unglazed at the applicant's discretion.
 - 2.4. Where appropriate, seats may also be included, at the option of the manufacturer, in their normal positions in relation to the structure of the bodywork section. The normal fixings and joints between all members and attachments shall be incorporated. The backrests if adjustable shall be in their most upright position and the height of the seats, if adjustable, shall be in the highest position.
 - 2.5. The side of the bodywork section to be impacted shall be at the discretion of the manufacturer. Where more than one bodywork section is required to be tested, both shall be impacted on the same side.
 - 2.6. High speed photography, deformable templates or other suitable means shall be used to determine that the requirement specified in paragraph 3.1. of this annex has been met. Templates shall be fixed to a substantially non-deformable part of the structure.
 - 2.7. The bodywork section to be tested shall be firmly and securely attached to the mounting frame through the cross-bearers or parts which replace these in such

a way that no significant energy is absorbed in the support frame and its attachments during the impact.

2.8. The pendulum shall be released from such a height that it strikes the bodywork section at a speed of between 3 and 8 m/s.

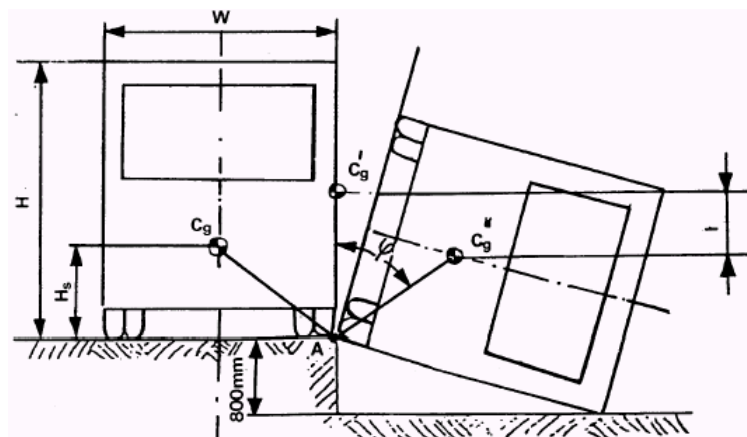
3. Description of the pendulum

3.1. The striking face of the pendulum shall be made of steel, or plywood 20 mm $\pm$ 5 mm thick, and the mass of the pendulum shall be evenly distributed. Its striking face shall be rectangular and flat, having a width of not less than the width of the bodywork section being tested and a height of not less than 800 mm. Its edges shall be rounded to a radius of curvature of not less than 15 mm.

3.2. The body of the pendulum shall be rigidly attached to two rigid bars. The axis of the bars shall be not less than 3 500 mm from the geometric centre of the body of the pendulum.

Sub-appendix 1

CALCULATION OF TOTAL ENERGY (E*)



Assumptions:

1. The shape of the cross-section of the body is assumed to be rectangular.
2. The suspension system is assumed to be rigidly fixed.
3. The movement of the bodywork section is assumed to be pure rotation about point "A".

Calculation of total energy (E*)

If the fall of the centre of gravity (h) is determined by graphical methods, E* may be taken to be given by the formula:

$$E^* = 0.75 M \cdot g \cdot h \text{ (Nm)}$$

Alternatively, E* may be calculated by the formula:

$$E^* = 0.75 M \cdot g \cdot \left[\sqrt{\left(\frac{W}{2}\right)^2 + H_s^2} - \frac{W}{2H} \sqrt{H^2 - 0.8^2} + 0.8 \frac{H_s}{H} \right] \text{ (Nm)}$$

(Nm) where:

M = the mass in running order of the vehicle (kg)

g = 9.8 m/s²

W = the overall width of the vehicle (m)

H_s = the height of the centre of gravity of the unladen vehicle (m)

H = the height of the vehicle (m)

Sub-appendix 2

REQUIREMENTS FOR THE DISTRIBUTION OF THE MAIN ENERGY ABSORBING PARTS OF THE SUPERSTRUCTURE

1. A sufficient number of tests shall be carried out for the technical service to be satisfied that the complete vehicle meets the requirements of paragraph 3.1. of this annex. This shall not necessarily require more than one test.
2. Calculations based on data obtained from a test on a bodywork section may be used to demonstrate the acceptability of another bodywork section which is not identical with the bodywork section already tested if it has many structural features in common with it.
3. The manufacturer shall declare which pillars of the superstructure are considered as contributing to its strength and shall also declare the amount of energy (E_i) that each pillar is intended to absorb. These declarations shall meet the following criteria:

- (1)
$$\sum_{i=1}^{i=m} E_i > E^*$$
 where m is the total number of declared pillars.
- (2) (a)
$$\sum_{i=1}^{i=n} E_{iF} \geq 0.4E^*$$
 where n is the number of declared pillars forward of the centre of gravity of the vehicle;
- (b)
$$\sum_{i=1}^{i=p} E_{iR} \geq 0.4E^*$$
 where p is the number of declared pillars to the rear of the centre of gravity of the vehicle.
- (3)
$$L_F \geq 0.4l_f$$
- (4)
$$L_R \geq 0.4l_r$$
- (5)
$$\frac{d_{\max}}{d_{\min}} \leq 2.5$$
 this shall apply only where $d_{\max}$ is greater than 0.8 x maximum deflection permitted without intrusion of the residual space.

where:

- E_i is the declared amount of energy that can be absorbed by ith pillar of the superstructure,
- E_{iF} is the declared amount of energy that can be absorbed by the ith pillar forward of the centre gravity of the vehicle,
- E_{iR} is the declared amount of energy that can be absorbed by the ith pillar to the rear of the centre of gravity of the vehicle,

E^* is the total energy to be absorbed by the complete structure of the vehicle,

$d_{\max}$ is the greatest amount of deflection measured in the direction of impact of any section of the bodywork structure after it has absorbed its own declared impact energy.

$d_{\min}$ is the least amount of deflection, measured in the direction of impact and at the same point on the bay as $d_{\max}$, of any section of the bodywork structure after it has absorbed its own declared impact energy.

$$L_F = \frac{\sum_{i=1}^{i=n} (E_{iF} l_{if})}{\sum_{i=1}^{i=n} E_{iF}} = \text{weighted mean distance of the declared pillars in front of}$$

the centre of gravity of the vehicle.

$$L_R = \frac{\sum_{i=1}^{i=p} (E_{iR} l_{ir})}{\sum_{i=1}^{i=p} E_{iR}} = \text{weighted mean distance of the declared pillars to the rear}$$

of the centre of gravity of the vehicle.

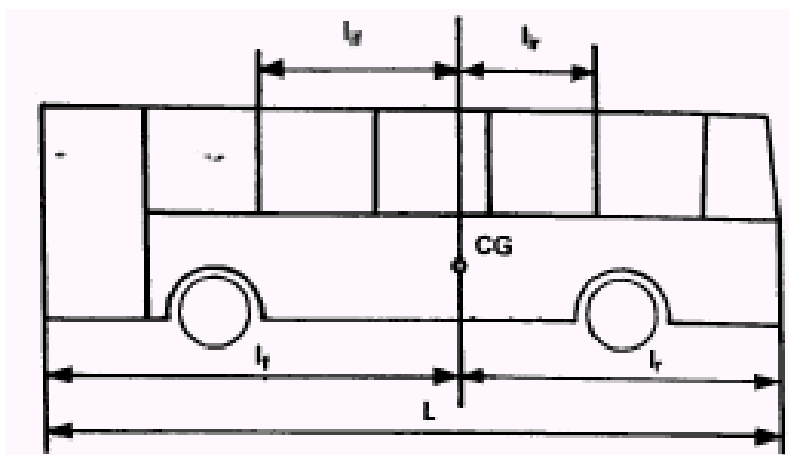
where:

l_{if} is the distance from the centre of gravity of the vehicle of the i th pillar forward of the centre of gravity.

l_{ir} is the distance from the centre of gravity of the vehicle of the i th pillar rearward of the centre of gravity.

l_f is the distance of the front of the vehicle from the centre of gravity of the vehicle.

l_r is the distance of the rear of the vehicle from the centre of gravity of the vehicle.



Annex 5 - Appendix 4

VERIFICATION OF STRENGTH OF SUPERSTRUCTURE BY CALCULATION

1. A superstructure or sections of a superstructure may be shown to meet the requirement specified in paragraph 3.1. of this annex by a calculation method approved by the technical service responsible for conducting the tests.
2. If the structure is likely to be subject to deformations beyond the elastic limit of the materials used, then the calculations shall simulate the behaviour of the structure when undergoing large plastic deformations.
3. The technical service responsible for conducting the tests may require tests to be carried out on joints or parts of the structure to verify the assumptions made in the calculation.
4. Preparations for calculation
 - 4.1. Calculations cannot be started until the structure has been analysed and a mathematical model of it produced. This will define the separate members to be considered and identify the points at which plastic hinges may develop. The dimensions of the members and the properties of material used must be stated. Physical tests must be made on the hinge points to determine the force (moment of rotation) - deformation characteristics in the plastic mode as this is essential data for the calculations. The strain rate and the dynamic yield stress appropriate for this strain rate must be determined. If the calculation method will not indicate when a significant fracture will occur, it will be essential to determine, by experiment, separate analyses or appropriate dynamic distribution. Distribution of loading along the length of a vehicle shall be stated.
 - 4.2. The calculation method shall include the deformations up to the elastic limits of the materials followed by the identification of where plastic hinges will form and the subsequent formation of other plastic hinges unless the position and sequences of formation of plastic hinges is known from previous experience. The method shall accommodate the changes in geometry of the structure that take place, at least up to the stage where the deformations have passed the acceptable limits. The calculations shall simulate the energy and direction of impact which would occur if that particular superstructure were to be submitted to the roll-over tests prescribed in appendix 1. The validity of the calculation method shall have been established by comparison with the results of physical tests, which need not necessarily have been made in connection with the vehicle now being approved.
5. Test of section of superstructure

When a calculation method is used for a section of the complete superstructure, the same conditions shall apply as stated above for the complete vehicle.

ANNEX 6

GUIDELINES FOR MEASURING THE CLOSING FORCES OF POWER-OPERATED DOORS

(see annex 3, paragraph 7.6.5.6.1.1.)

1. General

The closing of a power-operated door is a dynamic process. When a moving door hits an obstacle, the result is a dynamic reaction force, the history of which (in time) depends on several factors (e.g. mass of the door, acceleration, dimensions).

2. Definitions

2.1. Closing force $F(t)$ is a time function, measured at the closing edges of the door (see paragraph 3.2. below).

2.2. Peak force F_S is the maximum value of the closing force.

2.3. Effective force F_E is the average value of the closing force related to the pulse duration:

$$F_E = \frac{1}{T} \int_{t_1}^{t_2} F(t) dt$$

2.4. Pulse duration T is the time between the t_1 and t_2 :

$$T = t_2 - t_1$$

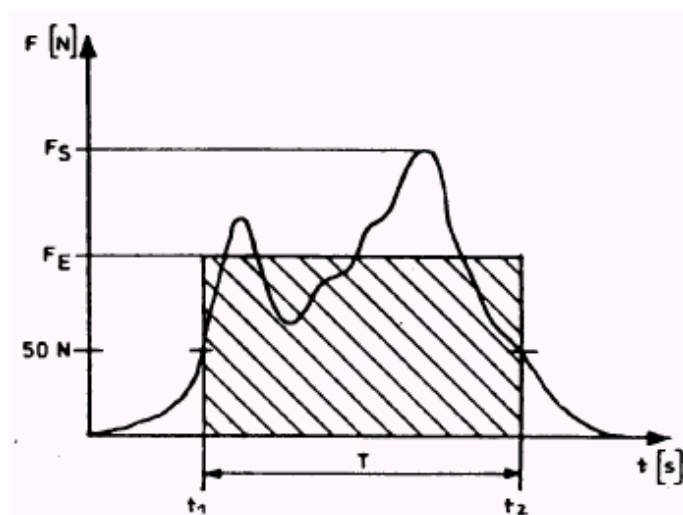
Where,

t_1 = threshold of sensitivity, where the closing force exceeds 50 N.

t_2 = fade-away threshold, where the closing force becomes less than 50 N.

2.5. The relation between the above parameters is shown in figure 1 below (as an example):

Figure 1



- 2.6. Clamping force F_c is the arithmetical mean value of the effective forces, measured at the same measuring point subsequently more times:

$$F = \frac{\sum_{i=1}^{i=n} (F_E)_i}{n}$$

3. Measurements

3.1. Conditions of measurement:

3.1.1. Temperature range: 10° - 30°C

3.1.2. The vehicle shall stay on a horizontal surface.

3.2. Measurements points shall be:

3.2.1. at the main closing edges of the door:

one in the middle of the door;
one 150 mm above the lower edge of the door.

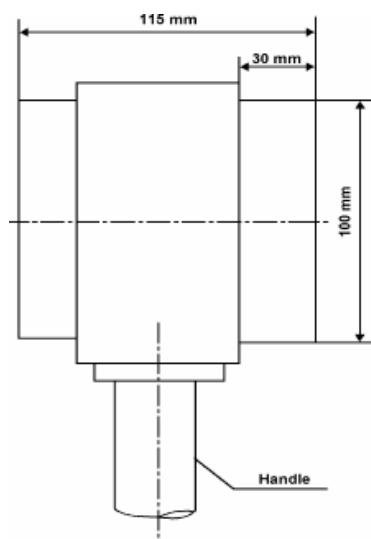
3.2.2. in the case of doors equipped with clamping prevention devices for the opening process:

at the secondary closing edges of the door at that point which is considered to be the most dangerous place of clamping.

3.3. At least three measurements shall be taken at each of the measuring points to determine the clamping force according to paragraph 2.6.

- 3.4. The signal of the closing force shall be recorded by means of a low-pass filter with a limiting frequency of 100 Hz. Both the threshold of sensitivity and the fade-away threshold to limit the pulse duration shall be set at 50 N.
- 3.5. The deviation of the reading from the rated value shall not be more than ± 3 percent.
4. Measuring device
- 4.1. The measuring device shall consist of two parts: one handle and one measuring part which is a load cell (see figure 2).
- 4.2. The load cell shall have the following characteristics:
- 4.2.1. It shall consist of two sliding housings with the outer dimension of 100 mm in diameter and 115 mm in width. Inside the load cell a compression spring shall be fitted between the two housings such that the load cell can be pressed together if an appropriate force is applied.
- 4.2.2. The stiffness of the load cell shall be 10 ± 0.2 N/mm. The maximum spring deflection shall be limited to 30 mm so that a maximum peak force of 300 N is achieved.

Figure 2



ANNEX 7**SPECIAL REQUIREMENTS FOR VEHICLES HAVING A CAPACITY NOT EXCEEDING 22 PASSENGERS**1.1. Minimum dimensions for exits

The several kinds of exits shall have the following dimensions:

Aperture	Dimensions	Remarks
Service Door	<u>Entry height:</u> Class A 1650 mm B 1500 mm	The service door entry height shall be measured as the vertical distance measured on a vertical plane of the horizontal projections of the mid point of the door aperture and the top surface of the lowest step.
	Aperture Height	The vertical height of the service door aperture shall be such as to permit the free passage of the dual panel referred to in paragraph 7.7.1.1. of annex 3. The upper corners may be reduced with round-offs, with a radius of not more than 150 mm.
	<u>Width:</u> Single door: 650 mm Double door: 1200 mm	For Class B vehicles where the service door aperture height lies between 1400 mm and 1500 mm a minimum single door aperture width of 750 mm shall apply. For all the vehicles the width of any service door may be reduced by 100 mm when the measurement is made at the level of the handholds and by 250 mm in cases where intruding wheel arches or the actuating mechanism for automatic or remote-control doors or the rake of the windscreen so require.
Emergency door	Height: 1250 mm Width: 550 mm	The width may be reduced to 300 mm in cases where intruding wheel arches so require, providing that the width of 550 mm is respected at the minimum height of 400 mm above the lowest part of the door aperture. The upper corners may be reduced with round-offs, with a radius of not more than 150 mm.
Emergency Window	Aperture area: 4000 cm ²	A 5 percent tolerance shall, however, be permitted in respect of this area for type-approvals issued for one year following the entry into force of this Regulation. It shall be possible to inscribe in this area a rectangle of 500 mm x 700 mm.

- 1.1.1. A vehicle to which paragraph 7.7.1.9. of annex 3 applies shall meet the requirements of paragraph 7.6.3.1. of annex 3 or paragraph 1.1. of this annex as regards emergency windows and escape hatches, and the following minimum requirements as regards service doors and emergency doors:

Aperture	Dimensions	Remarks
Service Door	Aperture Height: 1100 mm	This dimension may be reduced by a radius at the corners of the aperture not exceeding 150 mm.
	Width: Single door: 650 mm Double door: 1200 mm	This dimension may be reduced by a radius at the corners of the aperture not exceeding 150 mm. The width may be reduced by 100 mm when the measurement is made at the level of the handholds and by 250 mm in cases where intruding wheel arches or the actuating mechanism for automatic or remote-control doors or the rake of the windscreen so require.
Emergency door	Height: 1100 mm Width: 550 mm	The width may be reduced to 300 mm in cases where intruding wheel arches so require, providing that the width of 550 mm is respected at the minimum height of 400 mm above the lowest part of the door aperture. The upper corners may be reduced with round-offs with a radius of not more than 150 mm.

1.2. Siting of exits

- 1.2.1. The service door(s) shall be situated on the side of the vehicle that is nearer to the side of the road corresponding to the direction of the traffic in the country in which the vehicle is to be registered, or in the rear face of the vehicle.
- 1.2.2. The exits shall be placed in such a way that there is at least one exit on each side of the vehicle.
- 1.2.3. The forward half and the rearward half of the passenger space shall each contain at least one exit.
- 1.2.4. At least one exit shall be situated either in the rear face or in the front face of the vehicle unless an escape hatch is fitted.

ANNEX 8**REQUIREMENTS FOR TECHNICAL DEVICES FACILITATING
ACCESS FOR PASSENGERS OF REDUCED MOBILITY**

1. GENERAL

This annex contains the provisions which apply to a vehicle designed for easy access for passengers with reduced mobility and wheelchair users.

2. SCOPE

These requirements shall apply to vehicles permitting easier access for persons with reduced mobility.

3. REQUIREMENTS.

3.1. Steps

The height of the first step from the ground of at least one service door shall not exceed 250 mm for vehicles of Class I and A and 320 mm for vehicles of class II, III and B.

As an alternative for vehicles of Class I and A, the first step from the ground shall not exceed 270 mm in two door openings, one entrance and one exit.

A kneeling system and/or retractable step may be engaged.

The height of the steps other than the first step from the ground at the abovementioned door(s), in an access passage and in a gangway, shall be not more than 200 mm for vehicles of Class I and A and 250 mm for vehicles of Class II, III and B.

The transition from a sunken gangway to a seating area shall not be considered to be a step.

3.2. Priority seats and space for passengers with reduced mobility

3.2.1. A minimum number of forward or rearward facing seats designated as priority seats for disabled passengers shall be situated in a position near to a service door(s) suitable for boarding and alighting. The minimum number of priority seats shall be four in Class I, two in Class II and Class III and one in Class A and B. A seat that folds out of the way when not in use shall not be designated as a priority seat. Paragraph 7.7.8.5.2. of annex 3 shall not apply to vehicles that comply with this requirement.

3.2.2. There shall be adequate space under, or adjacent to, at least one of the priority seats for a guide dog.

3.2.3. Armrests shall be fitted on seats between the seating position and the gangway and shall be capable of being moved easily out of the way to permit clear access to the seat.

Handrails or handholds shall be fitted adjacent to priority seats in such a way as to allow the passenger to grasp them easily.

3.2.4. The minimum width of a priority seat cushion, measured from a vertical plane passing through the centre of that seating position, shall be 220 mm on each side or, in the case of a continuous seat, 220 mm per seating position on each side.

3.2.5. The height of the uncompressed seat cushion relative to the floor shall be such that the distance from the floor to a horizontal plane tangent to the front upper surface of the seat cushion is between 400 mm and 500 mm.

3.2.6. The foot space at priority seating positions shall extend forward of the seat from a vertical plane through the forward edge of the seat cushion. The foot space shall not have a slope in any direction of more than 8 percent.

3.2.7. Each priority seating position shall have a free height of not less than 1300 mm for vehicles of Class I and A and 900 mm for vehicles of Class II, measured from the highest point of the uncompressed seat cushion. This free height shall extend over the vertical projection of the whole of the seat and the associated foot space. Intrusion of a seat back or other object into this space shall be permitted provided that a minimum clear vertical space extending 230 mm in front of the seat cushion is maintained. Where the priority seat is positioned facing a bulkhead more than 1200 mm in height this space shall be 300 mm.

3.3. Communication devices

3.3.1. Communication devices shall be placed adjacent to any priority seat and within any wheelchair area and shall be at a height between 700 mm and 1200 mm above the floor.

3.3.2. Communication devices situated in the low floor area shall be at a height between 800 mm and 1500 mm where there are no seats.

3.3.3. The control for all internal communication devices shall be capable of operation with the palm of the hand and shall be in a contrasting colour or colours and tone.

3.3.4. If a vehicle is fitted with a ramp or lift, a means of communication with the driver shall be fitted outside, adjacent to the door, and not higher than 1300 mm from the ground.

3.4. Pictograms

3.4.1. Vehicles fitted with a wheelchair space and/or priority seats shall have pictograms in accordance with annex 4, figure 23A visible from the outside, both on the front nearside of the vehicle and adjacent to the relevant service door(s). Appropriate pictograms will also be placed internally adjacent to the wheelchair space or to the priority seat.

3.5. Floor slope

The slope of any gangway, access passage or floor area between any priority seat or wheelchair space and at least one entrance and one exit or a combined entrance and exit shall not exceed 8 per cent. Such sloping areas shall be provided with a non-slip surface.

3.6. Wheelchair accommodation provisions

3.6.1. For each wheelchair user provided for in the passenger compartment there shall be a special area at least 750 mm wide and 1300 mm long. The longitudinal plane of the special area shall be parallel to the longitudinal plane of the vehicle and the floor surface of the special area shall be slip resistant.

In the case of a wheelchair space designed for a forward facing wheelchair, the top of preceding seat-backs may intrude into the wheelchair space if a clear space is provided as shown in annex 4, figure 23.

3.6.2. There shall be at least one doorway through which wheelchair users can pass. In the case of vehicles of Class I, at least one wheelchair access door shall be a service door. The wheelchair access door shall bear a boarding aid complying with the provisions of paragraph 3.11.2. (a kneeling system) of this annex; this shall be in combination with the provisions of paragraph 3.11.3. (a lift) or 3.11.4. (a ramp) of this annex.

3.6.3. A door for wheelchair access, that is not a service door, shall have a minimum height of 1400 mm. The minimum width of all doors providing wheelchair access to the vehicle shall be 900 mm which may be reduced by 100 mm when the measurement is made at the level of handholds.

3.6.4. It shall be possible to move from the outside of the vehicle through at least one of the doors for wheelchair access into the special area(s) with a reference wheelchair of the dimensions shown in annex 4, figure 21.

3.7. Seats in the wheelchair space

3.7.1. Folding seats may be fitted in a wheelchair space. However, such seats when folded and out of use shall not intrude into the wheelchair space.

3.7.2. A vehicle may be equipped with demountable seats fitted in the wheelchair space provided that such seats may be easily removed by the driver or a crew member.

3.7.3. Where the foot space of any seat, or part of a folding seat when in use, intrudes into a wheelchair space, those seats shall have a sign fixed on or adjacent to them with the following text:

"Please give up this space for a wheelchair user".

3.8. Stability of wheelchairs

3.8.1. Wheelchair restraint system. As an alternative to the requirements contained in paragraphs 3.8.1.1. to 3.8.1.2.3. restraint systems may comply with the requirements contained in paragraphs 3.8.2. to 3.8.2.11.

3.8.1.1. In a vehicle where passenger seats are not required to be fitted with any kind of occupant restraint system, the wheelchair space shall be fitted with a restraint system in order to warrant the stability of the wheelchair;

A static test shall be carried out in accordance with the following requirements:

- a) a force of $250 \text{ daN} \pm 20 \text{ daN}$ per wheelchair shall be applied on the restraint system itself;
- b) the force shall be applied in the horizontal plane of the vehicle and towards the front of the vehicle if the restraint system is not attached to the floor of the vehicle. If the restraint system is attached to the floor, the force shall be applied in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane and towards the front of the vehicle;
- c) the force shall be maintained for a period of not less than 1.5 seconds;
- d) the restraint system shall be capable of withstanding the test. Permanent deformation, including partial rupture or breakage of the restraint system, shall not constitute failure if the required force is sustained for the specified time. Where applicable, the locking device enabling the wheelchair to leave the vehicle shall be operable by hand after removal of the traction force.

3.8.1.2. When passenger seats are required with occupant restraint systems, each wheelchair space shall be provided with a restraint system capable of restraining the wheelchair and its occupant.

This restraint system and its anchorages shall be designed to withstand forces equivalent to the ones required for the passenger seats and occupant restraint systems.

A static test shall be carried out in accordance with the following requirements:

- a) the forces referred hereto shall be applied in forward and rearward directions, separately and on the restraint system itself;
- b) the force shall be maintained for a period of not less than 0.2 seconds;
- c) the restraint system shall be capable of withstanding the test. Permanent deformation, including partial rupture or breakage of the restraint system shall not constitute failure if the required force is sustained for the specified time. Where applicable, the locking device enabling the wheelchair to leave the vehicle shall be operable by hand after removal of the traction force.

3.8.1.2.1. In forward direction in the case of a separate wheelchair and wheelchair user restraint system

3.8.1.2.1.1. For category M₂:

- a) 1110 daN $\pm$ 20 daN in the case of a lap belt. The force shall be applied on the wheelchair user restraint system in the horizontal plane of the vehicle and towards the front of the vehicle if the restraint system is not attached to the floor of the vehicle. If the restraint system is attached to the floor, the force shall be applied in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle;
- b) 675 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and 675 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
- c) 1715 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
- d) the forces shall be applied simultaneously.

3.8.1.2.1.2. For category M₃:

- a) 740 daN $\pm$ 20 daN in the case of a lap belt. The force shall be applied on the wheelchair user restraint system in the horizontal plane of the vehicle and towards the front of the vehicle if the restraint system is not attached to the floor of the vehicle. If the restraint system is attached to the floor, the force shall be applied in an angle $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle;
- b) 450 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and 450 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
- c) 1130 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
- d) the forces shall be applied simultaneously.

3.8.1.2.2. In forward direction in the case of a combined wheelchair and wheelchair user restraint system.

3.8.1.2.2.1. For category M₂;

- a) 1110 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair user restraint system in the case of a lap belt;
- b) 675 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and 675 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
- c) 1715 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
- d) the forces shall be applied simultaneously.

3.8.1.2.2.2. For category M₃:

- a) 740 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair user restraint system in the case of a lap belt;
- b) 450 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the lap portion of the belt and 450 daN $\pm$ 20 daN in the horizontal plane of the vehicle and towards the front of the vehicle on the torso portion of the belt in the case of 3-point belt;
- c) 1130 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the front of the vehicle on the wheelchair restraint system;
- d) the forces shall be applied simultaneously.

3.8.1.2.3. In rearward direction:

- a) 810 daN $\pm$ 20 daN in an angle of $45^\circ \pm 10^\circ$ to the horizontal plane of the vehicle and towards the rear of the vehicle on the wheelchair restraint system.

3.8.2. Alternative wheelchair restraint system:

3.8.2.1. A wheelchair space shall be fitted with a wheelchair restraint system suitable for general wheelchair application and shall allow the carriage of a wheelchair and a wheelchair user facing the front of the vehicle;

3.8.2.2. A wheelchair space shall be fitted with a wheelchair user restraint system which shall comprise of a minimum of two anchorage points and a pelvic restraint (lap belt) designed and constructed of components intended to perform in a similar manner to those of a seat belt conforming to Regulation No. 16;

- 3.8.2.3. Any restraint system fitted to a wheelchair space shall be capable of being easily released in the case of an emergency;
- 3.8.2.4. Any wheelchair restraint system shall either:
 - 3.8.2.4.1. meet the dynamic test requirements described in paragraph 3.8.2.8. and be securely attached to vehicle anchorages meeting the static test requirements in paragraph 3.8.2.6.; or
 - 3.8.2.4.2. be securely attached to vehicle anchorages such that the combination of restraint and anchorages meets the requirements of paragraph 3.8.2.8.
- 3.8.2.5. Any wheelchair user restraint shall either:
 - 3.8.2.5.1. meet the dynamic test requirements described in paragraph 3.8.2.9. and be securely attached to vehicle anchorages meeting the static test requirements in paragraph 3.8.2.6.; or
 - 3.8.2.5.2. be securely attached to vehicle anchorages such that the combination of restraint and anchorages meets the dynamic test requirements described in paragraph 3.8.2.9. when attached to anchorages set up as described in paragraph 3.8.2.6.7.
- 3.8.2.6. A static test shall be carried out on the anchorage points for both the wheelchair restraint system and the wheelchair user restraint in accordance with the following requirements:
 - 3.8.2.6.1. the forces specified in paragraph 3.8.2.7. shall be applied by means of a device reproducing the geometry of the wheelchair restraint system;
 - 3.8.2.6.2. the forces specified in paragraph 3.8.2.7.3. shall be applied by means of a device reproducing the geometry of the wheelchair user restraint and by means of a traction device specified in paragraph 6.3.4. of Regulation No. 14.
 - 3.8.2.6.3. the forces in paragraph 3.8.2.6.1. and paragraph 3.8.2.6.2. shall be applied simultaneously in the forward direction and at an angle of $10^{\circ} \pm 5^{\circ}$ above the horizontal plane;
 - 3.8.2.6.4. the forces in paragraph 3.8.2.6.1. shall be applied in the rearward direction and at an angle of $10^{\circ} \pm 5^{\circ}$ above the horizontal plane;
 - 3.8.2.6.5. the forces shall be applied as rapidly as possible through the central vertical axis of the wheelchair space; and
 - 3.8.2.6.6. the force shall be maintained for a period of not less than 0.2 seconds.
 - 3.8.2.6.7. the test shall be carried out on a representative section of the vehicle structure together with any fitting provided in the vehicle which is likely to contribute to the strength or rigidity of the structure.
- 3.8.2.7. The forces specified in paragraph 3.8.2.6. are:

- 3.8.2.7.1. in the case of anchorages provided for a wheelchair restraint system fitted to a category M₂ vehicle:
 - 3.8.2.7.1.1. 1110 daN applied in the longitudinal plane of the vehicle and towards the front of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space, and
 - 3.8.2.7.1.2. 550 daN applied in the longitudinal plane of the vehicle and towards the rear of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space;
- 3.8.2.7.2. in the case of anchorages provided for a wheelchair restraint system fitted to a category M₃ vehicle
 - 3.8.2.7.2.1. 740 daN applied in the longitudinal plane of the vehicle and towards the front of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space, and
 - 3.8.2.7.2.2. 370 daN applied in the longitudinal plane of the vehicle and towards the rear of the vehicle at a height of not less than 200 mm and not more than 300 mm measured vertically from the floor of the wheelchair space;
- 3.8.2.7.3. in the case of anchorages provided for a wheelchair user restraint system the forces shall be in accordance with the requirements of paragraph 6.4. of Regulation No. 14.
- 3.8.2.8. A wheelchair restraint system shall be subject to a dynamic test carried out in accordance with the following requirements:
 - 3.8.2.8.1. a representative wheelchair test trolley of mass 85 kg shall, from a speed of between 48 km/h to 50 km/h to rest, be subject to a deceleration-time pulse:
 - 3.8.2.8.1.1. exceeding 20 g in the forward direction for a cumulative period of at least 0.015 seconds;
 - 3.8.2.8.1.2. exceeding 15 g in the forward direction for a cumulative period of at least 0.04 seconds;
 - 3.8.2.8.1.3. exceeding a duration of 0.075 seconds;
 - 3.8.2.8.1.4. not exceeding 28 g and for not more than 0.08 seconds;
 - 3.8.2.8.1.5. not exceeding a duration of more than 0.12 seconds, and
 - 3.8.2.8.2. a representative wheelchair test trolley of mass 85 kg shall, from a speed of between 48 km/h to 50 km/h to rest, be subject to a deceleration-time pulse:
 - 3.8.2.8.2.1. exceeding 5 g in the rearward direction for a cumulative period of at least 0.015 seconds;
 - 3.8.2.8.2.2. not exceeding 8 g in the rearward direction and for not more than 0.02 seconds;

- 3.8.2.8.3. the test in paragraph 3.8.2.8.2. shall not apply if the same restraints are used for the forward and rearward direction or if an equivalent test has been conducted;
- 3.8.2.8.4. for the above test, the wheelchair restraint system shall be attached to either:
- 3.8.2.8.4.1. anchorages fixed to the test rig which represents the geometry of the anchorages in a vehicle for which the restraint system is intended, or
- 3.8.2.8.4.2. anchorages forming part of a representative section of the vehicle for which the restraint system is intended, set up as described in paragraph 3.8.2.6.7.
- 3.8.2.9. A wheelchair occupant restraint shall comply with the test requirements specified in paragraph 7.7.4. of Regulation No. 16 or an equivalent test to the deceleration-time pulse in paragraph 3.8.2.8.1. A seat belt approved to Regulation No. 16 and so marked shall be deemed to comply.
- 3.8.2.10. A test in paragraph 3.8.2.6., 3.8.2.8. or 3.8.2.9. shall be deemed to have failed unless the following requirements are met:
- 3.8.2.10.1. no part of the system shall have failed, or shall have become detached from its anchorage or from the vehicle during the test;
- 3.8.2.10.2. mechanisms to release the wheelchair and user shall be capable of release after completion of the test;
- 3.8.2.10.3. in the test in paragraph 3.8.2.8. the wheelchair shall not move more than 200 mm in the longitudinal plane of the vehicle during the test;
- 3.8.2.10.4. no part of the system shall be deformed to such an extent after completion of the test that, because of sharp edges or other protrusions, the part is capable of causing injury.
- 3.8.2.11. Its operating instructions shall be clearly displayed adjacent to it.
- 3.8.3. In alternative to the provisions of paragraph 3.8.1.1., the wheelchair space shall be designed for the wheelchair user to travel unrestrained with the wheelchair facing rearwards against a support or backrest, in accordance with the following provisions:
- a) one of the longitudinal sides of the space for a wheelchair shall rest against a side or wall of the vehicle;
 - b) a support or backrest perpendicular to the longitudinal axis of the vehicle shall be provided in the forward end of the wheelchair space;
 - c) the support or backrest shall be designed for the wheels or the back of the wheelchair to rest against the support or backrest in order to avoid the wheelchair from tipping over;
 - d) the support or backrest of the seat row in front shall be able to withstand a force of $250 \text{ daN} \pm 20 \text{ daN}$ per wheelchair. The force shall be applied in the horizontal plane of the vehicle and towards the

front of the vehicle in the middle of the support or backrest. The force shall be maintained for a period of not less than 1.5 seconds;

- e) a handrail or handhold shall be fitted to the side or wall of the vehicle in such a way to allow the wheelchair user to grasp it easily;
- f) a retractable handrail or any equivalent device shall be fitted on the opposite side of the wheelchair space in order to restrict any lateral shift of the wheelchair and to allow the wheelchair user to grasp it easily;
- g) the floor surface of the special area shall be slip-resistant;
- h) a sign shall be fixed adjacent to the wheelchair area with the following text:

"This space is reserved for a wheelchair. The wheelchair must be placed facing rearwards resting against the support or backrest with the brakes on"

3.9. Door controls

- 3.9.1. Any opening control adjacent to a door referred to in paragraph 3.6., whether being outside or inside of the vehicle, shall not be higher than 1300 mm from the ground or the floor.

3.10. Lighting

- 3.10.1. Adequate lighting shall be provided to illuminate the area inside and immediately outside the vehicle to allow people with reduced mobility to board and alight in safety. Any lighting likely to affect the driver's vision shall operate only while the vehicle is at rest.

3.11. Provisions for boarding aids

3.11.1. General requirements:

- 3.11.1.1. The controls actuating the boarding aids shall be clearly marked as such. The extended or lowered position of the boarding aid shall be indicated by a tell-tale to the driver.
- 3.11.1.2. In the event of the failure of a safety device, lifts, ramps and kneeling systems shall be incapable of operation, unless they can be safely operated by manual effort. The type and location of the emergency operating mechanism shall be clearly marked. In the event of power failure, lifts and ramps must be capable of manual operation.
- 3.11.1.3. Access to one of the service or emergency doors on the vehicle may be obstructed by a boarding aid providing the following two conditions are satisfied from both inside and outside the vehicle.
 - 3.11.1.3.1. The boarding device does not obstruct the handle or other device for opening the door.

3.11.1.3.2. The boarding device can be readily moved to leave the doorway clear for use in an emergency.

3.11.2. Kneeling system

3.11.2.1. A switch shall be required to enable operation of the kneeling system.

3.11.2.2. Any control which initiates the lowering or raising of any part or the whole of the bodywork relative to the road surface must be clearly identified and be under the direct control of the driver.

3.11.2.3. The lowering or raising process shall be capable of being stopped and immediately reversed by a control both within the reach of the driver, whilst seated in the cab, and also adjacent to any other operating controls provided for the operation of the kneeling system.

3.11.2.4. Any kneeling system, which is fitted to a vehicle shall not:

allow the vehicle to be driven at a speed of more than 5 km/h when the vehicle is lower than the normal height of travel, or

allow the vehicle to be raised or lowered when the operation of the service door is prevented for any reason.

3.11.3. Lift

3.11.3.1. General provisions

3.11.3.1.1. Lifts shall only be capable of operation when the vehicle is at standstill. When raising of the platform and before lowering is initiated a device preventing the wheelchair from rolling off shall automatically come into operation.

3.11.3.1.2. The lift platform shall not be less than 800 mm wide, and not less than 1200 mm long and shall be capable of operating when carrying a mass of at least 300 kg.

3.11.3.2. Additional technical requirements for power-operated lifts

3.11.3.2.1. The operating control shall be designed in such a way that, if released, it automatically returns to the off position. As it does so the movement of the lift shall immediately be stopped and it shall be possible to initiate a movement in either direction.

3.11.3.2.2. A safety device (e.g. reversing mechanism) shall protect areas not visible to the operator, where the movement of the lift might trap or crush objects.

3.11.3.2.3. In the event of one of these safety devices coming into operation, the movement of the lift shall immediately be stopped and movement in the opposite direction initiated.

3.11.3.3. Operation of power operated lifts

- 3.11.3.3.1. Where the lift is at a service door situated within the direct field of vision of the driver of the vehicle, the lift may be operated by the driver when in the driver's seat.
- 3.11.3.3.2. In all others cases, the controls shall be adjacent to the lift. They shall be capable of being activated and deactivated only by the driver from his seat.
- 3.11.3.4. Manually operated lift
- 3.11.3.4.1. The lift shall be designed for operation by controls adjacent to the lift.
- 3.11.3.4.2. The lift shall be so designed that excessive forces are not required to operate it.
- 3.11.4. Ramp
- 3.11.4.1. General provisions
- 3.11.4.1.1. The ramp shall only be capable of operation when the vehicle is at standstill.
- 3.11.4.1.2. Edges on the outside shall be rounded to a radius of no less than 2.5 mm. Corners on the outside shall be rounded to a radius of not less than 5 mm.
- 3.11.4.1.3. The ramp shall be at least 800 mm wide. The slope of the ramp, when extended or folded out on to a kerb of 150 mm in height, should not exceed 12 per cent. A kneeling system may be used to achieve this test.
- 3.11.4.1.4. Any ramp which when ready for use exceeds 1200 mm in length shall be fitted with a device to prevent the wheelchair rolling off the sides.
- 3.11.4.1.5. Any ramp shall be capable of operating safely with a load of 300 kg.
- 3.11.4.2. Modes of operation
- 3.11.4.2.1. Extension and retraction of the ramp may be carried out either manually or power-operated.
- 3.11.4.3. Additional technical requirements for power-operated ramps
- 3.11.4.3.1. Extension and retraction of the ramp shall be indicated by flashing yellow lights and an audible signal; the ramps shall be identifiable by clearly visible red and white retro-reflecting hazard markings on the outer edges.
- 3.11.4.3.2. Extension of the ramp in the horizontal direction shall be protected by a safety device.
- 3.11.4.3.3. In the event of one of these safety devices coming into operation, the movement of the ramp shall immediately be stopped.
- 3.11.4.3.4. The horizontal movement of a ramp shall be interrupted when it is loaded with a mass of 15 kg.
- 3.11.4.4. Operation of power-operated ramps

- 3.11.4.4.1. Where the ramp is at a service door situated within the direct field of vision of the driver of the vehicle, the ramp may be operated by the driver when in the driver's seat.
- 3.11.4.4.2. In all others cases, the controls shall be adjacent to the ramp. They shall be capable of being activated and deactivated only by the driver from his seat.
- 3.11.4.5. Operation of manually-operated ramp
- 3.11.4.5.1. The ramp shall be so designed that excessive forces are not required to operate the ramp.

ANNEX 9**SPECIAL REQUIREMENTS FOR DOUBLE-DECK VEHICLES**

This annex contains the requirements for double-deck vehicles, where these differ from the basic requirements of Annex 3. The paragraphs or subparagraphs below shall replace those paragraphs or subparagraphs with equivalent numbers in Annex 3. Unless otherwise stated below, all the other requirements of Annex 3 shall apply to double-deck vehicles. The numbering of paragraphs below follows that of Annex 3.

7.4.2.1. Loads equal to Q (as defined in paragraph 7.4.3.3.1. of annex 11) shall be placed on each upper deck passenger seat. If the vehicle is intended to be used with a crew member who is not seated, the centre of gravity of the mass of 75 kg representing the crew member shall be placed in the upper deck gangway at a height of 875 mm. The baggage compartments shall not contain any baggage.

7.5.4. Fire extinguishers and first-aid equipment

7.5.4.1. Space shall be provided for the fitting of two fire extinguishers, one being near the driver's seat and one on the upper deck. The space shall be not less than 15 dm³.

7.6. Exits

7.6.1. Number of exits

7.6.1.1. Every double-deck vehicle shall have two doors on the lower deck, (see **also** paragraph 7.6.2.2.). The minimum number of service doors required is as follows:

Number of passengers	Number of service doors on a double-deck vehicle		
	Classes I and A	Class II	Classes III and B
9 - 45	1	1	1
46 - 70	2	1	1
71 - 100	2	2	1
> 100	4	3	1

7.6.1.4. The minimum number of emergency exits shall be such that the total number of exits is as follows, the number of exits for each separate deck and each separate compartment being determined separately. Toilet compartments or galleys are not considered to be separate compartments for the purposes of defining the number of emergency exits. Escape hatches can only count as one of the abovementioned number of emergency exits:

Number of passengers and crew per compartment to be accommodated in each compartment or deck	Minimum total number of emergency exits
1 - 8	2
9 - 16	3
17 - 30	4
31 - 45	5
46 - 60	6
61 - 75	7
76 - 90	8
91 - 110	9
111 - 130	10
> 130	11

- 7.6.1.11. Escape hatches, additional to the emergency doors and windows, shall be fitted in the roof of the upper deck of Class II and Class III vehicles. They may also be fitted in the case of Class I vehicles. In such case the minimum number of hatches shall be:

Total number of passengers in the upper deck (A_a)	Number of hatches
not exceeding 50	1
exceeding 50	2

- 7.6.1.12. Each intercommunication staircase shall be considered to be an exit from the upper deck.
- 7.6.1.13. All persons accommodated in the lower deck must in an emergency situation, have access to the exterior of the vehicle without having to enter the upper deck.
- 7.6.1.14. The upper deck gangway shall be connected by one or more intercommunication staircases to the access passageway of a service door or to the lower deck gangway within 3m of a service door:
- two, or at least one and-one-half staircases, shall be provided in Class I and Class II vehicles if more than 50 passengers are carried on the upper deck;
 - Two, or at least one and-one-half, staircases are to be provided in Class III vehicles if more than 30 passengers are carried on the upper deck.

7.6.2. Siting of exits

7.6.2.2. Two of the doors referred to in paragraph 7.6.1.1. shall be separated such that the distance between transverse vertical planes through their centres of area is not less than either 25 per cent of the overall length of the vehicle or 40 percent of the overall length of the passenger compartment on the lower deck; this shall not apply if the two doors are on different sides of the vehicle. If one of these two doors forms part of a double door, this distance shall be measured between the two doors which are furthest apart.

7.6.2.3. The exits on every deck shall be placed in such a way that their number on each of the two sides of the vehicle is substantially the same.

7.6.2.4. In each upper deck, at least one emergency exit shall be situated either in the rear face or in the front face of the vehicle respectively.

7.6.4. Technical requirements for all service doors

7.6.4.6. If the direct view is not adequate, optical or other devices shall be installed to enable the driver to detect from his seat the presence of a passenger in the immediate exterior vicinity of every service door which is not an automatically-operated service door. In the case of vehicles of Class I, this requirement also applies to the interior of all service doors and to the immediate vicinity of each intercommunication staircase on the upper deck.

7.6.7. Technical requirements for emergency doors

7.6.7.3. Every control or device for opening an emergency door on the lower deck from the outside shall be between 1000 mm and 1500 mm from the ground and not more than 500 mm from the door. In vehicles of Classes I, II and III every control or device for opening a emergency door from the inside shall be between 1000 mm and 1500 mm from the upper surface of the floor or step nearest to the control and be not more than 500 mm from the door. This shall not apply to controls located within the driver's area.

7.7.5. Gangways (see figure 1)

7.7.5.1. The gangways of a vehicle shall be so designed and constructed as to permit the free passage of a gauging device consisting of two co-axial cylinders with an inverted truncated cone interposed between them, the gauging device having the following dimensions (in mm):

	Class I */		Class II */		Class III */	
Upper/lower deck:	UD	LD	UD	LD	UD	LD
Diameter of lower cylinder	450	450	350	350	300	300
Height of lower cylinder	900	1020 (900/ 990)	900	1020 (900/ 990)	900	1 020 (900/ 990)
Diameter of upper cylinder	550	550	550	550	450	450
Height of upper cylinder	500	500	500	500	500	500
Overall height	1680	1800 (1680/ 1770)	1680	1800 (1680/ 1770)	180	1800 (1680/ 1770)

*/ Dimensions in brackets apply for the rearmost part of the lower deck and near the front axle only (see paragraph 7.7.5.10.)

The gauging device may come into contact with strap hangers for standing passengers, if fitted, and move them away. The diameter of the upper cylinder may be reduced at the top to 300 mm when a chamfer not exceeding 30 degrees from the horizontal is included (figure 1)

7.7.5.4. On articulated buses or coaches, the gauging device defined in paragraph 7.7.5.1. shall be able to pass unobstructed through the articulated section on any deck where the two sections permit through passage by passengers. No part of the soft covering of that section, including parts of bellows, shall project into the gangway.

7.7.5.10. The overall height of the gauging device of paragraph 7.7.5.1. may be reduced:

- a) from 1800 mm to 1680 mm in any part of the gangway of the lower deck to the rear of a transverse vertical plane situated 1500 mm forward to the centre of the rear axle (foremost rear axle in the case of vehicles with more than one rear axle),
- b) from 1800 mm to 1770 mm in the case of a service door which is situated forward the front axle in any part of the gangway situated between two transverse vertical planes situated 800 mm forwards and behind the centre line of the front axle.

7.7.7. Steps

7.7.7.1. Footnote 1/: 850 mm maximum in the case of an emergency door in the lower deck and 1500 mm maximum in the case of the emergency door in the upper deck.

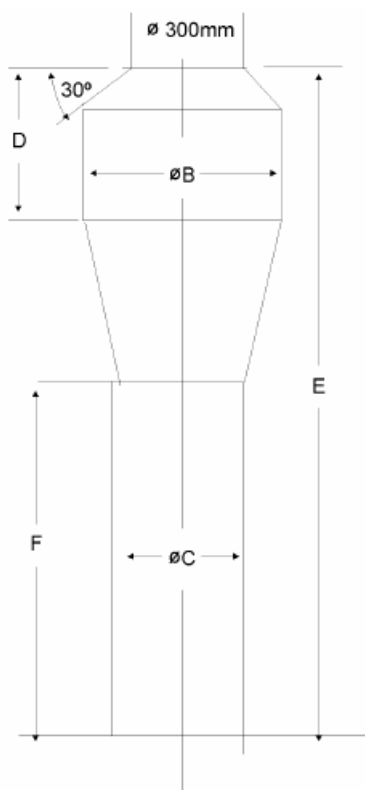
7.7.8.6. Free height over seating positions.

- 7.7.8.6.1. Each seating position shall have a free height of not less than 900 mm measured from the highest point of the uncompressed seat cushion. This free height shall extend over the vertical projection of the whole area of the seat and the associated foot space. In the case of the upper deck, this free height may be reduced to 850 mm.
- 7.7.12. Intercommunication staircase (see annex 4, figure 1).
- 7.7.12.1. The minimum width of any intercommunication staircase shall be so designed as to permit the free passage of the single door access template as defined in figure 1 of annex 4. The panel shall be moved starting from the gangway of the lower deck up to the last step, in the probable direction of motion of a person using the staircase.
- 7.7.12.2. Intercommunication staircases shall be so designed, that, during heavy braking of the vehicle moving in the forward direction, there is no danger of a passenger being projected downwards.
- This requirement is considered to be fulfilled if at least one of the following conditions is met:
- 7.7.12.2.1. no part of the staircase is forward descending;
- 7.7.12.2.2. the staircase is equipped with guards or a similar provision;
- 7.7.12.2.3. there is an automatic device in the upper part of the staircase which prevents the use of the staircase when the vehicle is in motion; this device shall be easily operable in an emergency.
- 7.7.12.3. It shall be verified, by use of the cylinder of paragraph 7.7.5.1., that access conditions from the gangways (upper and lower) to the staircase are adequate.
- 7.11. Handrails and handholds
- 7.11.5. Handrails and handholds for intercommunication staircases.
- 7.11.5.1. Suitable handrails or handholds shall be provided at each side of all intercommunication staircases. These shall be positioned between 800 mm and 1100 mm above the tread edge of each step.
- 7.11.5.2. The handrails and/or handholds to be provided shall be such that they include a grasping point available to a person standing on the lower or upper deck adjacent to the intercommunication staircase, and at any of the successive steps. Such points shall be situated vertically between 800 mm and 1100 mm above the lower deck or each above the surface of each step, and,
- 7.11.5.2.1. for the position appropriate to a person standing on the lower deck, not more than 400 mm inwards from the outer edge of the first step, and

- 7.11.5.2.2. for the position appropriate to a particular step, not outwards from the outer edge of the step considered, and not more than 600 mm inwards from the same edge.
- 7.12. Guarding of step wells and exposed seats
- 7.12.2. On the upper deck of a double-deck vehicle, the intercommunication staircase well shall be protected by an enclosed guard having a minimum height of 800 mm measured from the floor. The lower edge of the guard shall not be more than 100 mm from the floor.
- 7.12.3. The front windscreen ahead of passengers occupying upper deck front seats must be provided with a padded guard. The higher edge of that protection shall be situated vertically between 800 mm and 900 mm above the floor where the passenger's feet rest.
- 7.12.4. The riser of each step in a staircase shall be closed.

ANNEX 9AppendixFigure 1

GANGWAYS
(see paragraph 7.7.5. of annex 9.)



	B (mm)	C (mm)	D (mm)	E (mm) (1/)	F (mm)
Class I	550	450	500	1800 (1680/1770)	1020 (900/990)
Class II	550	350	500	1800 (1680/1770)	1020 (900/990)
Class III	450	300 (220 in the case of laterally movable seats)	500	1800 (1680/1770)	1020 (900/990)

(1/) Dimensions in brackets apply for upper deck only and/or the rearmost part of the lower deck and/or the lower deck near the front axle only (see paragraph 7.7.5.10.).

ANNEX 10**TYPE-APPROVAL FOR A SEPARATE TECHNICAL UNIT AND TYPE-APPROVAL
OF A VEHICLE FITTED WITH A BODYWORK ALREADY APPROVED AS A
SEPARATE TECHNICAL UNIT**

1. Separate technical unit type-approval.
 - 1.1. In order to be granted separate technical unit type-approval to this Regulation for a vehicle bodywork, the manufacturer must demonstrate to the satisfaction of the approval authority the accomplishment of the conditions declared by the manufacturer. The remaining conditions to this Regulation must be accomplished and demonstrated according to paragraph 2.
 - 1.2. Approval may be granted subject to conditions to be met by the completed vehicle (such as, for example, characteristics of suitable chassis, restriction on use or installation), these restrictions being recorded on the approval certificate.
 - 1.3. Any such conditions must be communicated to the purchaser of the vehicle bodywork or the next stage builder of the vehicle in an appropriate form.
2. Type-approval of a vehicle fitted with a bodywork already approved as a separate technical unit.
 - 2.1. In order to be granted type-approval to this Regulation for a vehicle fitted with a bodywork which has already been granted approval as a separate technical unit, the manufacturer must demonstrate to the satisfaction of the approval authority compliance with the requirements of this Regulation that would not have already been accomplished and demonstrated according to paragraph 1., considering any previous type-approval as uncompleted vehicle.
 - 2.2. Any requirements established according to paragraph 1.2. must be fulfilled.

ANNEX 11**MASSES AND DIMENSIONS**

1. This annex applies to the masses and dimensions of motor vehicles of categories M2 and M3 in so far as they are necessary for the approval of a vehicle in respect of its general construction.

2. DEFINITIONS

For the purposes of this annex:

2.1. (Reserved)

2.2. (Reserved)

2.3. "Group of axles" means axles being part of a bogie. A two-axle group is called a tandem and a tri-axle group a tri-axle bogie. By convention, a solo axle is considered as a group of one axle.

2.4. Vehicles dimensions means the dimensions of the vehicle based on its construction, as stated by manufacturer.

2.4.1. "Vehicle length" is a dimension which is measured according to ISO standard 612-1978, term No 6.1.

In addition to the provisions of that standard, when measuring the vehicle length the following devices must not be taken into account:

- wiper and washer devices,
- front or rear marking-plates,
- customs sealing devices and their protection,
- devices for securing the tarpaulin and their protection,
- lighting equipment,
- mirrors and other devices for indirect vision,
- watching aids,
- air-intake pipes,
- length stops for demountable bodies,
- access steps and hand-holds,
- ram rubbers and similar equipment,
- lifting platforms, access ramps and similar equipment in running order, not exceeding 300 mm, provided that the loading capacity of the vehicle is not increased,
- coupling devices for motor vehicles,
- trolley booms of electrically-propelled vehicles,
- external sun visors.

2.4.2. "Vehicle width" is a dimension which is measured according to ISO standard 612-1978, term No. 6.2.

In addition to the provisions of that standard, when measuring the vehicle width the following devices must not be taken into account:

- customs sealing devices and their protection,
- devices for securing the tarpaulin and their protection,
- tyre failure tell-tale devices,
- protruding flexible parts of a spray-suppression,
- lighting equipment,
- access ramps in running order, lifting platforms and similar equipment in running order provided that they do not exceed 10 mm from the side of the vehicle and the corners of the ramps facing forwards or rearwards are rounded to a radius of not less than 5 mm; the edges must be rounded to a radius of not less than 2.5 mm,
- mirrors and other devices for indirect vision,
- tyre-pressure indicators,
- retractable steps,
- the deflected part of the tyre walls immediately above the point of contact with the ground,
- watching aids,
- retractable lateral guidance devices on buses and coaches intended for use on guided bus systems, if not retracted.

2.4.3. "Vehicle height" is a dimension which is measured according to ISO standards 612-1978, term No. 6.3.

In addition to the provisions of that standard, when measuring the vehicle height the following devices must not be taken into account:

- aerials,
- pantographs or trolley booms in their elevated position.

For vehicles with an axle-lift device, the effect of this device must be taken into account."

2.5. (Reserved)

2.6. (Reserved)

2.7. "Technically permissible maximum mass on the axle (m)" means the mass corresponding to the maximum permissible static vertical load exerted by the axle on the road surface, based on the construction of the vehicle and of the axle and as stated by the vehicle manufacturer.

2.8. "Technically permissible maximum mass on a group of axles (μ)" means the mass corresponding to the maximum permissible static vertical load exerted by the group of axles on the road surface, based on both the construction of the vehicle and of the group of axles and as stated by the vehicle manufacturer.

2.9. "Towable mass" means the total load exerted on the road surface by the axle(s) of the towed vehicle(s).

- 2.10. "Technically permissible maximum towable mass (TM)" means the maximum towable mass stated by the manufacturer.
- 2.11. "Technically permissible maximum mass on the coupling point of a motor vehicle" means the mass corresponding to the maximum permissible static vertical load on the coupling point based on the construction of the motor vehicle and/or coupling device and as stated by the manufacturer. By definition, this mass does not include the mass of the coupling device of the motor vehicle.
- 2.12. (Reserved)
- 2.13. "Technically permissible maximum laden mass of the combination (MC)" means the total mass of a combination of motor vehicle and trailer(s) as stated by the manufacturer.
- 2.14. "Axle-lift device" means a device permanently fitted to a vehicle for the purpose of reducing or increasing the load on the axle(s), according to the loading conditions of the vehicle:
- a) either by raising the wheels clear off the ground/lowering them to the ground,
 - b) or without raising the wheels off the ground, (e.g. in the case of air suspension systems, or other systems),
- in order to reduce the wear on the tyres when the vehicle is not fully laden, and/or make starting (moving off) on slippery ground easier for motor vehicles or vehicle combinations, by increasing the load on the driving axle.
3. (Reserved)
4. (Reserved)
5. (Reserved)
6. (Reserved)
7. REQUIREMENTS
- 7.1. Measurement of the mass of the vehicle in running order and of its distribution among the axles

The mass of the vehicle in running order and its distribution on the axles are measured on the vehicle(s) submitted in accordance with paragraph 3.4. of this Regulation placed in a stationary position with their wheels set straight ahead. If the measured masses differ by no more than 3 per cent from the masses stated by the manufacturer for the corresponding technical configurations within the type, or by no more than 5 per cent if the vehicle is of category M2 not exceeding 3500 kg, the masses in running order and their distribution among the axles as stated by the manufacturer are used for the purpose of the requirements below. Otherwise the measured masses must be

used and the technical service may then, if necessary, carry out additional measurements on vehicle(s) other than those submitted in accordance with paragraph 3.4. of this Regulation.

7.2. (Reserved)

7.3. (Reserved)

7.4. Mass distribution calculations

7.4.1. Calculation procedure

7.4.1.1. For the purpose of the mass distribution calculations hereafter laid down, the manufacturer must provide the technical service in charge of the tests, with the information (in tabular or any other appropriate form) necessary to identify for each technical configuration within the vehicle type the corresponding technically permissible maximum laden mass of the vehicle, the technically permissible maximum masses on the axles and groups of axles, the technically permissible maximum towable mass, and the technically permissible maximum laden mass of the combination.

7.4.1.2. Suitable calculations must be carried out in order to make sure that the following requirements are fulfilled for each technical configuration within the type. For this purpose, the calculations may be limited to the worst cases.

7.4.1.3. In the following requirements, the notations M , m_i , μ_j , TM , and MC respectively designate the following parameters, for which the requirements of 7.4 must be fulfilled:

M = the technically permissible maximum laden mass of the vehicle,

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

μ_j = the technically permissible maximum mass on the solo axle or group of axles designated 'j', where 'j' varies from 1 to the total number of solo axles and groups of axles,

TM = the technically permissible maximum towable mass, and

MC = the technically permissible maximum laden mass of the combination.

7.4.1.4. In the case of a solo axle, designated 'i' as an axle and 'j' as a group of axles, $m_i = \mu_j$ by definition.

7.4.1.5. In the case of vehicles fitted with loadable axles, the following calculations must be carried out with the suspension of the axles loaded in the normal running configuration. In the case of vehicles fitted with retractable axles, the following calculations are carried out with the axles lowered.

7.4.1.6. For groups of axles, the manufacturer must indicate the laws of distribution among the axles of the total mass applied on to the group (for instance by stating the distribution formulae or producing distribution graphs).

- 7.4.1.7. (Reserved)
- 7.4.2. (Reserved – See 7.4.3.1 and 7.4.4 below)
- 7.4.2.1. The sum of the masses m_i must not be less than the mass M .
- 7.4.2.2. For each group of axles designated 'j', the sum of the masses m_i on its axles must not be less than the mass μ_j . In addition, each of the masses m_i must not be less than the part of μ_j applying on the axle 'i' as determined by the mass distribution laws for that group of axles.
- 7.4.2.3. The sum of the masses μ_j must not be less than the mass M .
- 7.4.2.4. The mass in running order, plus the mass corresponding to 75 kg multiplied by the number of passengers, plus the technically permissible maximum mass on the coupling point, must not exceed the mass M .
- 7.4.2.5. (Reserved)
- 7.4.2.6. (Reserved)
- 7.4.2.7. MC must not exceed $M + TM$.
- 7.4.3. Requirements for buses and coaches
- 7.4.3.1. The requirements of paragraphs 7.4.2.1. to 7.4.2.3., and of 7.4.2.7., apply.
- 7.4.3.2. The mass of the vehicle in running order, plus the mass Q multiplied by the number of seated and standing passengers, plus the masses WP , B and BX as defined in paragraph 7.4.3.3.1., plus the technical permissible maximum mass on the coupling point, if a coupling is fitted by the manufacturer, shall not exceed the mass M .
- 7.4.3.3. When the vehicle in running order is laden as described in paragraph 7.4.3.3.1., the mass corresponding to the load on each axle must not exceed the mass m_i on each axle, and the mass corresponding to the load on each solo axle or group of axles must not exceed the mass μ_j on that group of axles. Moreover, the mass corresponding to the load on the driving axle or the sum of masses, corresponding to the loads on the driving axles must be at least 25 per cent of M .
- 7.4.3.3.1. The vehicle in running order is loaded with: a mass corresponding to the number P of seated passengers, of mass Q ; a mass corresponding to the number SP of standing passengers, of mass Q uniformly distributed over the surface available for standing passengers S_1 ; where appropriate, a mass WP uniformly distributed over each wheelchair space; a mass equal to B (kg) uniformly distributed in the baggage compartments; a mass equal to BX (kg) uniformly distributed over the surface area of the roof equipped for the carriage of baggage, where:
- P is the number of seating places.

S_1 is the area for standing passengers. In the case of vehicles of classes III or B, $S_1 = 0$.

SP, declared by the manufacturer, must not exceed the value S_1/S_{Sp} , where S_{Sp} is the conventional space provided for one standing passenger specified in the table below.

WP (kg), is the number of wheelchair spaces multiplied by 250 kg representing the mass of a wheelchair and user.

B (kg), declared by the manufacturer, must have a numeric value not less than $100 \times V$. This shall include baggage compartments or racks that may be attached to the outside of the vehicle.

V is the total volume of baggage compartments in m³. When approving a vehicle of

Class I or A, the volume of baggage compartments accessible only from the outside of the vehicle shall be disregarded.

BX, declared by the manufacturer, must have a numeric value not less than 75 kg/m².

Double deck vehicles shall not be equipped for the carriage of baggage on the roof and therefore BX for double deck vehicles shall be zero.

Q and S_{Sp} have values laid down in the following table:

Vehicle class	Q (kg) mass of one passenger	S_{Sp} (m ² /passenger) conventional space for one standing passenger
Class I and A	68	0.125
Class II	71 */	0.15
Class III and B	71 */	None

*/ Including 3 kg for hand baggage.

7.4.3.3.2. In the case of a vehicle equipped with a variable seating capacity, area available for standing passengers (S_1) and/or equipped for the carriage of wheelchairs, the requirements of sections 7.4.3.2 and 7.4.3.3 shall be determined for each of the following conditions as applicable:

7.4.3.3.2.1. with all possible seats occupied followed by the remaining area for standing passengers (up to the standing capacity limit declared by the manufacturer, if reached) and, if space remains, any wheelchair spaces occupied;

7.4.3.3.2.2. with all possible standing areas occupied (up to the standing capacity limit declared by the manufacturer) followed by the remaining seats available for seated passengers and, if space remains, any wheelchair spaces occupied;

7.4.3.3.2.3. with all possible wheelchair spaces occupied followed by the remaining area for standing passengers (up to the standing capacity limit declared by the manufacturer, if reached) and then the remaining seats available for use occupied.

7.4.3.4. When the vehicle is in running order or laden as specified in section 7.4.3.3.1, the mass corresponding to the load on the front axle or group of axles must not be less than the percentage of the mass of the vehicle in running order or of the technically permissible maximum laden mass 'M' laid down in the following table:

Classes I and A		Class II		Classes III and B	
Rigid	Articulated	Rigid	Articulated	Rigid	Articulated
20	20	25 (1)	20	25 (1)	20

(1) This figure is reduced to 20% for 3 axle vehicles of classes II and III having two steered axles.

7.4.3.5. Where a vehicle is to be approved to more than one Class, paragraphs 7.4.3.2. and 7.4.3.3 shall apply to each Class.

7.4.4. (Reserved)

7.5. (Reserved)

7.6. Manoeuvrability

7.6.1. Any motor vehicle must be able to manoeuvre on either side for a complete circular trajectory of 360° inside an area defined by two concentric circles, the outer circle having a radius of 12.50 m and the inner circle having a radius of 5.30 m, without any of the vehicle's outermost points (with the exception of the protruding parts excluded from the measurement the vehicle width) projecting outside the circumferences of the circles. For motor vehicles with axle-lift devices, this requirement also applies with the retractable axle(s) in the lifted position or loadable axle(s) in the unladen condition.

The abovementioned requirements must be verified as follows:

7.6.1.1. Motor vehicles

The outermost front point of the motor vehicle must be guided along the contour of the outer circle (see figure A).

7.6.1.2. (Reserved)

7.6.2. (Reserved)

7.6.3. Additional requirements for vehicles of categories M2 or M3

There are two alternative methods of proving compliance with this paragraph – 7.6.3.1 (A) or 7.6.3.1 (B) below.

The United Kingdom and Portugal may, within their territory until 9 March 2005, refuse to grant national type-approval of a vehicle type, or refuse or prohibit the sale, registration, entry into service or use of a vehicle if the vehicle does not comply with the manoeuvrability criteria specified in paragraph 7.6.3.1. (B) below.

With the above exceptions, Contracting Parties shall grant approvals on the basis of paragraph 7.6.3.1. (A).

- 7.6.3.1. (A) With the vehicle stationary, a vertical plane tangential to the side of the vehicle and facing outwards from the circle shall be established by marking a line on the ground. In the case of an articulated vehicle, the two rigid portions shall be aligned with the plane. When the vehicle moves from a straight line approach into the circular area described in paragraph 7.6.1., no part of it shall move outside of that vertical plane by more than 0,60 m (see figures B and C).

Figure A

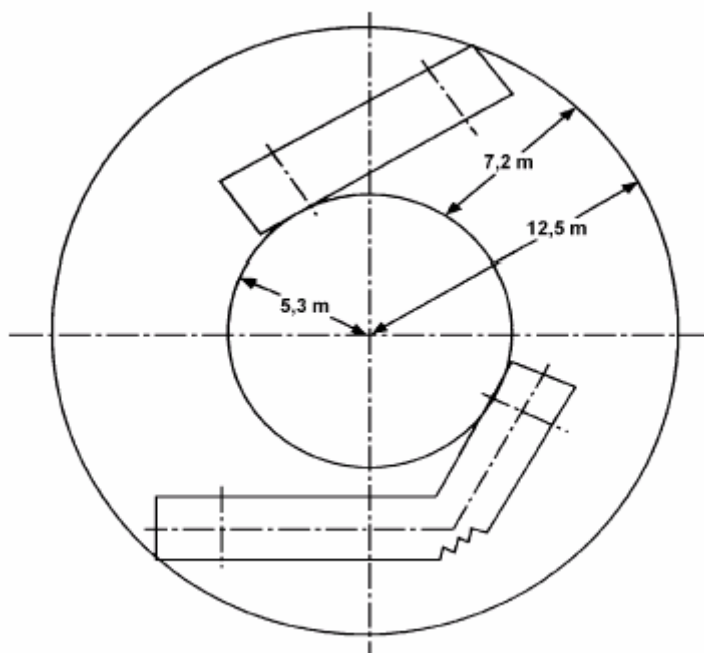
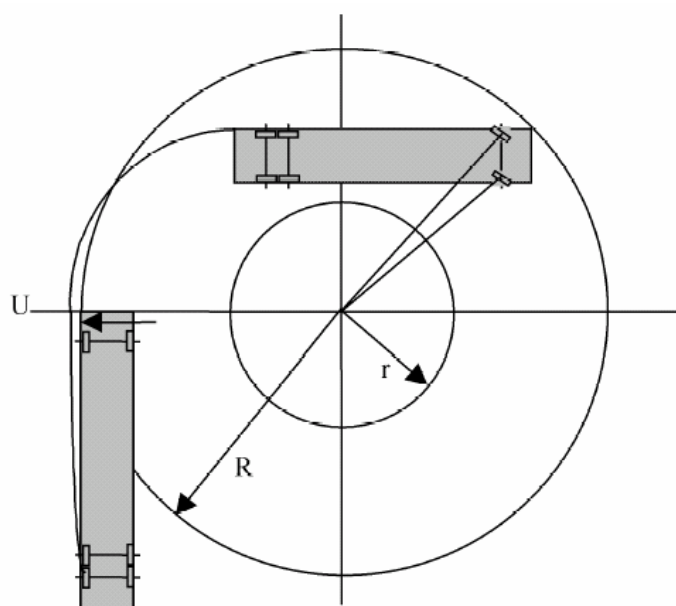
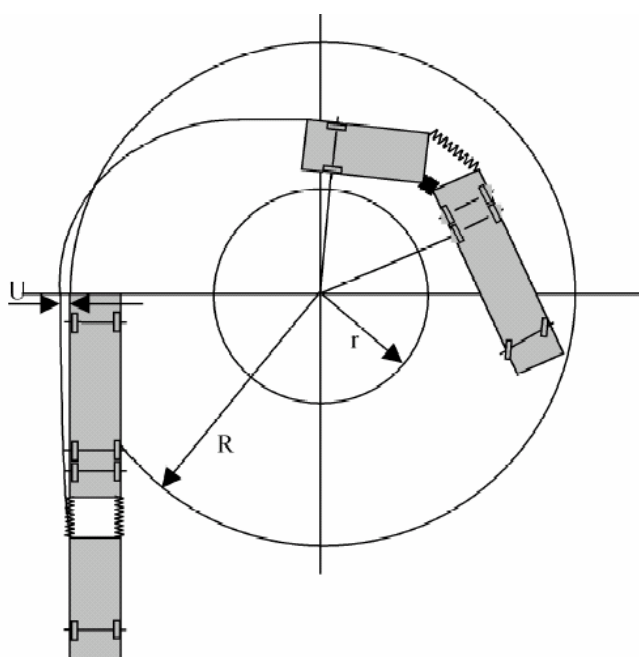


Figure B

$$R = 12.5 \text{ m}$$

$$r = 5.3 \text{ m}$$

$$U = \text{maximum } 0.6 \text{ m}$$

Figure C

$$R = 12.5 \text{ m}$$

$$r = 5.3 \text{ m}$$

$$U = \text{maximum } 0.6 \text{ m}$$

7.6.3.1. (B) When the vehicle is stationary and has its steered wheels so directed that if the vehicle moved, its outermost forward point would describe a circle of 12.50 m radius, a vertical plane tangential to the side of the vehicle which faces outwards from the circle must be established by marking a line on the ground. In the case of

an articulated vehicle of category M2 or M3, the two rigid portions must be aligned with the plane.

When the vehicle moves forward on either side following the circle of 12.50 m radius, no part of it may move outside the vertical plane by more than 0.80 m (see Figure B) in the case of a rigid vehicle up to 12 m in length or by more than 1.20 m (see Figure C) in the case of a rigid vehicle of over 12 m in length or an articulated vehicle of category M2 or M3.

For vehicles with an axle-lift device this requirement also applies to the axle(s) in the lifted position (within the meaning of paragraph 2.14.).

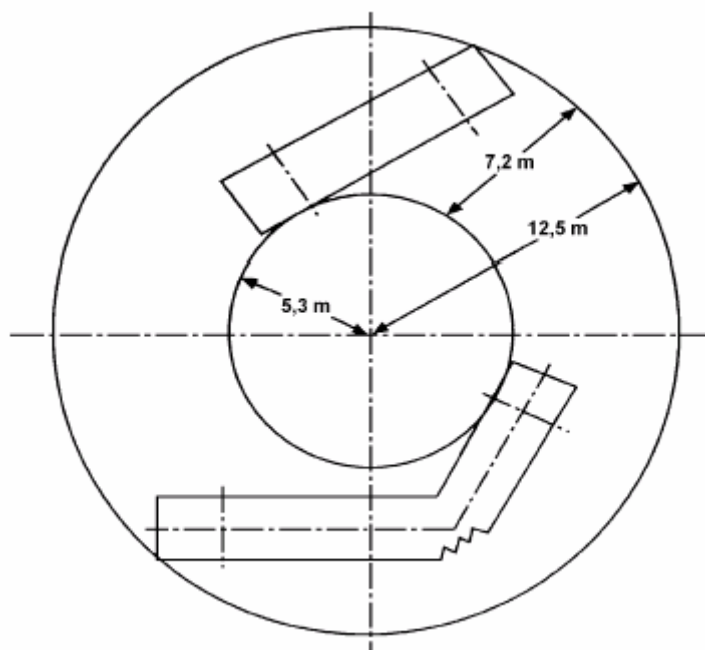
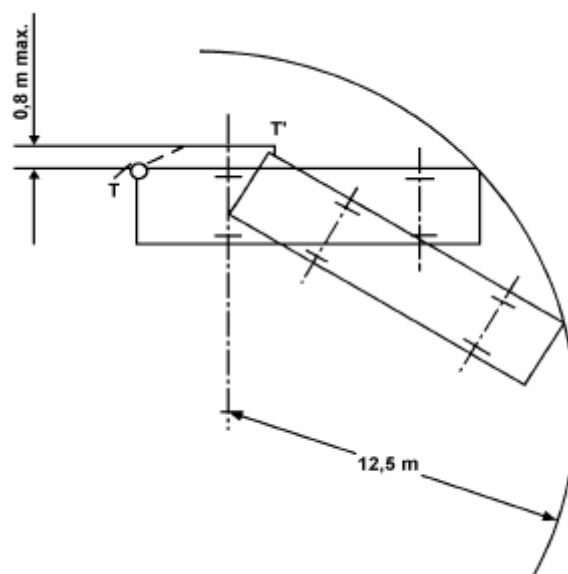
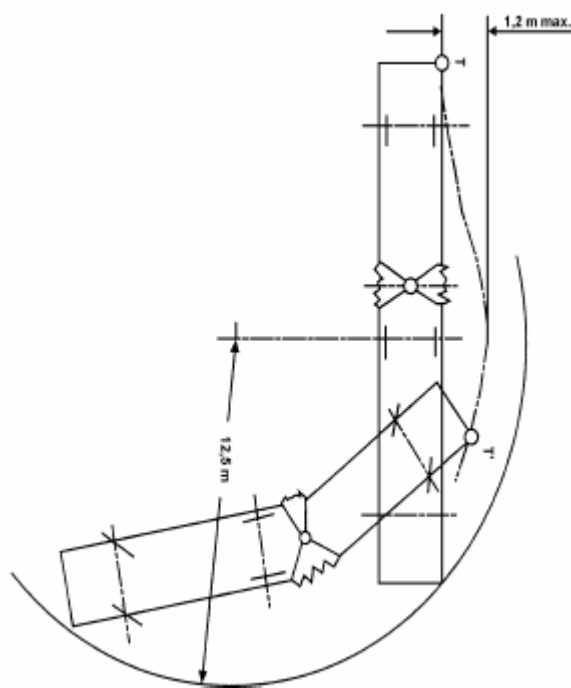
Figure AFigure B

Figure C

- 7.6.4. The requirements of paragraphs 7.6.1. to 7.6.3. may also be verified, at the request of the manufacturer, with an appropriate equivalent calculation or geometric demonstration.
- 7.6.5. In the case of incomplete vehicles, the manufacturer must declare the maximum permissible dimensions for which the vehicle is to be checked against the requirements of 7.6.1. to 7.6.3.
- 7.7. (Reserved)
- 7.8. (Reserved)
- 7.9. (Reserved)
- 7.10. (Reserved)
- 7.11. (Reserved)

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/Rev.X, available at:

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>.

**Regulation No 114 of the Economic Commission for Europe of the
United Nations (UN/ECE).**

Uniform provisions concerning the approval of :

- I. An Airbag Module for a Replacement Airbag System;**
- II. A Replacement Steering Wheel equipped with an Airbag Module of an Approved Type;**
- III. A Replacement Airbag System other than that installed in a Steering Wheel.**

1. SCOPE

This Regulation applies to the following aftermarket equipment:

- 1.1. to airbag modules for replacement airbag systems intended to be installed on motor vehicles;
- 1.2. to replacement steering wheels for vehicles of categories M₁ and N₁, equipped with an airbag module of an approved type and intended to be installed as an additional restraint system beside safety-belts and other restraint systems in power-driven vehicles, i.e. a system which, in the event of a severe impact, automatically deploys a flexible structure intended to reduce the severity of injuries of the occupants;
- 1.3. to replacement airbag systems other than those installed in steering wheels and equipped with airbag modules of an approved type as an additional restraint system beside safety-belts and other restraint systems in power-driven vehicles of categories M₁ and N₁, i.e. a system which, in the event of a severe impact, automatically deploys a flexible structure intended to reduce the severity of injuries of the occupants.

2. DEFINITIONS

- 2.1. "Airbag system" means a group of components which, once installed in vehicle(s), perform all functions provided for by the manufacturer. This system comprises as a minimum a release unit activating one or more airbag modules and the electrical wiring harness, if present.
- 2.2. "Airbag" means a flexible material, forming an enclosed volume that receives the gas from the inflator and restrains the occupant.
- 2.3. "Airbag module" means the smallest sub-assembly comprising the energy source for its deployment and the airbag involved in the deployment.
- 2.4. "Replacement steering wheel" (equipped with an airbag module) means an aftermarket steering wheel which is supplied to modify a motor vehicle and which

may vary in its functional dimensions, form and/or material from the original steering wheel provided by the vehicle manufacturer.

- 2.5. "Replacement airbag system" means an aftermarket airbag system which is supplied to modify a motor vehicle, and which may vary in its functional dimensions, form, materials or operation from any original airbag system provided by the vehicle manufacturer for that motor vehicle.
- 2.6. Categories of airbag modules for replacement airbag systems:
- 2.6.1. Category A: Device intended to protect the driver of a vehicle in the event of a frontal collision.
- 2.6.2. Category B: Device intended to protect front seat passenger(s) other than the driver in the event of a frontal collision.
- 2.6.3. Category C: Device intended to protect the passenger(s) in seats other than the front seats in the event of a frontal collision.
- 2.6.4. Category D: Device intended to protect the front seat occupant(s) in the event of a lateral collision.
- 2.7. "Instant of release" means the moment at which, in the event of an impact causing airbag deployment, the components producing that deployment are irreversibly actuated.
- 2.8. "Control unit or release unit" means the sub-assembly comprising all components permitting the collision to be detected and producing release.
- 2.9. "Wiring harness" means all the electrical conductors and connections linking the various parts of the complete airbag system to each other and possibly to the vehicle.
- 2.10. "Unladen kerb mass" means the mass of the vehicle in running order, unoccupied and unladen but complete with fuel, coolant, lubricant, tools and spare wheel (if these are provided as a standard equipment by the vehicle manufacturer).
- 2.11. "Type of an airbag module for a replacement airbag system" comprises airbag modules which do not differ in such essential aspects as:
- (a) the category of an airbag module,
 - (b) the geometry of the airbag,
 - (c) the material of the airbag,
 - (d) the vents or equivalent devices,
 - (e) the gas generator,
 - (f) the envelope principle,
 - (g) the material, structure and dimension of the cover,
 - (h) the composition of the propellant,
 - (i) the method of fixation of the module.
- 2.12. "Type of a replacement steering wheel equipped with an airbag module" means

aftermarket steering wheels, which do not differ in such essential aspects as:

- (a) the presence of an airbag,
- (b) the dimension and diameter of the steering wheel,
- (c) the form, in so far as the safety performance and the strength performance is influenced,
- (d) the material,
- (e) the type definition of an airbag module for a replacement airbag system according to paragraph 2.11. above.

2.13. "Type of a replacement airbag system other than that installed in a steering wheel" comprises replacement airbag systems, which do not differ in such essential respects as:

- (a) the category of airbag module,
- (b) the geometry of the airbag,
- (c) the material of the airbag,
- (d) the vents or equivalent devices,
- (e) the gas generator,
- (f) the envelope principle,
- (g) the material, structure and dimension of the cover,
- (h) the composition of the propellant,
- (i) the method of fixation of the module.

2.14. "Vehicle type" means a category of power-driven vehicles, which do not differ in such essential respects in so far as they have an effect on the results of the impact tests prescribed in this Regulation for:

- (a) the structure, dimension, body version and materials of the vehicle,
- (b) the unladen kerb mass, as defined in paragraph 2.10. above,
- (c) the steering control, the seat and the safety-belt system and other restraint systems,
- (d) the siting and orientation of the engine,
- (e) the parts and optional arrangements or fittings of the vehicle which influence the performance of the airbag.

3. APPLICATION FOR APPROVAL

3.1. Application for approval of an airbag module for a replacement airbag system

3.1.1. The application for approval of an airbag module shall be submitted by the holder of the trade mark of the airbag module manufacturer, the component manufacturer or by their duly accredited representatives.

3.1.2. For each category of an airbag module for a replacement airbag system, the application shall be accompanied by the following documents in triplicate and the following particulars:

3.1.2.1. A technical description, including mounting instructions and specifying the type(s) of vehicle for which the airbag module is intended,

- 3.1.2.2. Sufficiently detailed drawings to permit the verification of the positions intended for the approval mark as required under paragraph 4.1.4. below.
- 3.1.2.3. A sufficient number of airbag modules shall be submitted to the technical service responsible for the tests and verification of the conformity with the relevant paragraphs 5. and 6. of this Regulation.
- 3.2. Application for approval of a replacement steering wheel equipped with an airbag module of an approved type
 - 3.2.1. The application for approval of a replacement steering wheel equipped with an airbag module shall be submitted by the holder of the trademark of the replacement steering wheel or by the manufacturer, or by their duly accredited representative.
 - 3.2.2. For each type of a replacement steering wheel equipped with an airbag module, the application shall be accompanied by the following documents in triplicate and the following particulars:
 - 3.2.2.1. a technical description, including mounting instructions,
 - 3.2.2.2. sufficiently detailed drawings,
 - 3.2.2.3. drawings showing the position of the airbag module(s) and its (their) attachment(s) on the steering wheel,
 - 3.2.2.4. the position intended for the approval mark and required under paragraph 4.2.4. below,
 - 3.2.2.5. a sufficient number of replacement steering wheels equipped with airbag modules and vehicles representative of the types for which the replacement steering wheel shall be approved for shall be submitted to the technical service responsible for conducting the approval tests so as to verify conformity with the relevant paragraphs 5. and 6. of this Regulation.
- 3.3. Application for approval of a replacement airbag system other than that installed in a steering wheel
 - 3.3.1. The application for approval of a replacement airbag system other than that installed in a steering wheel shall be submitted by the holder of the trade mark of the replacement airbag system or by the manufacturer, or by their duly accredited representatives.
 - 3.3.2. For each type of a replacement airbag system, the application shall be accompanied by the following documents in triplicate and the following particulars:
 - 3.3.2.1. a technical description, including mounting instructions,
 - 3.3.2.2. sufficiently detailed drawings,

- 3.3.2.3. drawings showing the position of the airbag system(s) and its (their) attachment(s) on the vehicle,
 - 3.3.2.4. the position intended for the approval mark and required under paragraph 4.3.4. below,
 - 3.3.2.5. a sufficient number of replacement airbag systems and vehicles representative of the types for which the replacement system shall be approved for, shall be submitted to the technical service responsible for conducting the approval tests so as to verify conformity with the relevant paragraphs 5. and 6. of this Regulation.
4. APPROVAL
- 4.1. Approval of an airbag module for a replacement airbag system
 - 4.1.1. If the samples of the airbag module submitted for approval meet the requirements of the relevant paragraphs 5. and 6. below, approval for this type of airbag module for a replacement airbag system shall be granted.
 - 4.1.2. An approval number shall be assigned to each type approved. Its first two digits (00 at present) 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 airbag module for a replacement airbag system.
 - 4.1.3. Notice of approval or of refusal or extension or withdrawal of approval or of definite discontinuation of production of a type of airbag module for a replacement airbag system, pursuant to this Regulation, shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation.
 - 4.1.4. The samples of airbag modules for a replacement airbag system shall be clearly and indelibly marked with the manufacturer's trade name or mark and an approval mark consisting of:
 - 4.1.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval, ⁽¹⁾

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 and Montenegro, 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 and 48 for New Zealand. 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.

- 4.1.4.2. an approval number,
- 4.1.4.3. an additional symbol, indicating the airbag module category (see paragraph 2.6. above).
- 4.1.5. The approval mark and the additional symbol shall be clearly legible and indelible.
- 4.1.6. Annex 4 to this Regulation gives an example of the approval mark and the additional symbol mentioned above.
- 4.2. Approval of a replacement steering wheel equipped with an airbag module of an approved type
 - 4.2.1. If a replacement steering wheel type equipped with an airbag module of an approved type submitted for approval meets the requirements of the relevant paragraphs 5. and 6. below, approval of that type of replacement steering wheel equipped with an airbag module of an approved type shall be granted.
 - 4.2.2. An approval number shall be assigned to each type approved. Its first two digits (00 at present) 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 replacement steering wheel.
 - 4.2.3. Notice of approval or refusal or extension or withdrawal of approval or of definite discontinuation of production of a type of replacement steering wheel equipped with an airbag module of an approved type pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in Annex 2 to this Regulation.
 - 4.2.4. The samples of the replacement airbag steering wheel and the hub (adapters) shall be clearly and indelibly marked with the manufacturer's trade name or mark and an approval mark consisting of:
 - 4.2.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval, ⁽²⁾
 - 4.2.4.2. an approval number,
 - 4.2.4.3. an additional symbol, indicating the airbag module category (see paragraph. 2.6. above).
 - 4.2.5. The approval mark and the additional symbol shall be clearly legible and indelible.
 - 4.2.6. The approval mark shall be placed on the replacement steering wheel and on the hub (adapter). If the replacement steering wheel and hub are in one piece, one approval mark and one mark with the manufacturer's trade name or mark is

² See footnote No. 1

sufficient.

- 4.2.7. Annex 5 to this Regulation gives an example of the approval mark and the additional symbol mentioned above.
- 4.3. Approval of a replacement airbag system other than that installed in a steering wheel
- 4.3.1. If a replacement airbag system other than that installed in a steering wheel submitted for approval meets the requirements of the relevant paragraphs 5. and 6. below, approval of that type of replacement airbag system shall be granted.
- 4.3.2. An approval number shall be assigned to each type approved. Its first two digits (00 at present) 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 replacement airbag system.
- 4.3.3. Notice of approval or refusal or extension or withdrawal of approval or of definite discontinuation of production of a replacement airbag system pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in Annex 3 to this Regulation.
- 4.3.4. The samples of the replacement airbag system shall be clearly and indelibly marked with the manufacturer's trade name or mark and an approval mark consisting of:
- 4.3.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval, ⁽³⁾
- 4.3.4.2. an approval number,
- 4.3.4.3. an additional symbol, indicating the airbag module category (see paragraph. 2.6. above).
- 4.3.5. The approval mark and the additional symbol shall be clearly legible and indelible.
- 4.3.6. Annex 6 to this Regulation gives an example of the approval mark and the additional symbol mentioned above.
5. REQUIREMENTS
- 5.1. General requirements for the approval of an airbag module for a replacement airbag system, a replacement steering wheel equipped with an airbag module of an approved type, or a replacement airbag system other than that installed in a steering wheel.

³ See footnote No. 1

- 5.1.1. Before type approval is granted according to paragraphs 4.1., 4.2. and/or 4.3., the competent authority shall verify the existence of satisfactory arrangements for ensuring:
- 5.1.1.1. installation, maintenance, repair and dismantling of the system by trained technicians only according to a manual, which shall be prepared by the applicant of the approval.
- 5.1.1.2. substitution of a part or the complete system after guaranteed lifetime,
- 5.1.1.3. labelling and notices for rescue persons, labelling and information for the use of child restraint systems.
- 5.1.2. Interference from magnetic fields shall not disrupt the operation of the airbag system.
- 5.1.3. A complete system shall comprise a device alerting the user if the airbag system is not in working order as designed.
- 5.1.4. Airbag modules for replacement airbag system of category A shall be so designed that, when they are submitted to a test in accordance with the requirements of paragraph 5.2.2.7., static deployment test, the airbag may be pushed aside manually after full deployment.
- 5.1.5. Toxicity and burns
- A certificate shall be presented stating that the nature, concentration and temperature of the gases and solid particles released on deployment of an airbag are not such as to be liable to injure seriously the occupants of the vehicle. The authorities responsible for issuing the approval shall reserve the right to verify the accuracy of the statement.
- 5.2. Requirements for the approval of an airbag module for a replacement airbag system
- 5.2.1. Each airbag module shall comply with the requirements of the "International Standard ISO 12097-2 ROAD VEHICLES-AIRBAG COMPONENT TESTING-PART 2: Testing of Airbag Modules" version: 1996-08-00, to guarantee the operating safety of the airbag modules.
- Airbag modules designed for front seats equipped with side airbag systems shall comply, as far as possible, with the requirements of the above-mentioned ISO Standard (for example tests according to paragraph 5.2.2.).
- The module manufacturer shall state that the above-mentioned tests were carried out with positive test results. In case of doubts the approval authority responsible for issuing the approval shall reserve the right to verify the accuracy of this statement.
- 5.2.2. Instead of paragraph 5.2.1., a reduced test programme is permitted which shows as a minimum the following test elements:

- 5.2.2.1. Drop test
- 5.2.2.2. Mechanical impact test
- 5.2.2.3. Simultaneous vibration temperature test
- 5.2.2.4. Thermal humidity cycling test
- 5.2.2.5. Solar radiation simulation test
- 5.2.2.6. Temperature shock test
- 5.2.2.7. Static deployment test
- 5.3. Requirements for the approval of a replacement steering wheel equipped with an airbag module of an approved type
 - 5.3.1. Before type approval is granted according to paragraph 4.2., the competent authority shall verify the existence of satisfactory arrangements for carrying out:
 - 5.3.1.1. a heat test of the replacement steering wheel (all parts except the airbag module), as described in paragraph 6.2.1.1., to guarantee a cohesion of all materials.
 - 5.3.1.2. a bending test, as described in paragraph 6.2.1.2., to guarantee a minimum deformation of the steering wheel rim,
 - 5.3.1.3. a torque test, as described in paragraph 6.2.1.3., to guarantee a sufficient stiffness when the replacement steering wheel is loaded tangentially to the steering wheel rim,
 - 5.3.1.4. a fatigue test, as described in paragraph 6.2.1.4., to guarantee a sufficient lifetime.
 - 5.3.2. For the replacement steering wheel, it must be guaranteed that the effective diameter is not substantially smaller than the effective diameter of the steering wheel installed by the manufacturer of the vehicle. This requirement is deemed fulfilled when the effective diameter of the replacement steering wheel is not less than 0.9 times the effective diameter of the steering wheel used by the vehicle manufacturer.
 - 5.3.3. The size and fitting of the replacement steering wheel to the steering column must be within the dimensions and tolerances specified by the vehicle manufacturer. Otherwise the replacement manufacturer shall demonstrate to the Technical Service the proper function of any other chosen fixing method.
 - 5.3.4. The replacement steering wheel shall allow the drivers a direct view to all important instruments and indicators such as
 - (a) the speedometer and
 - (b) the tell tale signs for:

direction indicator
main beam
rear fog lamp
hazard warning signal
automatic antilock system
brake system malfunctions
airbag function indicator

The tests shall be carried out according to the prescription laid down in paragraph 6.2.2.

- 5.3.5. Replacement steering wheels equipped with airbag modules of an approved type shall be such that, when installed in a vehicle, this vehicle fulfils the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4. and 5.2.1.5. of Regulation No. 94, 01 series of amendments.

In case of doubt, when verifying the conformity of the replacement steering wheel equipped with an airbag module of an approved type to the requirements of this Regulation, account shall be taken of any data or test results provided by the applicant for approval, and these can be taken into consideration in validating the approval test carried out by the technical service.

- 5.4. Requirements for the approval of a replacement airbag system other than that installed in a steering wheel

- 5.4.1. Replacement airbag systems shall be equipped with an approved airbag module or it shall be demonstrated to the satisfaction of the technical service, responsible for this test, that the system used complies with the requirements prescribed in paragraphs 5.1. and 5.2. above.

- 5.4.2. Replacement airbag systems other than those installed in steering wheels shall be such that, when installed in a vehicle, this vehicle fulfils in case of an airbag system of:

- 5.4.2.1. category B, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 94, 01 series of amendments;

- 5.4.2.2. category C, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 94, 01 series of amendments; in addition instrumented dummies shall be used for the verification of the performance of the airbag system;

- 5.4.2.3. category D, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 95, 01 series of amendments; in this case the side impact dummy shall be used for the test.

6. TESTS

- 6.1. Tests of an airbag module for a replacement airbag system

The tests shall be carried out according to ISO 12097-Part 2, version 1996-08-00.

6.2. Tests of a replacement steering wheel equipped with an airbag module of an approved type

6.2.1. Strength tests:

6.2.1.1. Heat test

The replacement steering wheel (except the airbag module) is exposed to the following temperature carried out in one circle:

- 16 hours at $-15^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- 30 minutes at $+22^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- 3 hours at $+80^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- 30 minutes at $-22^{\circ}\text{C} \pm 2^{\circ}\text{C}$

This test must leave no permanent deformation over and above the design tolerances, or any cracks or fractures.

6.2.1.2. Bending test

The replacement steering wheel is exposed to a temperature of at least $-15^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 16 hours. The replacement steering wheel is then mounted with its hub on a rigid shaft and the steering wheel rim is subjected to a static loading of $70 \text{ daN} \pm 0.5 \text{ daN}$ acting perpendicular to the plane of the rim. The test loading must be applied on the rim and between two spokes that confine the greatest angle.

This test may not leave any permanent deformation on the rim of the replacement steering wheel that would be greater than 8 per cent of the steering wheel diameter. There must be no signs of any cracks or fractures, which will affect the operational safety of the steering wheel.

6.2.1.3. Torque test

The replacement steering wheel is mounted with its hub on a rigid shaft and subjected statically to a test load of $70 \text{ daN} \pm 0.5 \text{ daN}$ applied tangentially to the steering wheel rim. The permanent deformation resulting from this test may not exceed 1 degree in the direction of rotation. The test may not leave any signs of cracks or fractures, which might affect the operational safety of the steering wheel. The steering wheel rim is then subjected to a tangential load corresponding to a torque of $22 \text{ daNm} \pm 0.5 \text{ daNm}$. This must not affect the steering wheel's operational safety even if the permanent deformation is greater than 1 degree in the direction of rotation.

6.2.1.4. Fatigue test

The replacement steering wheel is mounted with its rim in a test jig, as shown in Annex 7, figure of an example of a fatigue test device, and subjected to a approximate sinusoidal endurance load cycle test with a torque of $14 \text{ daNm} \pm 0.5 \text{ daNm}$ at a frequency of $1.5 \text{ Hz} \pm 0.25 \text{ Hz}$.

The replacement steering wheel must withstand at least 1 x 10⁵ load cycles without showing any signs of cracks or fractures which might affect its operational safety.

6.2.2. Installation requirement tests and driver's view to the instrument panel

6.2.2.1. The driver's view to:

- (a) the speedometer
- (b) the tell tales for:
 - direction indicator
 - main beam
 - rear fog lamp
 - hazard warning signal
 - automatic antilock system
 - brake system malfunctions
 - airbag function indicator

shall be guaranteed. The visibility is assessed by means of a comparative evaluation of photographs taken of the instrument panel of the vehicle under test equipped with a replacement steering wheel. The H points are measured after the vehicle has been aligned on the three dimensional measuring device. The relation between vehicle and coordinate system is established through reference points of the body.

If the coordinates of the R point are not known, the H point is determined using a 50 percentile manikin. The driver's seat is adjusted as follows:

- (a) seat in rearmost position of the device for longitudinal adjustment;
- (b) backrest inclined corresponding to 25° back angle of the manikin;
- (c) other adjusting devices in central position.

A 35 mm camera inclined by 15° towards the horizontal plane is used to simulate binocular viewing and photos are taken from each of the eye points.

Position of the eye points related to the R or H point in the coordinate system in accordance with ISO 4130 (dimensions in mm):

x	y	z	x	y	z
0	- 32.5	+ 635.0	0	+ 32.5	+ 635.0

For the camera the eye points are determined 35 mm in front of the plane of representation (normally the film plane) and on the centre axis of the optical system.

6.2.2.2. Operation of control elements

An examination is made to find out whether the minimum and maximum distances indicated below between the control elements for instance for direction indicator and headlamp flasher and the steering wheel rim are maintained. Thus, satisfactory operation of the control elements and satisfactory handling of the replacement steering wheel are to be ensured:

- (a) the measure "a" with a limitation of a minimum 30 mm refers to the control element with the smallest distance to the replacement steering wheel. It denotes the shortest distance between the control element and the rearplane of the steering wheel rim facing the instrument panel.
- (b) The measure "b" with a limitation of a maximum value of 130 mm denotes the distance from the centre of the direction indicator control element and the front plane of the steering wheel rim facing the driver.

6.2.2.3. Testing of installation

The conditions of installation, the diameter of the replacement steering wheel as compared with the original version of the vehicle manufacturer, the repositioning of direction indicator control, the function of the audible warning device and the function of the airbag tell tale are considered in the examination. Also the function of sensors monitoring the driver's seat or the passenger seat(s) and providing a deployment status to the airbag controller shall be examined, if available.

6.2.2.4. Testing of adapters

The fitting dimensions (e.g. toothing of the steering shaft) are compared with the dimensions as provided by the manufacturer using a profile projector.

The strength of the replacement adapters is checked by tightening the fixing nut/screw applying twice the tightening torque specified by the vehicle manufacturer but not more than 85 Nm.

Adequate examinations are made to verify that the adapters for vehicle types with anti-theft systems integrated into the steering wheel conform to the corresponding features of the steering wheel produced by the vehicle manufacture in terms of strength, dimensions and the materials and function, or tests of the anti-theft system in accordance with Regulation No. 18 shall be carried out to demonstrate that the replacement steering wheel system fulfils the above-mentioned Regulation.

6.2.3. Frontal impact test(s) with vehicle(s) for replacement steering wheel(s) equipped with an airbag module of an approved type.

Replacement steering wheels equipped with airbag modules of an approved type shall be such that, when installed in a vehicle, this vehicle fulfils the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4. and 5.2.1.5. of Regulation No. 94, 01 series of amendments.

In case of doubt, when verifying the conformity of the replacement steering wheel equipped with an airbag module of an approved type to the requirements of this Regulation, account shall be taken of any data or test results provided by the applicant for approval, and these can be taken in consideration in validating the approval test carried out by the technical service.

6.3. Tests of a replacement airbag system other than that installed in a steering wheel

6.3.1. Tests of an airbag module for a replacement airbag system

The replacement airbag system shall be equipped with an approved airbag module or the manufacturer of the replacement airbag system shall demonstrate to the satisfaction of the technical service, responsible for this test, that the system fulfils the requirements as prescribed in paragraphs 5.1. and 5.2. above.

6.3.2. Replacement airbag systems other than those installed in steering wheels shall be such that when installed in a vehicle, this vehicle fulfils:

6.3.2.1. in case of an airbag system of category B, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 94, 01 series of amendments;

6.3.2.2. in case of an airbag system of category C, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 94, 01 series of amendments; in addition instrumented dummies shall be used for the verification of the performance of the airbag system;

6.3.2.3. in case of an airbag system of category D, the requirements of paragraphs 5.2.1.1., 5.2.1.2., 5.2.1.3., 5.2.1.4., and 5.2.1.5. of Regulation No. 95, 01 series of amendments; in this case the side impact dummy shall be used for the test.

7. INSTRUCTIONS FOR USERS

7.1. The manufacturer of the replacement airbag systems shall include in the operating instructions any recommendations or precautions to be taken during the use, maintenance or destruction of the system or of any of its components.

7.1.1. In particular:

7.1.1.1. If the system is fitted with a monitoring device intended to inform the user of its operating condition, it shall be clearly indicated how messages delivered by the system, of whatever kind, are to be interpreted. An indication shall be given of measures to be taken in the event of a message warning of malfunctioning, together with a description of any risk involved in using the vehicle in such a condition;

7.1.1.2. It shall be indicated whether maintenance or repair work is to be performed exclusively by specially trained personnel, and whether any risks are involved in disassembling the system;

7.1.1.3. The procedure to be followed in the event of deployment shall be explained. In

particular, details shall be given of any precautions to be taken as regards products generated by deployment, in the form of gases, liquids or solids. Similarly, if there is any danger from the components of the system as a result of deployment, such as dangerous roughness or sharp edges, temperature, corrosion, etc., these dangers shall be described, as well as the ways of avoiding them;

- 7.1.1.4. If the scrapping of the replacement airbag system(s) can lead to situations which are dangerous either directly to humans or to the environment, an appropriate procedure for avoiding them shall be indicated. This may consist in a method for deliberately releasing the airbag if its released state does not lead to a dangerous situation, in an obligation to return the system or part of it to the constructor or manufacturer, or in any other appropriate measure.

- 7.2 The replacement airbag system shall carry labelling and information for the use of child restraint systems according to Regulation No. 94.

Airbag systems with airbag modules of category A, B, C or D shall carry the inscription "AIRBAG" located in the interior of the circumference of the replacement steering wheel or on the cover of the airbag module; this inscription shall be durably affixed and easily visible.

In addition, in the case of a frontal protection airbag system intended for use in any passenger seating position, the following label shall be permanently attached to the visible surface of the cover of the airbag module (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 x 120 mm.



8. 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:

- 8.1. 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 once every two years. Where negative results are recorded during one of these verifications, their frequency may be increased.
- 8.2. Conformity of production of an airbag module for a replacement airbag system

Airbag modules approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5.1. and 5.2. above.
- 8.3. Conformity of production of replacement steering wheel equipped with an airbag module of an approved type

Replacement steering wheels equipped with an airbag module of an approved type

and approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5.1. and 5.3. above.

- 8.4. Conformity of production of a replacement airbag system other than that installed in a steering wheel

Replacement airbag systems other than those installed in steering wheels approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5.1. and 5.4. above.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

The approval granted for a type of airbag module for a replacement airbag system, a type of replacement steering wheel equipped with an airbag of an approved type, or a type of replacement airbag system other than that installed in a steering wheel, pursuant to this Regulation, may be withdrawn if the requirements laid down in paragraph 8. above are not complied with.

10. MODIFICATIONS OF THE TYPE OF AIRBAG MODULE FOR A REPLACEMENT AIRBAG SYSTEM OR THE TYPE OF REPLACEMENT STEERING WHEEL WITH AN AIRBAG MODULE OF AN APPROVED TYPE OR THE TYPE OF REPLACEMENT AIRBAG SYSTEM, OTHER THAN THAT INSTALLED IN A STEERING WHEEL

- 10.1. Every modification of the type of the above-mentioned system shall be notified to the administrative department which approved the type. The department may then either:

- 10.1.1. decide that the modifications made are unlikely to have an appreciable adverse effect and that in any case the module or the system or the replacement steering wheel still meets the requirements,

- 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 paragraphs 4.1. to 4.3. above to the other Parties to the Agreement applying this Regulation.

- 10.3. The competent authority which has issued the extension of approval shall assign a series number to that extension and so inform the other Parties to the 1958 Agreement applying this Regulation, by means of a communication form conforming to the models in Annexes 1, 2 and 3 to this Regulation.

11. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval ceases completely to manufacture a type of airbag module for a replacement airbag system or a type of replacement steering wheel equipped with an airbag of an approved type or a type of replacement airbag system other than that installed in a steering wheel under this Regulation, he shall

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 models in Annexes 1, 2 and 3 to this Regulation.

12. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR 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 extension, or refusal or withdrawal of approval, issued in other countries, are to be sent.

Annex 1

COMMUNICATION

(maximum format: A4 (210 x 297 mm))

(1)

issued by:

Name of administration:

.....

concerning:(2)



APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of airbag module for a replacement airbag system pursuant to Regulation No. 114

Approval No.

Extension No.

1. Replacement airbag module of categories A, B, C, D:.....
2. Trade name or mark:.....
3. Description of the type of airbag module for a replacement airbag system given by the manufacturer:.....

4. Manufacturer's name:.....
5. If applicable, name and address of manufacturer's representative:.....

6. Airbag module for a replacement airbag system submitted for approval on:.....
7. Technical service responsible for conducting approval tests:.....
8. Date of test report issued by this service:.....
9. Number of test report issued by this service:.....
10. Approval granted/refused/extended/withdrawn for general use/for use in a specific vehicle or in specific types of vehicles (2)
11. Position of the approval mark
12. Place
13. Date:.....
14. 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.

15. The list of documents deposited with the administrative service, which has granted approval is Annexed to this communication and may be obtained on request.

Annex 2COMMUNICATION(maximum format: A4 (210 x 297 mm))

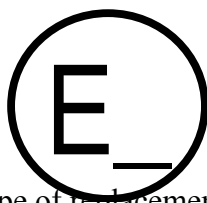
(1)

issued by:

Name of administration:

.....

concerning:(2)



APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of replacement steering wheel equipped with an airbag module of an approved type
 pursuant to Regulation No. 114

Approval No.

Extension No.

1. Trade name or mark of the replacement steering wheel:.....
2. Manufacturer's name and address:.....
3. If applicable, name and address of manufacturer's representative:.....

4. Trade name and mark of the type of the airbag module and approval No.:.....

5. Extension of approval of the type of replacement steering wheel:.....
6. List of vehicles, where the replacement steering wheel can be installed (name of vehicle manufacturer/commercial name/vehicle code/replacement steering wheel type/adaptor type and number):.....

7. Technical service responsible for conducting approval tests:.....
8. Date of test report issued by this service:.....
9. Number of test report issued by this service:.....
10. Approval granted/refused/extended/withdrawn for general use/for use in a specific vehicle or in specific types of vehicles (2)
11. If applicable, reasons for extension of approval:.....

12. Position of the approval mark

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.

- 13. Place
- 14. Date:.....
- 15. Signature:
- 16. The list of documents deposited with the administrative service, which has granted approval is Annexed to this communication and may be obtained on request.

Annex 3

COMMUNICATION

(maximum format: A4 (210 x 297 mm))

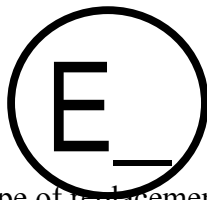
(1)

issued by:

Name of administration:

.....

concerning:(2)



APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of replacement airbag system other than that installed in a replacement steering wheel pursuant to Regulation No. 114

Approval No.

Extension No.

1. Trade name or mark of the replacement airbag system:.....
2. Category of the airbag system and approval No. of the airbag module:

3. Manufacturer's name and address:.....
4. If applicable, name and address of manufacturer's representative:.....

5. Replacement airbag system and vehicles submitted for approval on:.....
6. Extension of approval of the type of replacement steering wheel:.....
7. List of vehicles, where the replacement airbag system can be installed:.....

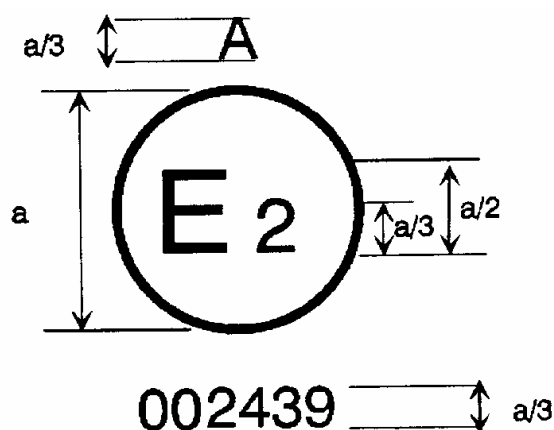
8. Technical service responsible for conducting approval tests:.....
9. Date of test report issued by this service:.....
10. Number of test report issued by this service:.....
11. Approval granted/refused/extended/withdrawn for general use/for use in a specific vehicle or in specific types of vehicles (2)
12. If applicable, reasons for extension of approval:.....

13. Position of the approval mark

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.

- 14. Place
- 15. Date:.....
- 16. Signature:
- 17. The list of documents deposited with the administrative service, which has granted approval is Annexed to this communication and may be obtained on request.

Annex 4**EXAMPLE OF AN APPROVAL MARK FOR AN AIRBAG MODULE FOR A
REPLACEMENT AIRBAG SYSTEM**

$a = 5 \text{ mm min.}$

The airbag module bearing the above approval mark is a category A airbag module approved in France (E2) under the number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of the Regulation in its original form.

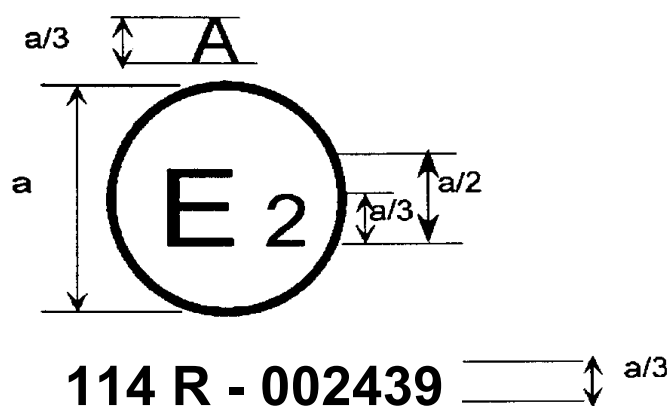
Note:

The approval number and additional symbol(s) must be placed close to the circle and either above or below the "E" or to the left or right of that letter.

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 the other symbols.

Annex 5

EXAMPLE OF AN APPROVAL MARK FOR A REPLACEMENT STEERING WHEEL
EQUIPPED WITH AN AIRBAG MODULE OF AN APPROVED TYPE



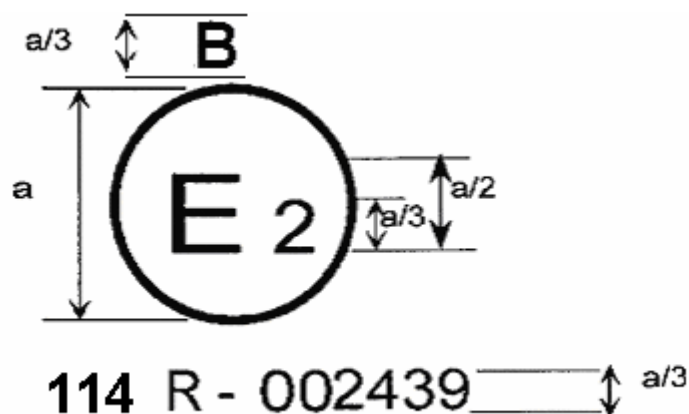
$a = 5 \text{ mm min.}$

The replacement steering wheel bearing the above approval mark is a steering wheel with an airbag module of category A and approved in France (E2) under the number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of the Regulation in its original form.

Note:

The approval number and additional symbol(s) must be placed close to the circle and either above or below the "E" or to the left or right of that letter.

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 the other symbols.

Annex 6**EXAMPLE OF AN APPROVAL MARK FOR A REPLACEMENT AIRBAG SYSTEM
OTHER THAN THAT INSTALLED IN A STEERING WHEEL**

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

The replacement airbag system bearing the above approval mark is a category B airbag system approved in France (E2) under the number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of the Regulation in its original form.

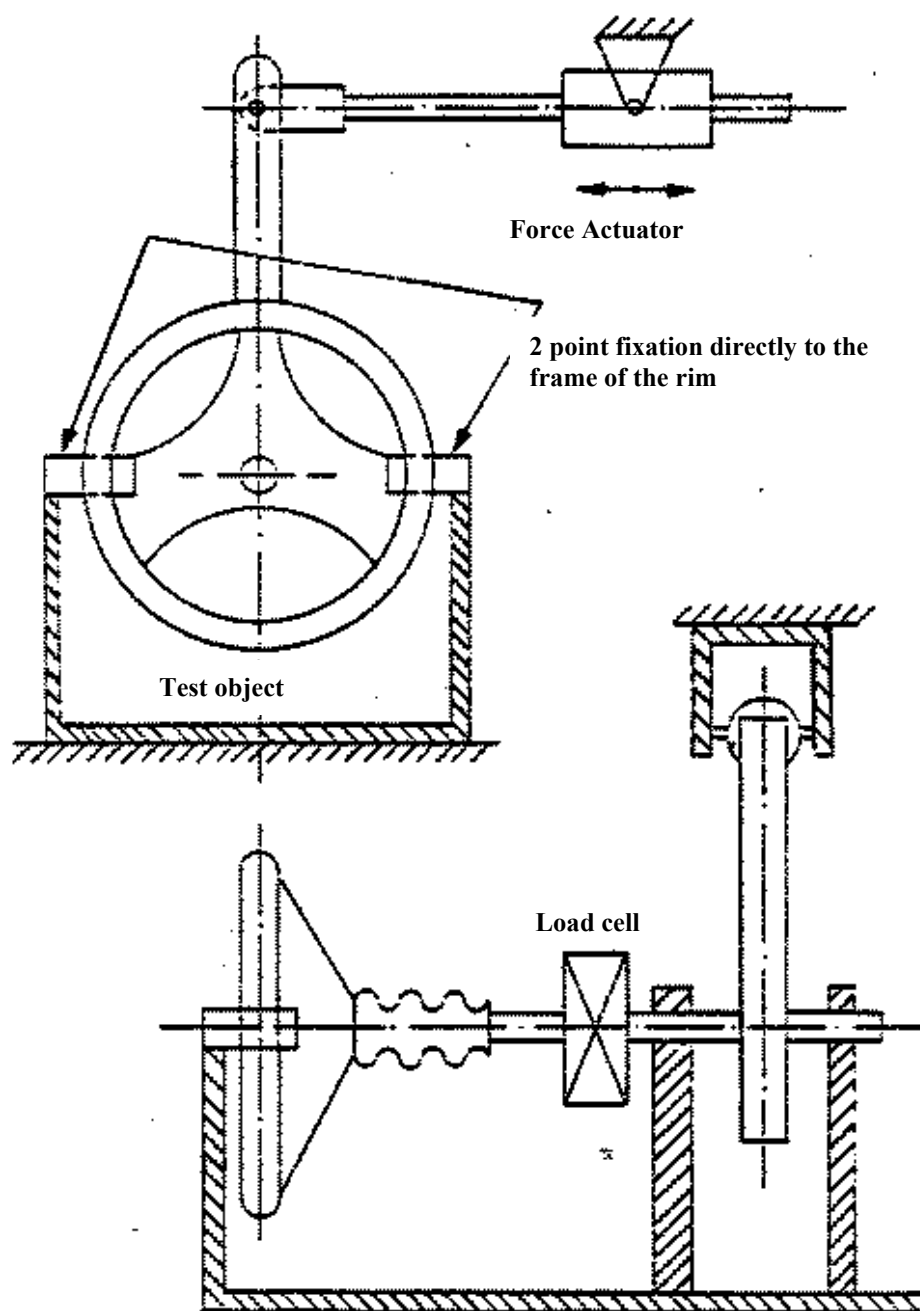
Note:

The approval number and additional symbol(s) must be placed close to the circle and either above or below the "E" or to the left or right of that letter.

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 the other symbols.

Annex 7

FATIGUE TEST DEVICE



Example of a fatigue test device

Annex 8

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

For the purposes of this Annex:

- 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

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.

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 measured 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:

- 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 $20 \pm 10^{\circ}\text{C}$ 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 one minute to flex the cushion and back. At the manufacturer's request, all seat assemblies shall remain unloaded for a minimum period of 30 min. 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 cm and weighing 0.228 kg/m^2 or knitted or non-woven fabric having equivalent characteristics. If test is run on a seat outside the vehicle, the floor on which the seat is placed shall have the same essential

characteristics⁽²⁾ 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.
- 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.
- 4.8. 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:

² Tilt angle, height difference with a seat mounting, surface texture etc.

- 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 min. 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.

Annex 8 - 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.

* 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 ISO Standard 6549-1980.

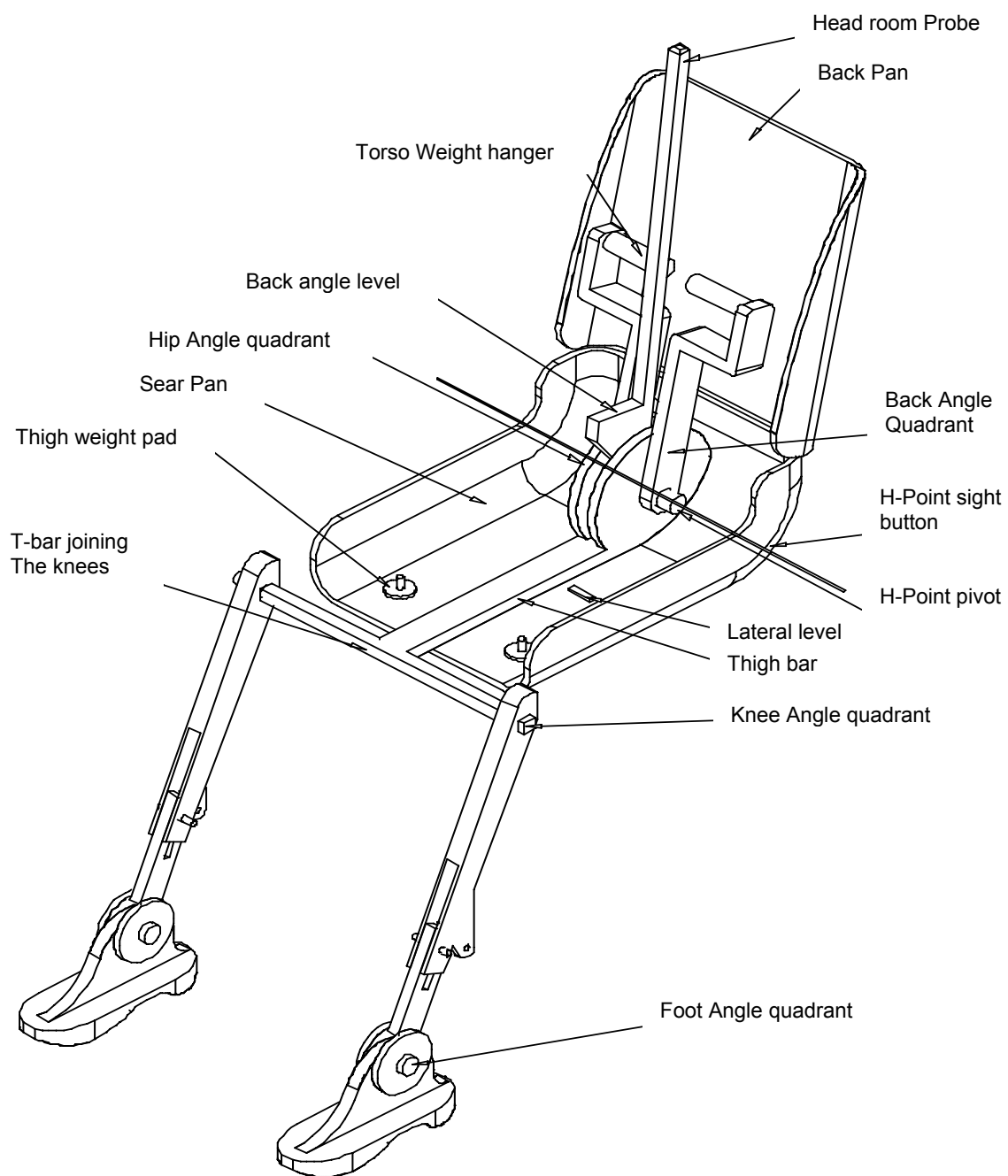


Figure 1: 3-D H machine elements designation

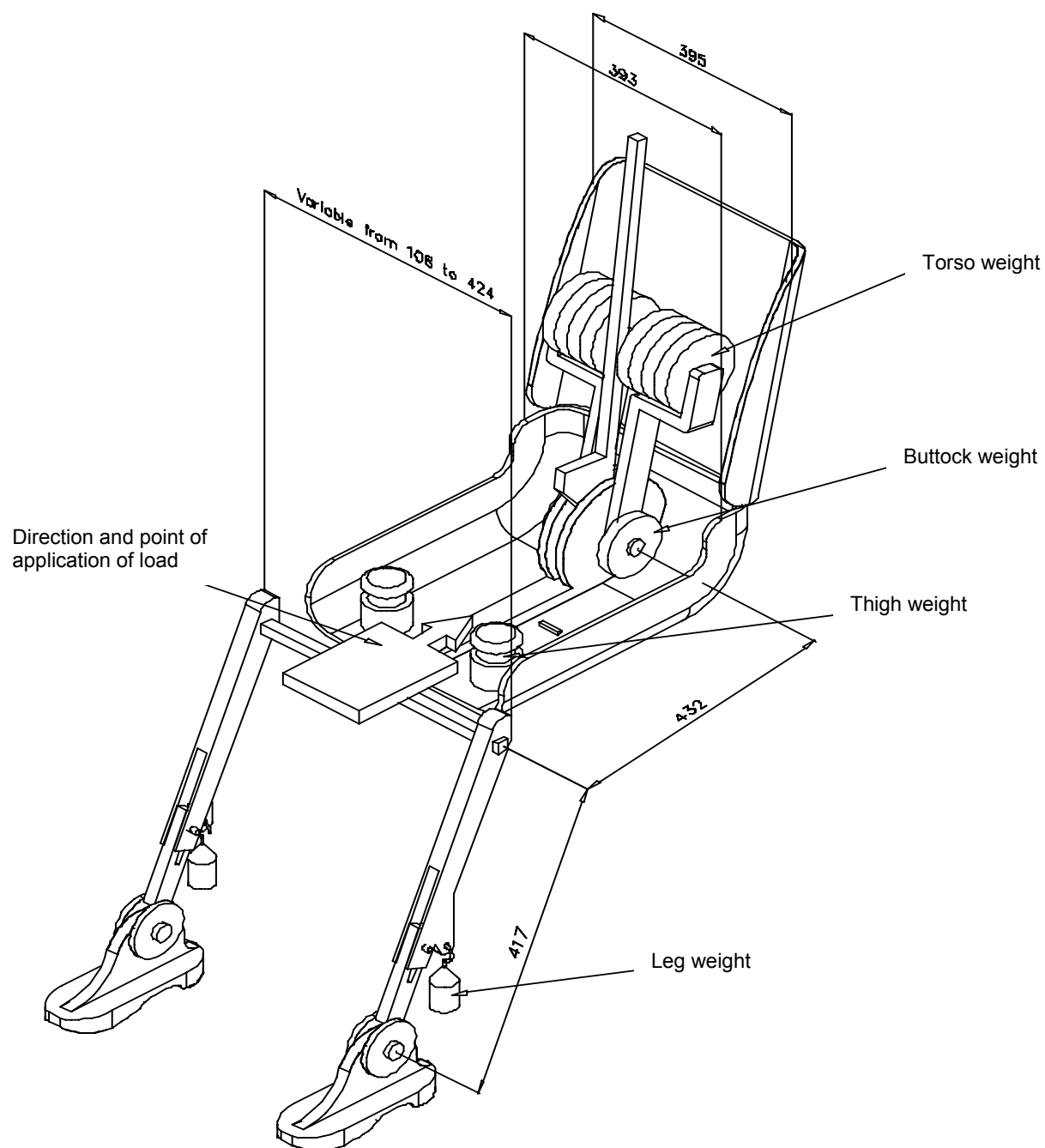


Figure 2: Dimensions of the 3-D H machine elements and load distribution

Annex 8 - 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.

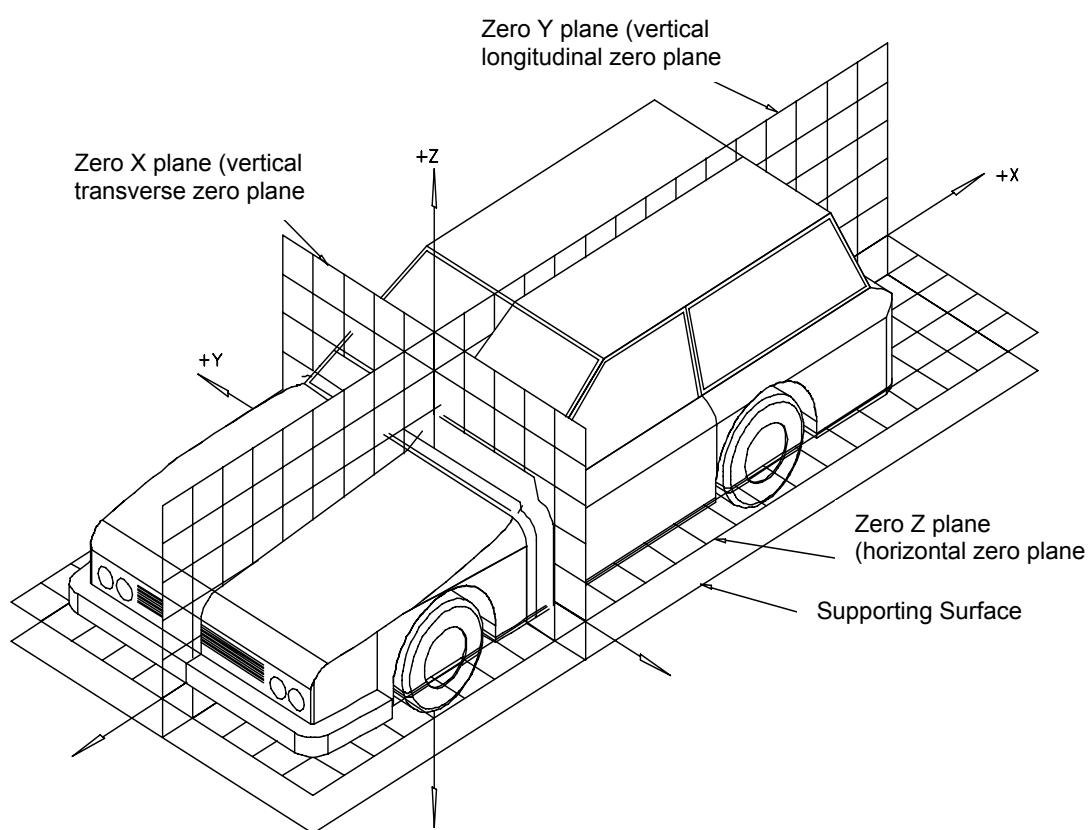


Figure - Three-dimensional reference system

*

The reference system corresponds to ISO standard 4130, 1978.

Annex 8 - 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 3.2., 3.3., etc.

* Strike out what does not apply.