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COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to safety belts and restraint systems of motor vehicles

(77/541/EEC)

(OJ L 220, 29.8.1977, p. 95)

Amended by:

	Official Journal		
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► <u>M1</u> Council Directive 81/576/EEC of 20 July 1981	L 209	32	29.7.1981
► <u>M2</u> Commission Directive 82/319/EEC of 2 April 1982	L 139	17	19.5.1982

Amended by:

► <u>A1</u> Act of Accession of Greece	L 291	17	19.11.1979
► <u>A2</u> Act of Accession of Spain and Portugal	L 302	23	15.11.1985



COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to safety belts and restraint systems of motor vehicles

(77/541/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community and in particular Article 100 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament ⁽¹⁾,

Having regard to the opinion of the Economic and Social Committee ⁽²⁾,

Whereas the technical requirements which motor vehicles must satisfy pursuant to national laws relate *inter alia* to seat belts and restraint systems;

Whereas these requirements differ from one Member State to another; whereas it is therefore necessary that all Member States adopt the same requirements either in addition to or in place of their existing regulations, in order in particular to allow the EEC type-approval procedure which was the subject of Council Directive 70/156/EEC of 6 February 1970 on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers ⁽³⁾ to be applied in respect of each type of vehicle;

Whereas common requirements for the interior parts of the passenger compartment, the layout of controls, the roof, the backrest and rear part of the seats have been laid down by Directive 74/60/EEC ⁽⁴⁾; whereas requirements for the internal fittings relating to the protection of the driver against injury by the steering mechanism in the event of an impact have been laid down by Directive 74/297/EEC ⁽⁵⁾; whereas requirements relating to the strength of the seats and their anchorages have been laid down by Directive 74/408/EEC ⁽⁶⁾; whereas requirements relating to anchorages for safety belts have been laid down by Directive 76/115/EEC ⁽⁷⁾; whereas other requirements relating to internal fittings, and in particular those relating to head restraints and the identification of the controls, will be laid down at a later date;

Whereas rules for seat belts and restraint systems include not only design requirements but also their fitting in motor vehicles;

Whereas a harmonized component type-approval procedure for safety belts and restraint systems makes it possible for each Member State to check compliance with the common design and testing requirements and to inform the other Member States of its findings by sending a copy of the component type-approval certificate completed for each type of safety belt or restraint system; whereas the placing of an EEC component type-approval mark on all safety belts and restraint systems manufactured in conformity with the approved type obviates any need for technical checks on these safety belts and restraint systems in the other Member States;

Whereas the main purpose of the harmonized requirements is to promote road safety; whereas it should therefore be made compulsory to fit safety belts and restraint systems to vehicles covered by this Directive;

⁽¹⁾ OJ No C 76, 7. 4. 1975, p. 37.

⁽²⁾ OJ No C 263, 17. 11. 1975, p. 37.

⁽³⁾ OJ No L 42, 23. 2. 1970, p. 1.

⁽⁴⁾ OJ No L 38, 11. 2. 1974, p. 2.

⁽⁵⁾ OJ No L 165, 20. 6. 1974, p. 16.

⁽⁶⁾ OJ No L 221, 12. 8. 1974, p. 1.

⁽⁷⁾ OJ No L 24, 30. 1. 1976, p. 6.

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Whereas the approximation of national laws relating to motor vehicles entails mutual recognition by the Member States of checks carried out by each of them on the basis of the common requirements,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. Each Member State shall grant EEC component type-approval for any type of three-point or lap safety belt and any type of restraint system which satisfies the design and test requirements laid down in 2 of Annex I and in Annexes IV to XIV.
2. The Member State which has granted EEC component type-approval shall take the measures required to ensure that production models conform to the approved type, if need be in cooperation with the competent authorities in the other Member States.
3. For the purpose of implementing paragraph 2, it shall be sufficient for a Member State to ensure that as a minimum the quality-control procedures laid down in 2.8.1 of Annex I are applied.

If, however, the checks are made by the Member State itself, or by laboratories authorized by it, the methods used shall be such as to give results at least as reliable as those that would be given by the procedures provided for in paragraph 1. The procedure laid down in 2.8.2 of Annex I is, in particular, an appropriate method.

Article 2

Member States shall, for each type of safety belt or restraint system which they approve pursuant to Article 1, issue to the manufacturer, or to his authorized representative, an EEC component type-approval mark conforming to one of the models shown in Annex III.

Member States shall take all appropriate measures to prevent the use of marks liable to create confusion between safety belts or restraint systems which have been type-approved pursuant to Article 1 and other devices.

Article 3

1. No Member State may prohibit the placing on the market of safety belts and restraint systems on grounds relating to their design or method of functioning if they bear the EEC component type-approval mark.
2. Nevertheless, a Member State may prohibit the placing on the market of safety belts and restraint systems bearing the EEC component type-approval mark which consistently fail to conform to the approved type.

That State shall inform the other Member States and the Commission forthwith of the measures taken, specifying the reasons for its decision.

Article 4

The competent authorities of each Member State shall within one month send to those of the other Member States a copy of the component type-approval certificate, an example of which is given in Annex II, completed for each type of safety belt and restraint system which they approve or refuse to approve.

Article 5

1. If a Member State which has granted EEC component type-approval finds that a number of safety belts and restraint systems bearing the same EEC component type-approval mark do not conform to the type which it has approved, it shall take the necessary measures to ensure that production models conform to the approved type. The competent authorities of that State shall advise those of the other Member States of the measures taken, which may, where there is

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consistent failure to conform, extend to withdrawal of EEC component type-approval. The said authorities shall take the same measures if they are informed by the competent authorities of another Member State of such failure to conform.

2. The competent authorities of the Member States shall inform one another within one month of any withdrawal of EEC component type-approval and of the reasons for such measure.

3. If a Member State which has granted EEC component type-approval disputes the failure to conform notified to it, the Member States concerned shall endeavour to settle the dispute. The Commission shall be kept informed and shall, where necessary, hold appropriate consultations for the purpose of reaching a settlement.

Article 6

Any decision taken pursuant to the provisions adopted in implementation of this Directive to refuse or withdraw EEC component type-approval for safety belts or restraint systems or prohibit their placing on the market or use shall set out in detail the reasons on which it is based. Such decisions shall be notified to the party concerned, who shall at the same time be informed of the remedies available to him under the laws in force in the Member States and of the time limits allowed for the exercise of such remedies.

Article 7

No Member State may refuse to grant EEC type-approval or national type-approval for a vehicle on grounds relating to the safety belts or restraint systems with which it is equipped, if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in 3 of Annex I.

Article 8

No Member State may refuse or prohibit the sale, registration, entry into service or use of any vehicle on grounds relating to its safety belts or restraint systems, if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in 3 of Annex I.

▼M1*Article 9*

For the purposes of this Directive, 'vehicle' means any motor vehicle in categories M and N as defined in Annex I to Directive 70/156/EEC intended for use on the road, having at least four wheels and a maximum design speed exceeding 25 km/h.

▼B*Article 10*

The amendments necessary for adapting the Annexes to take account of technical progress shall be adopted in accordance with the procedure laid down in Article 13 of Directive 70/156/EEC.

Article 11

1. Member States shall bring into force the provisions necessary in order to comply with this Directive within 18 months of its notification and shall forthwith inform the Commission thereof.

2. Member States shall ensure that the texts of the main provisions of national law which they adopt in the field covered by this Directive are communicated to the Commission.

Article 12

This Directive is addressed to the Member States.

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ANNEX I

**SCOPE, DEFINITIONS, EEC COMPONENT TYPE-APPROVAL,
INSTALLATION REQUIREMENTS****▼M2**

0. SCOPE

This Directive applies to safety belts and restraint systems which are designed for installation in vehicles conforming to the definition given in Article 9 and are intended for separate use, i.e. as individual fittings, by persons of adult build occupying forward-facing seats.

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1. DEFINITIONS

For the purposes of this Directive:

1.1. '*safety belt (seat belt, belt)*' means an assembly of straps with a securing buckle, adjusting devices and attachments which is capable of being anchored to a power-driven vehicle and is designed to diminish the risk of injury to its wearer, in the event of collision or of abrupt vehicle deceleration, by limiting the mobility of the wearer's body. Such an assembly is generally referred to as a 'belt assembly', a term also embracing any device for energy absorption or belt retraction;

1.1.1. '*lap belt*' means a belt which passes across the front of the wearer's pelvic region;

1.1.2. '*diagonal belt*' means a belt which passes diagonally across the front of the chest, from the hip to the opposite shoulder;

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1.1.3. '*three-point belt*' means a belt which is essentially a combination of a lap strap and a diagonal strap;

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1.1.4. '*harness belt*' means a belt assembly comprising a lap belt and shoulder straps;

1.2. '*belt type*' means a category of belts which do not differ in such essential respects as:

1.2.1. rigid parts (buckle, attachments, retractor, etc.),

1.2.2. the material, weave, dimensions and colour of the straps,

1.2.3. the geometry of the belt assembly;

1.3. '*strap*' means a flexible component designed to hold the body and to transmit stresses to the belt anchorages;

1.4. '*buckle*' means a quick-release device enabling the wearer to be held by the belt. The buckle may incorporate the belt adjusting device;

1.5. '*belt adjusting device*' means a device enabling the belt to be adjusted according to the requirements of the individual wearer and to the position of the seat. ►M2 The adjusting device may be part of the buckle, the retractor or any other part of the safety belt; ◄

1.6. '*attachments*' means parts of the belt assembly, including the necessary securing components, which enable it to be attached to the belt anchorages;

1.7. '*energy absorber*' means a device designed to disperse energy independently of, or jointly with, the strap and forming part of a belt assembly;

1.8. '*retractor*' means a device for accommodating a part or the whole of the strap of a safety belt;

1.8.1. '*non-locking retractor*' (type 1) means a retractor from which the strap is extracted to its full length by a small external force and which allows of no adjustment of the strap which has been extracted;

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- 1.8.2. *'manually unlocking retractor'* (type 2) means a retractor requiring the manual operation of a device by the user to unlock the retractor in order to obtain the desired strap extraction and which locks automatically when the said operation ceases;
- 1.8.3. *'automatically locking retractor'* (type 3) means a retractor allowing extraction of the strap to the desired length and which, when the buckle is fastened, automatically adjusts the strap to the wearer. Further extraction of the strap is not possible without deliberate action on the part of the wearer;
- 1.8.4. *'emergency locking retractor'* (type 4) means a retractor which, in normal driving conditions, does not restrict the freedom of movement of the wearer of the safety belt. It has a length adjusting device which automatically adjusts the strap to the wearer, and a locking mechanism actuated in an emergency by:
- 1.8.4.1. deceleration of the vehicle, extraction of the strap relative to the retractor or any other automatic means (single sensitivity), or
- 1.8.4.2. any combination of these factors (multiple sensitivity);

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- 1.8.5. *'emergency-locking retractor with higher response threshold'* (type 4N) means a retractor of the type defined in Item 1.8.4, but having special properties as regards use in vehicles of categories M₂, M₃, N₁, N₂ and N₃⁽¹⁾;

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- 1.9. *'belt anchorages'* means the parts of the vehicle structure or seat structure or any other part of the vehicle to which the safety belts are to be secured;
- 1.10. *'vehicle type'* as regards safety belts and restraint systems means a category of power-driven vehicles which do not differ in such essential respects as the dimensions, lines and constituent materials of the components of the vehicle structure or seat structure or any other part of the vehicle to which the safety belts and the restraint systems are attached;
- 1.11. *'restraint system'* means a system combining a seat, fixed to the structure of the vehicle by appropriate means, and a safety belt for which at least one anchorage is located on the seat structure;
- 1.12. *'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 and part of a bench seat intended to seat one person;
- 1.13. *'group of seats'* means either a bench-type seat, or seats which are separate but side-by-side (i.e., fixed so that the front seat anchorages of one of these seats are in line with the front or rear anchorages of the other or between the anchorages of the other seat) and seat one or more adults;
- 1.14. *'bench seat'* means a structure complete with trim, intended to seat at least two adults;
- 1.15. *'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, allow:
- 1.15.1. longitudinal displacement,
- 1.15.2. vertical displacement,
- 1.15.3. angular displacement;
- 1.16. *'seat anchorage'* means the system by which the seat assembly is secured to the vehicle structure, including the affected parts of the vehicle structure;
- 1.17. *'seat type'* means a category of seats which do not differ in such essential respects as:
- 1.17.1. the structure, shape, dimensions and materials of the seat,
- 1.17.2. the type and dimensions of the adjustment systems and all locking systems,

⁽¹⁾ 'Vehicle categories defined in Annex I to Directive 70/156/EEC (OJ No L 42, 23. 2. 1970).'

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- 1.17.3. the type and dimensions of the belt anchorages on the seat, of the seat anchorage and of the affected parts of the vehicle structure;
- 1.18. '*displacement system*' means a device enabling the seat or one of its parts to be displaced angularly or longitudinally, without a fixed intermediate position, to facilitate passenger access;
- 1.19. '*locking system*' means a device ensuring that the seat and its parts are maintained in any position of use;

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- 1.20. '*recessed buckle-release button*': it must not be possible to release the buckle using a sphere having a diameter of 40 mm;
- 1.21. '*non-recessed buckle-release button*': it must be possible to release the buckle using a sphere having a diameter of 40 mm.

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- 2. EEC COMPONENT TYPE-APPROVAL

2.1. **Application for EEC component type-approval**

- 2.1.1. The application for EEC component type-approval of a type of safety belt shall be submitted by the holder of the trade name or mark or by his representative.

The application for EEC component type-approval of a type of restraint system shall be submitted by the holder of the trade mark or by his representative or by the manufacturer of the vehicle in which it is to be installed or by his representative.

- 2.1.2. It shall be accompanied by:

- 2.1.2.1. **►M2** a technical description in triplicate of the belt type, providing details of the straps and rigid parts used, together with appropriate drawings and, in the case of retractors, instructions for installation thereof and installation of the sensors. **◄** The drawings must show the position for the EEC component type-approval mark. The description shall mention the colour of the model submitted for approval and shall specify the vehicle type(s) for which this belt type is intended. In the case of a restraint system, the description shall include: drawings, on an appropriate scale, of the vehicle structure, seat structure, adjustment systems and attachments, showing the positions of the seat anchorages and belt anchorages and reinforcements in sufficient detail; a specification of the materials used which may affect the strength of the seat anchorages and belt anchorages; a technical description of the seat anchorages and the belt anchorages;

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- 2.1.2.2. five samples of a belt type, and
- 2.1.2.3. a 10-m length of each type of strap used in the type of belt.
- 2.1.2.4. The technical service conducting the component type-approval tests shall be entitled to request further samples.

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- 2.1.3. In the case of restraint systems, two samples, which may include two of the samples of belts mentioned in 2.1.2.2, and, at the manufacturer's choice, either a vehicle representative of the vehicle type to be approved, or the part or parts of the vehicle considered essential by the technical service conducting approval tests for testing the restraint system, shall be submitted by the applicant to the service.

2.2. **Markings**

The samples of a belt type or type of restraint system submitted for EEC component type-approval in accordance with 2.1 shall be clearly and indelibly marked with the manufacturer's name, trade name or mark.

2.3. **General specifications**

- 2.3.1. Each sample submitted in accordance with 2.1 shall conform to the specifications set out in 2.3 to 2.7.
- 2.3.2. The belt or the restraint system shall be so designed and constructed that, when correctly installed and properly used by an occupant, it operates satisfactorily and reduces the risk of bodily injury in the event of an accident.

▼B2.4. **Rigid parts**2.4.1. *General*

2.4.1.1. The rigid parts of the safety belt, such as buckles, adjusting devices, attachments and the like, shall not have sharp edges liable to cause wear or breakage of the straps by chafing.

2.4.1.2. All parts of a belt assembly liable to be affected by corrosion shall be suitably protected against it. After undergoing the corrosion test prescribed in 2.7.2, neither signs of deterioration likely to impair the proper functioning of the device nor any significant corrosion shall be visible to the unaided eye of a qualified observer.

2.4.1.3. Rigid parts intended to absorb energy or to be subjected to or to transmit a load shall not be fragile.

2.4.1.4. The rigid items and ►**M2** parts made of plastics ◀ of a safety belt must be so located and installed that, when a power-driven vehicle is in normal use, they cannot become trapped under a sliding seat or in a door of the vehicle. If one of the parts does not meet the above requirements, it must be subjected to the cold impact test specified in 2.7.6.4. After test, if any visible cracks are present in the plastic covers or retainers of rigid items, these ►**M2** parts made of plastics ◀ shall be removed and the remaining assembly shall then be checked for its continued security. If the remaining assembly is still secure, or if no visible cracks are present, it shall be checked again in order to ascertain whether it meets the requirements of 2.4.2, 2.4.3 and 2.6.

2.4.2. *Buckle*

2.4.2.1. The buckle shall be so designed as to preclude any possibility of incorrect use. This means *inter alia* that it must not be possible for the buckle to be left in a partially-closed position. The procedure for opening the buckle must be obvious. Wherever the buckle is likely to be in contact with the wearer, the width of its contact surface shall not be less than 46 mm.

2.4.2.2. The buckle, even when not under load, shall remain closed, whatever its position. It must not be possible to release it with a force less than 1 daN.

The buckle shall be so designed as to be easy to use and to grasp. It shall be capable of being released when under the load specified in 2.7.9.2.

The buckle shall be released by pressing either a button or a similar device. ►**M2** The surface to which this pressure is applied must have the following dimensions with the button in the release position and when projected into a plane perpendicular to the button's initial direction of motion: ◀

- for enclosed devices, an area of not less than 4.5 cm² and a width of not less than 15 mm;
- for non-enclosed devices, an area of not less than 2.5 cm² and a width of not less than 10 mm.

This area shall be coloured red. No other part of the buckle shall be of this colour.

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2.4.2.3. The buckle must be capable of withstanding repeated operation and, before the dynamic test referred to in Item 2.7.8, must undergo 5 000 opening and closing cycles under normal conditions of use.

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2.4.2.4. The buckle, when tested in accordance with 2.7.6.3 shall operate normally.

2.4.2.5. The force required to open the buckle in the test prescribed in 2.7.9 shall not exceed 6 daN.

2.4.2.6. The buckle shall be tested for strength in accordance with the requirements of 2.7.6.1 and 2.7.6.5, as appropriate. It must not break, be seriously distorted or become detached when subjected to the prescribed load.

2.4.2.7. In the case of buckles which incorporate a component common to two assemblies, if the buckle of one assembly can be assembled in use with the mating part of that assembly and with that of the other assembly, the strength and release tests mentioned in 2.7.8 and 2.7.9 shall be carried out for both possible means of assembly.

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- 2.4.3. *Belt adjusting device*
- 2.4.3.1. Two samples of each belt adjusting device shall be tested in accordance with the requirements of 2.7.4. The strap slip shall not exceed 25 mm for each sample of adjusting device and the sum of shifts for all the adjusting devices of a belt shall not exceed 40 mm.
- 2.4.3.2. All adjusting devices shall be tested for strength in accordance with 2.7.6.1. They must neither break nor become detached when subjected to the prescribed load.
- 2.4.3.3. When a test is carried out in accordance with 2.7.6.6, the force required to operate any manual device shall not exceed 5 daN.
- 2.4.4. *Attachments*
- Attachments shall be tested for strength in accordance with the requirements of 2.7.6.1 and 2.7.6.2. They must neither break nor become detached when subjected to the prescribed load.
- 2.4.5. *Retractors*
- Retractors shall fulfil the requirements specified below, including the tests for strength prescribed in 2.7.6.1 and 2.7.6.2.
- 2.4.5.1. *Automatically locking retractors*
- 2.4.5.1.1. The strap of a safety belt equipped with an automatically locking retractor shall not move more than 30 mm between the locking positions of the retractor. After a rearward movement by the wearer, the belt must either remain in its initial position or return to that position automatically on subsequent forward movements by the wearer.
- 2.4.5.1.2. If the retractor is part of a lap belt, the retracting force of the strap shall be not less than 0.7 daN when measured in the free length between the manikin and the retractor in accordance with 2.7.7.4. If the retractor is part of a diagonal strap, the retracting force of the strap shall be not less than 0.2 daN and not more than 0.7 daN when similarly measured. If the strap passes through a guide or pulley, the retracting force shall be measured in the free length between the manikin and the guide or pulley. If the assembly incorporates a device which, upon manual or automatic operation, prevents the strap from being completely retracted, such a device shall not be operated when the retracting force is assessed.
- 2.4.5.1.3. The strap shall be withdrawn from the retractor and allowed to retract repeatedly, in accordance with the method described in 2.7.7.1, until 5 000 cycles of withdrawal and retraction have been completed. The retractor shall then be subjected to the corrosion test prescribed in 2.7.2 followed by the dust resistance test described in 2.7.7.3. It shall then satisfactorily complete a further 5 000 cycles after which it shall still meet the requirements of 2.4.5.1.1 and 2.4.5.1.2. After the above tests, the retractor shall still function correctly and stow the strap efficiently.
- 2.4.5.2. *Emergency locking retractors*
- 2.4.5.2.1. An emergency locking retractor shall satisfy the following conditions when tested in accordance with 2.7.7.2:

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- 2.4.5.2.1.1. it shall have locked when the vehicle deceleration reaches a value of 0.45 g in the case of type 4 or 0.85 g in the case of type 4N retractors;
- 2.4.5.2.1.2. it shall not lock at strap accelerations, measured in the direction of unreeling, of less than 0.8 g in the case of type 4 or less than 1.0 g in the case of type 4N retractors;
- 2.4.5.2.1.3. in addition, it shall not lock when the sensor is inclined at an angle not exceeding 12° in any direction from the installation position specified by the manufacturer;
- 2.4.5.2.1.4. it shall lock when the sensor is inclined at an angle of not less than 27° in the case of type 4 or not less than 40° in the case of type 4N retractors in any direction from the installation position specified by the manufacturer;
- 2.4.5.2.1.5. if operation of the retractor is dependent on an external signal or energy source, the device shall ensure automatic locking of the retractor in the event of the failure or interruption of the signal or energy source.

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- 2.4.5.2.2. when tested in accordance with Item 2.7.7.2, an emergency locking retractor with multiple sensitivity, including strap-sensitivity, shall comply with the specified requirements and also lock when strap acceleration measured in the direction of unreeling is not less than 1.5 g in the case of type 4 or not less than 2.0 g in the case of type 4N retractors;

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- 2.4.5.2.3. in each of the tests mentioned in 2.4.5.2.1 and 2.4.5.2.2, the amount of strap movement which may occur before the retractor locks shall not exceed 50 mm, starting at the length specified in 2.7.7.2.1. In order to comply with the requirements of 2.4.5.2.1.2, a retractor shall be considered as satisfactory if, at the strap acceleration values prescribed in that point, it does not lock until at least the first 50 mm of strap has been unwound, starting at the length specified in 2.7.7.2.1;
- 2.4.5.2.4. if the retractor is part of a lap belt, the retracting force of the strap shall be not less than 0.7 daN when measured in the free length between the manikin and the retractor, in accordance with 2.7.7.4. If the retractor is part of a diagonal strap, the retracting force of the strap shall be not less than 0.2 daN and not more than 0.7 daN when similarly measured. If the strap passes through a guide or pulley, the retracting force shall be measured in the free length between the manikin and the guide or pulley. If the assembly incorporates a device which, upon manual or automatic operation, prevents the strap from being completely retracted, such a device shall not be operated when the retracting force is assessed;
- 2.4.5.2.5. the strap shall be withdrawn from the retractor and allowed to retract repeatedly in accordance with the method described in 2.7.7.1 until 40 000 cycles of withdrawal and retraction have been completed. The retractor shall then be subjected to the corrosion test prescribed in 2.7.2 followed by the dust resistance test described in 2.7.7.3. It shall then satisfactorily complete a further 5 000 cycles of withdrawal and retraction, after which it shall still meet the requirements of 2.4.5.2.1, 2.4.5.2.2, 2.4.5.2.3 and 2.4.5.2.4. After the above tests, the retractor shall still function correctly and stow the strap efficiently.

2.5. Straps**2.5.1. General**

- 2.5.1.1. The characteristics of the straps shall be such as to ensure that their pressure on the wearer's body is distributed as evenly as possible over their whole width and that they do not twist, even under load. They shall have energy-absorbing and energy-dispersing capacities.
- 2.5.1.2. The width of the strap under a load of 980 daN shall not be less than 46 mm. This dimension shall be measured during the breaking-strength test prescribed in 2.7.5, and without stopping the machine.

2.5.2. Strength after room-conditioning

In the case of the two strap samples conditioned in conformity with 2.7.3.1, the breaking load of the strap, determined in accordance with 2.7.5, shall be not less than 1 470 daN. The difference between the breaking loads of the two samples shall not exceed 10 % of the greater of the breaking loads measured.

2.5.3. Strength after special conditioning

In the case of the two strap samples conditioned in conformity with one of the provisions of 2.7.3 (except 2.7.3.1), the breaking load of the strap shall be not less than 75 % of the average of the loads determined in the test referred to in 2.5.2, and not less than 1 470 daN. The technical service may dispense with one or more of these tests if the composition of the material used, or information already available, renders the test or tests superfluous.

2.6. Belt assembly or restraint system**2.6.1. Requirements for dynamic testing**

- 2.6.1.1. The belt assembly or restraint system shall be subjected to a dynamic test in conformity with 2.7.8.

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- 2.6.1.2. The dynamic test shall be performed on two belt assemblies which have not previously been under load, except in the case of belt assemblies forming part of restraint systems, when the dynamic test shall be performed on the restraint systems intended for one group of seats which have not previously been under load. The buckles of the belts to be tested shall satisfy the requirements set out in Item 2.4.2.3:
- 2.6.1.2.1. the belts shall have undergone the corrosion test defined in Item 2.7.2, after which the buckles shall be subjected to a further 500 opening and closing cycles under normal conditions of use;
- 2.6.1.2.2. in the case of safety belts with retractors, the latter shall have been subjected to the tests described in Items 2.4.5.1 or 2.4.5.2. If, however, a retractor has already been subjected to the corrosion test pursuant to the provisions of Item 2.6.1.2.1, this test need not be repeated.
- 2.6.1.3. During this test, the following requirements shall be met:
- 2.6.1.3.1. no part of a belt assembly or a restraint system securing the occupant shall break and no buckle or locking or displacement system shall unlock; and
- 2.6.1.3.2. the forward displacement of the manikin shall be between 80 and 200 mm at pelvic level in the case of lap belts. In the case of other types of belt, the forward displacement shall be between 80 and 200 mm at pelvic level and between 100 and 300 mm at torso level. These displacements are the displacements in relation to the measurement points shown in Annex VIII, Figure 6.

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- M2 2.6.1.4. ◀ In the case of a restraint system:
- M2 2.6.1.4.1. ◀ the movement of the chest reference point may exceed that specified in 2.6.1.2.2 if it can be shown, either by calculation or by a further test, that no part of the torso or the head of the manikin used in the dynamic test would have come into contact with any forward rigid part of the vehicle, apart from contact of the chest with the steering assembly, if the latter meets the requirements of Directive 74/297/EEC and provided that contact does not occur at a speed higher than 24 km/h. For this assessment, the seat shall be considered to be in the position specified in 2.7.8.1.5;

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

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- 2.6.2. *Strength after abrasion procedure*
- 2.6.2.1. For both samples conditioned in conformity with 2.7.3.6, the breaking load shall be assessed in accordance with 2.5.2 and 2.7.6. It shall be at least equal to 75 % of the average of the breaking loads determined during tests on unabraded straps, and not less than the minimum load specified for the items being tested. The difference between the breaking loads of the two samples shall not exceed 20 % of the greater of the breaking loads measured.
►M2 In the type 1 and type 2 procedures, the tensile-strength test shall be conducted on the strap samples only (Item 2.7.5). In type 3 procedures, the tensile-strength test shall be conducted on the strap and relevant rigid parts (Item 2.7.6). ◀
- 2.6.2.2. The items to be subjected to an abrasion procedure and the procedures to be followed are indicated in the following table. A new sample shall be used for each procedure.

	Type 1 procedure	Type 2 procedure	Type 3 procedure
Attachment	—	—	x
Guide or pulley	—	x	—
Buckle-loop	—	x	x
Adjusting device	x	►M2 — ◀	x
Parts sewn to the strap	—	—	x

▼B2.7. **Tests**

2.7.1. *Use of samples submitted for EEC component type-approval of a type of belt or restraint system (see Annex XIV)*

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2.7.1.1. Two belts or restraint systems are required for the buckle inspection, the low-temperature buckle test, the low-temperature test described in Item 2.7.6.4 where necessary, the buckle durability test, the belt corrosion test, the retractor operating tests and the buckle-opening test after the dynamic test. One of these two samples shall be used for the inspection of the belt or restraint system.

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

2.7.1.3. Two belts or restraint systems are required for the inspection of the buckle, the micro-slip test and the abrasion test. The belt adjustment device operating test shall be conducted on one of the two samples.

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2.7.1.4. ►**M2** The sample of strap shall be used for testing the breaking strength of the strap. Part of this sample shall be preserved for as long as the component type-approval remains valid. ◀

▼M2**▼B**2.7.2. *Corrosion test*

2.7.2.1. A complete safety belt assembly shall be positioned in a test chamber as prescribed in Annex XIII. In the case of an assembly incorporating a retractor, the strap shall be unwound to full length, less 300 ± 3 mm.

Except for short interruptions that may be necessary, e.g. for checking and replenishing the salt solution, the exposure test shall proceed continuously for a period of fifty hours.

2.7.2.2. On completion of the exposure test, the assembly shall be gently washed or dipped in clean running water at a temperature not exceeding $38\text{ }^{\circ}\text{C}$ so as to remove any salt deposit that may have formed, and then allowed to dry at room temperature for 24 hours before being inspected in accordance with 2.4.1.2.

2.7.3. *Conditioning of straps for the breaking-strength test*

Samples cut from the strap, as referred to in 2.1.2.4, shall be conditioned as follows.

2.7.3.1. Room-conditioning

The strap shall be kept for a minimum of 24 hours in an atmosphere having a temperature of $20 \pm 5\text{ }^{\circ}\text{C}$ and a relative humidity of $65 \pm 5\%$. If the test is not carried out immediately after conditioning, the sample shall be placed in a hermetically sealed receptacle until the test begins. The breaking load shall be determined within five minutes of the strap's removal from the conditioning atmosphere or receptacle.

2.7.3.2. Light-conditioning

2.7.3.2.1. ►**M2** The provisions of recommendation ISO/R 105-B 02-1978 shall apply. ◀ The strap shall be exposed to light for the time necessary to produce fading of Standard Blue Dye No 7 to a contrast equal to grade four on the grey scale.

▼M2

2.7.3.2.2. The strap shall then be kept for a minimum of 24 hours at an air temperature of $20 \pm 5\text{ }^{\circ}\text{C}$ and a relative humidity of $65 \pm 5\%$. If the test cannot be carried out immediately after the conditioning, the sample shall be kept in an hermetically sealed container until the start of the test. The tensile strength of the strap shall be determined within five minutes of its removal from the conditioning atmosphere or receptacle.

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2.7.3.3. Cold-conditioning

2.7.3.3.1. The strap shall be kept for a minimum of 24 hours in an atmosphere having a temperature of 20 ± 5 °C and a relative humidity of 65 ± 5 %.

2.7.3.3.2. The strap shall then be kept for 1½ hours on a plane surface in a low-temperature chamber in which the air temperature is -30 ± 5 °C. It shall then be folded and the fold shall be loaded with a mass of 2 kg previously cooled to -30 ± 5 °C. When the strap has been kept under load for 30 minutes in the same low-temperature chamber, the mass shall be removed and the breaking load shall be measured within five minutes of the strap's removal from the low-temperature chamber.

2.7.3.4. Heat-conditioning

2.7.3.4.1. The strap shall be kept for three hours in a heating cabinet in an atmosphere having a temperature of 60 ± 5 °C and a relative humidity of 65 ± 5 %.

2.7.3.4.2. The breaking load shall be determined within five minutes of the strap's removal from the heating cabinet.

2.7.3.5. Exposure to water

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

2.7.3.5.2. The breaking load shall be determined within 10 minutes of the strap's removal from the water.

2.7.3.6. Conditioning by abrasion

2.7.3.6.1. The abrasion procedure shall be performed on every device in which the strap is in contact with a rigid part of the belt. However, the type 1 abrasion test (2.7.3.6.4.1) need not be carried out on the belt-adjusting device where the micro-slip test (2.7.4) shows that the strap slips less than half the prescribed amount. The setting on the test apparatus shall approximately maintain the relative position of strap and contact area.

2.7.3.6.2. The samples to be subjected to abrasion shall be kept for a minimum of 24 hours in an atmosphere having a temperature of 20 ± 5 °C and a relative humidity of 65 ± 5 %. The room temperature during testing shall be between 15 and 30 °C.

2.7.3.6.3. The table below sets out the requirements for each abrasion procedure:

	Load daN	Frequency Hz	Number of cycles	Shift mm
Type 1 procedure	2.5	0.5	5 000	300 + 20
Type 2 procedure	0.5	0.5	45 000	300 ± 20
Type 3 procedure ⁽¹⁾	0—5	0.5	45 000	—

⁽¹⁾ See 2.7.3.6.4.3.

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

2.7.3.6.4. Particular procedure conditions.

2.7.3.6.4.1. Type 1 procedure: for cases where the strap slides through an adjusting device.

The 2.5 daN load shall be vertically and permanently applied to one section of the strap.

The other section, set horizontally, shall be subjected to a back-and-forth motion.

The adjusting device shall be so placed that the horizontal section of the strap shall remain under load (see Annex XII, fig. 1).

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- 2.7.3.6.4.2. Type 2 procedure: in cases where the strap changes direction once on passing through a rigid part.

The angles which both straps ends make with each other must be as shown in Annex XII, Figure 2.

A permanent load of 0·5 daN must be applied. If the strap changes direction more than once on passing through a rigid part, the 0·5 daN load may be increased so as to achieve the prescribed 300 mm of strap movement through that rigid part.

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- 2.7.3.6.4.3. Type 3 procedure: for cases where the strap is fixed to a rigid part by sewing or similar means.

The total shift shall be 300 ± 20 mm and the 5 daN load shall be applied only during the time corresponding to a shift of 100 ± 20 mm for each half period (see Annex XII, fig. 3).

- 2.7.4. *Micro-slip test* (see Annex XII, fig. 3).

- 2.7.4.1. The components or devices to be subjected to the micro-slip test shall be kept for a minimum of 24 hours before testing in an atmosphere having a temperature of 20 ± 5 °C and a relative humidity of 65 ± 5 %.

The test shall be carried out at a temperature between 15 and 30 °C.

- 2.7.4.2. It shall be ensured that the free section of the adjusting device points either up or down on the test bench, as in the vehicle.

- 2.7.4.3. A 5 daN load shall be attached to the lower end of the section of strap.

The other end shall be subjected to a back-and-forth motion the total amplitude being 300 ± 20 mm (see figure).

- 2.7.4.4. If there is a free end serving as reserve strap, it must in no way be fastened or clipped to the section under load.

- 2.7.4.5. It shall be ensured that on the test bench the strap, in the slack position, descends in a concave curve from the adjusting device, as in the vehicle.

The 5 daN load applied on the test bench shall be guided vertically in such a way as to prevent the load swaying and the belt twisting.

The attachment shall be fixed to the 5 daN load as in the vehicle.

- 2.7.4.6. Before the actual start of the test, a series of 20 cycles shall be completed so that the self-tightening system settles properly.

- 2.7.4.7. 1 000 cycles shall be completed at a frequency of 0·5 cycle per second, the total amplitude being 300 ± 20 mm. The 5 daN load shall be applied only during the time corresponding to a shift of 100 ± 20 mm for each half period.

- 2.7.5. *Test of breaking strength of strap* (static test)

- 2.7.5.1. The test shall be carried out each time on two new samples of strap, of sufficient length, conditioned in accordance with one of the provisions of 2.7.3.

- 2.7.5.2. Each strap shall be gripped between the clamps of a tensile-testing machine. The clamps shall be so designed as to avoid breakage of the strap at or near the point of contact with the clamps. The speed of traverse shall be about 100 mm per minute. The free length of the sample between the clamps of the machine at the start of the test shall be 200 ± 40 mm.

- 2.7.5.3. When the load reaches 980 daN, the width of the strap shall be measured without stopping the machine.

- 2.7.5.4. The load shall then be increased until the strap breaks, and the breaking load shall be noted.

- 2.7.5.5. If the strap slips or breaks at the point of contact with one of the clamps or within 10 mm of either of them, the test shall be invalid and a new test shall be carried out on another sample.

- 2.7.6. *Static test of belt components incorporating rigid parts*

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- 2.7.6.1. The buckle and strap adjusting device must be connected to the tensile-testing machine by their normal attachments and a load of

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980 daN must be applied. If the buckle or adjusting device is part of the attachment or of the common component of a three-point strap, the buckle or adjusting device must be tested together with the attachment in accordance with Item 2.7.6.2, except in the case of retractors with a return pulley at the upper strap anchorage. In this case the test load must be 980 daN and the length of strap remaining on the reel at the moment of locking must be as close as possible to 450 mm.

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2.7.6.2. The attachments shall be tested in the way described in 2.7.6.1, but the load shall be 1 470 daN and, subject to the provisions of the second sentence of 2.7.8.1., shall be applied in the least favourable conditions likely to occur in a vehicle in which the belt is correctly installed. In the case of retractors, the test shall be performed with the strap completely unwound from the reel.

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2.7.6.3. Two samples of a belt assembly shall be placed in a low-temperature chamber at a temperature of -10 ± 1 °C for two hours. Immediately after being removed from the chamber, the mating parts of the buckle shall be locked together manually.

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2.7.6.4. Two samples of the complete belt assembly shall be placed in a low-temperature chamber at -10 ± 1 °C for two hours. The rigid items and ►M2 parts made of plastics ◀ under test shall then be laid in turn upon a flat steel surface (which has been kept with the samples in the low-temperature chamber), placed on the horizontal surface of a compact rigid block with a mass of at least 100 kg; within 30 seconds of their being removed from the low-temperature chamber, an 18 kg steel mass shall be allowed to fall under gravity from a height of 300 mm onto the item. The impact face of the mass shall have a hardness of at least 45 HRC and take the form of a convex surface having a transverse radius of 10 mm and a longitudinal radius of 150 mm. One sample shall be tested with the axis of the curved bar in line with the strap, and the other sample shall be tested at 90° to the strap.

2.7.6.5. Buckles having parts common to two safety belts shall be loaded in such a way as to simulate the conditions of use in a vehicle with the seats in the mid-position of their adjustment. The direction of application of the load shall be established in accordance with 2.7.8.1. A load of 1 470 daN shall be applied simultaneously to each of the straps. Suitable apparatus for the above test is shown in Annex XI.

2.7.6.6. When testing any manual adjusting device, the strap shall be drawn steadily through that device, having regard to normal conditions of use, at a rate of approximately 100 mm/s, and the maximum force shall be measured to the nearest 0.1 daN after the first 25 mm of strap movement. The test shall be carried out in both directions of strap travel through the adjusting device, the strap being cycled 10 times prior to measurement.

2.7.7. *Additional tests for retractors*

2.7.7.1. Durability of retractor mechanism

2.7.7.1.1. The strap shall be withdrawn and allowed to retract for the required number of cycles at a rate of not more than 30 cycles per minute. In the case of emergency locking retractors, a snatch shall be introduced at each fifth cycle to lock the retractor. The snatches shall occur in equal numbers at each of five different extractions, namely, 90, 80, 75, 70 and 65% of the total length of the strap on the retractor. However, where more than 900 mm is provided, the above percentages shall be related to the final 900 mm of strap which remain wound on the retractor.

2.7.7.1.2. Suitable apparatus for the tests specified in 2.7.7.1.1 is shown in Annex IV.

2.7.7.2. Locking of emergency locking retractors

2.7.7.2.1. The retractor shall be tested for locking when 300 ± 3 mm of strap remain wound on the retractor reel.

2.7.7.2.1.1. In the case of a locking retractor actuated by strap movement, the extraction shall be in the direction in which it normally occurs when the retractor is installed in a vehicle.

2.7.7.2.1.2. When retractors are being tested for sensitivity to vehicle deceleration, they shall be tested at the above extraction in both directions

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along two mutually perpendicular axes, which are horizontal if the retractor is to be installed in a vehicle as specified by the safety belt manufacturer. One of these test directions shall be chosen by the technical service conducting the approval test so as to give the most adverse conditions with respect to actuation of the locking mechanism.

- 2.7.7.2.2. Suitable apparatus for the tests specified in 2.7.7.2.1 is described in Annex V. The design of any such apparatus shall be such that the required acceleration is achieved at an average rate of increase of at least ►**M2** 25 g ◀ per second.
- 2.7.7.2.3. For the purpose of testing the requirements of 2.4.5.2.1.3 and 2.4.5.2.1.4, the retractor shall be mounted on a horizontal table and the table tilted at a speed not exceeding 2° per second until locking has occurred. The test shall be repeated in other directions so as to ensure that the requirements are fulfilled.

2.7.7.3. Dust resistance

- 2.7.7.3.1. The retractor shall be placed in a test chamber, as shown in Annex VI. Its relative position shall be the same as that in which it is mounted in the vehicle. The test chamber shall contain a quantity of dust which meets the requirements of 2.7.7.3.2. 500 mm of the strap shall be extracted from the retractor and kept extracted, except that it shall be subjected to 10 complete cycles of retraction and withdrawal within one or two minutes after each agitation of the dust.

For a period of five hours, the dust shall be agitated every 20 minutes for five seconds by compressed air which is dry and free of lubricating oil, passing through an aperture 1.5 ± 0.1 mm in diameter at a gauge pressure of $5.5 \times 10^5 \pm 0.5 \times 10^5$ Pa.

- 2.7.7.3.2. The dust used in the test described in 2.7.7.3.1 shall consist of about 1 kg of dry quartz. The particle size distribution shall be as follows:
- (a) passing through a 150 µ m aperture, 104 µ m wire diameter: 99 to 100 %;
 - (b) passing through a 105 µ m aperture, 64 µ m wire diameter: 76 to 86 %;
 - (c) passing through a 75 µ m aperture, 52 µ m wire diameter: 60 to 70 %.

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2.7.7.4. Retracting force

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- 2.7.7.4.1. ►**M2** The retracting force must ◀ be measured with the safety belt assembly fitted to a manikin, as in the dynamic test prescribed in 2.7.8. The strap tension shall be measured as close as possible to the points of contact with (but just clear of) the manikin ►**M2**, while the strap is being retracted at a speed of approximately 0.6 m per minute. ◀

2.7.8. *Dynamic tests of the belt assembly or the restraint system*

- 2.7.8.1. The belt assembly shall be mounted on a trolley equipped with the seat and the anchorages defined in Annex VII. If, however, the belt assembly is intended for a specific vehicle or for specific types of vehicle, the distances between the manikin and the anchorages shall be determined by the service conducting the tests, in accordance either with the fitting instructions supplied with the belt, or with the data supplied by the manufacturer of the vehicle.

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- 2.7.8.1.1. If a safety belt forms part of an assembly which is the subject of an application for component type-approval as a restraint system, this safety belt must be mounted on that part of the vehicle structure to which it is normally fitted and that part must be attached to the test trolley as follows:

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- 2.7.8.1.2. The method used to secure the vehicle during the test shall not be such as to strengthen the anchorages of the seats or safety belts, or to lessen the normal deformation of the structure.

No forward part of the vehicle shall be present which, by limiting the forward movement of the manikin, apart from the feet, would reduce the load imposed on the restraint system during the test. The discarded parts of the structure can be replaced by parts of

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equivalent strength, provided that they do not hinder the forward movement of the manikin.

- 2.7.8.1.3. A securing device shall be regarded as satisfactory if it produces no effect on an area extending over the whole width of the structure, and if the vehicle or the structure is blocked or immobilized in front at a distance of not less than 500 mm from the anchorage of the restraint system tested. At the rear, the structure shall be secured at a distance behind the anchorages which is sufficient to ensure that the requirements of 2.7.8.1.2 are fulfilled.
- 2.7.8.1.4. The seats shall be adjusted and placed in the driving or travelling position considered by the technical service conducting the approval tests as providing the most adverse conditions of strength consistent with the positioning of the manikin in the vehicle. ►**M2** If the seat back is adjustable, it must be locked as specified by the manufacturer or, in the absence of any specification, locked in such a manner as to form an effective angle as close as possible to 25° in the case of vehicles in categories M₁ and N₁ and as close as possible to 15° in the case of vehicles of all other categories. ◀
- 2.7.8.1.5. For the purpose of assessing the requirements of ►**M2** 2.6.1.4.1 ◀, the seat shall be regarded as being in its most forward driving or travelling position appropriate to the dimensions of the manikin.
- 2.7.8.1.6. All seats of the same group shall be tested simultaneously.

▼M2

- 2.7.8.2. The belt assembly must be attached to the manikin described in Annex VIII. A board 25 mm thick must be placed between the back of the manikin and the seat back. The belt must be firmly fastened around the manikin. The board must then be removed and the manikin so positioned that the whole length of its back is in contact with the seat back.

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- 2.7.8.3. The free ends of the straps shall extend sufficiently far beyond the adjusting devices to allow for slip.
- 2.7.8.4. The trolley shall then be propelled in such a way that, at the moment of impact, its free running speed is 50 ± 1 km/h and the manikin remains stable. The stopping distance of the trolley shall be 400 ± 50 mm. The trolley shall remain horizontal throughout deceleration. Deceleration of the trolley shall be achieved by using the apparatus shown in Annex VII or any other device giving equivalent results. The apparatus shall meet the performance requirements given in Annex IX.
- 2.7.8.5. The trolley speed immediately before impact and the maximum forward displacement of the manikin shall be measured.
- 2.7.8.6. After impact, the belt assembly or restraint system and its rigid parts shall be inspected visually, without opening the buckle, in order to determine whether there has been any failure or breakage. In the case of restraint systems, a check shall also be made, after the test, to establish whether the parts of the vehicle structure which are attached to the trolley have undergone any permanent deformation. Any such deformation found shall be taken into account in any calculation made in accordance with ►**M2** 2.6.1.4.1 ◀.
- 2.7.9. *Buckle-opening test*
- 2.7.9.1. Belt assemblies which have already undergone the dynamic test in accordance with 2.7.8, shall be used for this test.

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- 2.7.9.2. The belt assembly must be detached from the test-trolley without the buckle being opened. A direct tensile load of 30 daN must then be applied to the buckle. If the buckle is connected to a rigid part, account must be taken, when the force is applied, of the angle formed by the buckle and the rigid part during the dynamic test. At a speed of 400 ± 20 mm/min., a load must be applied to the geometric centre of the buckle-release button along a fixed axis running parallel to the initial direction of motion of the button. The buckle must be held in place by a rigid support when the force required to open the buckle is applied. The abovementioned load must not exceed the limit specified in Item 2.4.2.5. The point of contact of the test assembly must be spherical, with a radius of 2.5 ± 0.1 mm. It must have a smooth metal surface.

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- M2 2.7.9.3. ◀ The buckle-opening force shall be measured and any failure of the buckle noted.
- M2 2.7.9.4. ◀ After the buckle-opening test, the components of the belt assembly or restraint system which have undergone the tests prescribed in 2.7.8 shall be inspected and the extent of the damage sustained by the belt assembly or restraint system in the dynamic test shall be recorded in the test report.

2.7.10. *Test report*

The test report shall record the results of the tests prescribed in 2.7 and, in particular, the trolley speed, the maximum forward displacement of the manikin, the position of the buckle and any failure or breakage. If, pursuant to 2.7.8.1, the anchorage requirements of Annex VII have not been respected, the report shall describe how the belt assembly or the restraint system is mounted and specify important angles and dimensions. The report shall also mention any distortion or breakage of the buckle that occurred during the test.

In the case of a restraint system, the test report shall also specify the method of attaching the vehicle structure to the trolley, the position of the seats and the tilt of the seat backs. If the forward displacement of the manikin has exceeded the values prescribed in 2.6.1.2.2, the report shall state whether the requirements of ► M2 2.6.1.4.1 ◀ have been met.

2.8. **Verification of conformity**2.8.1. *Minimum requirements for verification of conformity*

- 2.8.1.1. The manufacturer or his authorized representative holding the EEC component type-approval mark shall be obliged to carry out continuous quality control, or see that it is carried out, so as to ensure that production of the ► M2 belts and restraint systems ◀ is uniform and conforms to the provisions of this Directive.
- 2.8.1.2. The manufacturer or his authorized representative shall be held responsible for:
- (a) the existence of quality control procedures;
 - (b) the availability of equipment necessary for the verification of conformity;
 - (c) keeping records of test results, test reports and any documents attached;
 - (d) the use of the test results to verify and ensure the consistency of the ► M2 belts and restraint systems ◀ manufactured, allowing for the variations admissible in industrial production.
- 2.8.1.3. The samples selected for verification of conformity shall undergo such tests as may be chosen by agreement with the competent authority from among those described in 2.6 and 2.7.
- 2.8.1.4. The following minimum requirements in particular must be complied with.

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- 2.8.1.4.1. All belts and restraint systems incorporating an emergency-locking retractor must be checked in respect of their compliance with:
- the provisions of Item 2.4.5.2.1.1 in accordance with the test conditions defined in Item 2.4.5.2.3, or
 - the provision set out in Item 2.4.5.2.1.4.

If the latter provision is fulfilled, at least 10 % of the production batch must also be tested in accordance with the provisions of Item 2.4.5.2.1.1.

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- 2.8.1.4.2. The check on the resistance of the samples of production belts in the dynamic test shall be carried out in accordance with the procedure laid down in 2.7.8. This check shall be carried out on a statistical and random basis, and in any event with a frequency of 1 in 25 000 belts produced or one per month of production, whichever is the greater.

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A minimum frequency of one per year shall be permitted where annual production is 5 000 assemblies or less.

During the test, after impact, the assembly shall be visually examined, without opening the buckle, to establish whether there has been any failure or breakage. If an assembly should fail the test, the manufacturer shall select further samples and take the necessary steps to ensure the conformity of production.

2.8.2. *Minimum requirements for spot checks made by Member States*

2.8.2.1. The frequency of spot checks shall be such that the tests specified in 2.8.2.2 are performed on at least 1 in 5 000 safety belts and restraint system of each approved type produced, with a minimum frequency of one and a maximum frequency of 50 for any 12 months of production.

2.8.2.2. Belts selected for verification of conformity with an approved type shall undergo such tests as may be chosen by the competent authority from among those described in 2.6 and 2.7.

At least 10 % of the belts selected for verification of conformity, but with a minimum of one and a maximum of five for 12 months production, shall undergo a dynamic test.

2.8.2.3. If one of the samples fails the test to which it is subjected, a further test shall be carried out on three other samples.

If one of the latter fails the test, Article 3 (2) shall be applied.

2.8.2.4. Tests shall be carried out on belts offered or intended for sale.

2.9. **Instructions**

Every safety belt shall be accompanied by the instructions specified in Annex X.

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3. REQUIREMENTS CONCERNING INSTALLATION IN THE VEHICLE

▼M1

3.1. **Vehicle equipment**

Any vehicle covered by Article 9, in categories M₁ or N₁, or category M₂ (except vehicles of a permissible maximum weight exceeding 3 500kg and those which include places specially designed for standing passengers) must be equipped with safety belts or restraint systems which satisfy the requirements of this Directive and have the following belt arrangements (with which neither non-locking locking retractors (1.8.1) or manually unlocking retractors (1.8.2) can be used).

In cases where the other vehicles covered by Article 9 are fitted with safety belts or restraint systems, these must comply with all the requirements of this Directive, with the exception of sections 3.1.1 to 3.1.3.

3.1.1. for the front outboard seating positions, three-point safety belts with emergency locking retractors having multiple sensitivity (1.8.4); however,

3.1.1.1. for the passenger seat, automatically locking retractors (1.8.3) are permitted;

3.1.1.2. for the passenger seat of category M₂ vehicles, lap-belts, whether or not fitted with retractors, are considered adequate where the windscreen is located outside the reference zone defined in Annex II to Directive 74/60/EEC.

As regards safety belts, the windscreen is considered as part of the reference zone when it is capable of entering into static contact with the test apparatus according to the method described in Annex II to Directive 74/60/EEC.

▼B

3.1.2. for front central seating positions, three-point safety belts, whether or not fitted with retractors;

3.1.2.1. however, for front central seating positions, lap-belts, whether or not fitted with retractors, shall be considered adequate where the wind-

▼B

screen is located outside the reference zone defined in Annex II to Directive 74/60/EEC;

as regards safety belts, the windscreen shall be considered as part of the reference zone when it is capable of entering into static contact with the test apparatus according to the method described in Annex II to Directive 74/60/EEC;

- 3.1.2.2. notwithstanding 3.1.2 and 3.1.2.1 and until 1 January 1979, each front central seat may be equipped with only a lap-belt, whether or not fitted with retractors;

▼M1

- 3.1.3. at rear seating positions of vehicles in category M₁, lap-belts or three-point belts, whether or not fitted with retractors;

▼B

- 3.1.4. on three-point belts fitted with retractors, one retractor must operate at least on the diagonal strap.

▼M1

- 3.1.5. Notwithstanding the foregoing provisions, on vehicles in categories N₁ and M₂, an emergency locking retractor of type 4N (1.8.5) may be permitted instead of a retractor of type 4 (1.8.4), where it has been shown to the satisfaction of the services responsible for the tests that the fitting of a type 4 retractor would impede the driver.

▼B

3.2. **General requirements**

- 3.2.1. Safety belts and restraint systems shall be fixed to anchorages conforming to the specifications of Directive 76/115/EEC.

- 3.2.2. The safety belts and the restraint systems shall be so installed that, when properly worn, they will work satisfactorily and reduce the risk of bodily injury in the event of an accident. In particular they shall be so installed that:

- 3.2.2.1. the straps are not liable to assume a dangerous configuration;

▼M2

- 3.2.2.2. that the danger of a correctly positioned belt slipping from the shoulder of a wearer as a result of his/her forward movement is reduced to a minimum;

▼B

- 3.2.2.3. the risk of the strap deteriorating through contact with sharp rigid parts of the vehicle or seat structure is reduced to a minimum.

3.3. **Special requirements for rigid parts incorporated in safety belts or restraint systems**

- 3.3.1. Rigid parts, such as the buckles, adjusting devices and attachments, shall not increase the risk of bodily injury to the wearer or to other occupants of the vehicle in the event of an accident.

- 3.3.2. The device for releasing the buckle shall be clearly visible to and within easy reach of the wearer and shall be so designed that it cannot be opened inadvertently or accidentally. The buckle shall also be located in such a position that it is readily accessible to a rescuer needing to release the wearer in an emergency.

The buckle shall be so installed that, both when not under load and when sustaining the wearer's weight, it is capable of being released by the wearer with a single simple movement of either hand in one direction. In the case of safety belts or restraint systems for front outboard seating positions, the buckle shall also be capable of being locked in the same manner.

A check shall be made to ensure that, if the buckle is in contact with the wearer, the width of the contact surface is not less than 46 mm.

- 3.3.3. When the belt is being worn, it shall either adjust automatically to fit the wearer or be so designed that the manual adjusting device is readily accessible to the wearer when seated and is convenient and easy to use. It shall also be possible for it to be tightened with one hand to suit the build of the wearer and the position of the vehicle seat.

▼B

- 3.3.4. Safety belts or restraint systems incorporating retractors shall be so installed that the retractors are able to operate correctly and stow the strap efficiently.

▼B

ANNEX II

MODEL EEC COMPONENT TYPE-APPROVAL CERTIFICATE

(Maximum format: A4 (210 × 297 mm))

Name of administration

Notification concerning the granting, refusal or withdrawal of EEC component type-approval or the granting, refusal or withdrawal of an extension of EEC component type-approval for a type of safety belt or restraint system

- EEC component type-approval No
1. Restraint system/three-point belt/lap belt/special type of belt/fitted with energy absorber/locking retractor/automatically locking retractor/emergency locking retractor ⁽¹⁾
 2. Trade name or mark
 3. Manufacturer's designation of the type of belt or restraint system
 4. Manufacturer's name and address
 5. If applicable, name and address of his representative
 6. Submitted for EEC component type-approval on
 7. Technical service conducting the EEC component type-approval tests
 8. Date of report issued by that service
 9. Number of report issued by that service
 10. EEC component type-approval is granted/refused ⁽¹⁾ for general use/for use in a particular vehicle or in particular types of vehicle ⁽¹⁾ (where necessary, see appendix)
 11. Position and nature of mark
 12. Place
 13. Date
 14. Signature
 15. The following documents, bearing the EEC component type-approval number shown above, are appended hereto:
 - drawings, diagrams and plans of the safety belt, including any energy absorber or retractor fitted;
 - drawings, diagrams and plans of the restraint system, the vehicle structure and the seat structure, and of the adjustment systems and attachments, including any energy absorber or retractor fitted;
 - photographs of the safety belt.

⁽¹⁾ Delete where inapplicable.

▼B*ANNEX III***EEC COMPONENT TYPE-APPROVAL MARK**

1. GENERAL
- 1.1. Every safety belt or restraint system conforming to a type approved under this Directive shall bear an EEC component type-approval mark.

The EEC component type-approval mark shall consist of:
 - 1.1.1. a rectangle surrounding the lower-case letter 'e' followed by the distinguishing letter(s) or number of the Member State which has granted the EEC component type-approval:

▼A2

- 1 for Germany
- 2 for France
- 3 for Italy
- 4 for the Netherlands
- 6 for Belgium
- 9 for Spain
- 11 for the United Kingdom
- 13 for Luxembourg
- DK for Denmark
- GR for Greece
- IRL for Ireland
- P for Portugal;

▼B

- 1.1.2. the EEC component type-approval number, located below the rectangle;
- 1.1.3. the following additional symbol or symbols located above the rectangle:
 - 1.1.3.1. the letter 'A' in the case of a three-point belt, the letter 'B' in the case of a lap belt and the letter 'S' in the case of a special type belt.
 - 1.1.3.2. The symbols described in 1.1.3.1 shall be supplemented by the following marks:
 - 1.1.3.2.1. the letter 'e' in the case of a belt fitted with an energy absorber;
 - 1.1.3.2.2. the letter 'r' in the case of a safety belt fitted with a retractor, followed by the number of the type of retractor used, in accordance with 1.8 of Annex I, and the letter 'm' if the retractor used is an emergency locking retractor with multiple sensitivity.
 - 1.1.3.3. The symbols described in 1.1.3.1 shall be preceded by the letter 'Z' when the safety belt is part of a restraint system.

▼M2

- 1.1.4. Belts fitted with a type 4N retractor shall also bear a symbol consisting of a rectangle with a vehicle of category M₁ crossed out, indicating that the use of this type of retractor is prohibited in vehicles of that category.

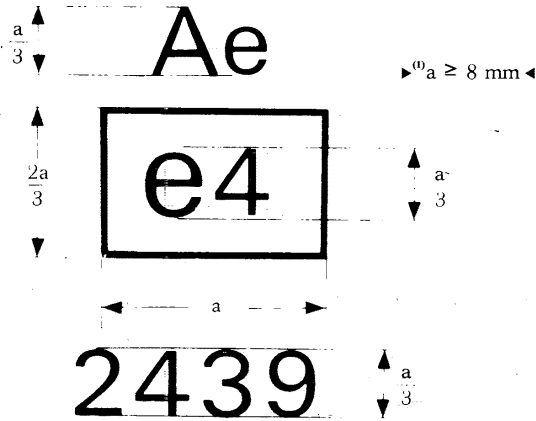
▼B

- 1.2. The details described in 1.1 shall be clearly legible and indelible, and must be provided either by means of a label or by direct marking. The label or marking shall be resistant to wear.

▼ **B**

2. DIAGRAMS OF EEC COMPONENT TYPE-APPROVAL MARKS

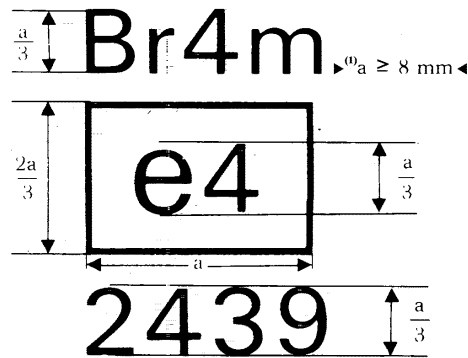
2.1.



The belt bearing the above EEC component type-approval mark is a three-point belt ('A') fitted with an energy absorber (e) and approved in the Netherlands (e 4) under the number 2439.

▶ ⁽¹⁾ **M2**

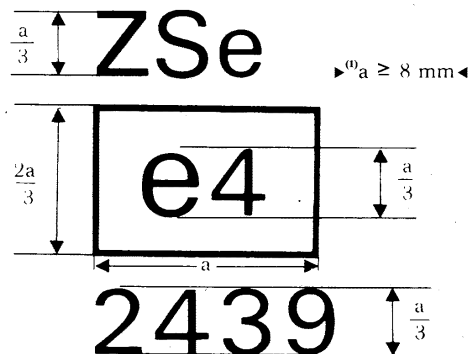
2.2.



The belt bearing the above EEC component type-approval mark is a lap belt ('B') fitted with a type 4 retractor with multiple sensitivity and approved in the Netherlands (e 4) under the number 2439.

▶ ⁽¹⁾ **M2**

2.3.



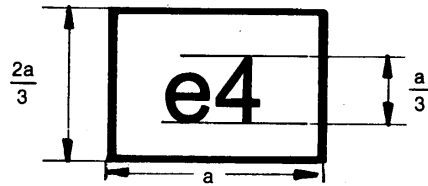
The belt bearing the above EEC component type-approval mark is a special type of belt ('S'), fitted with an energy absorber (e), forming part of a restraint system ('Z') and approved in the Netherlands (e 4) under the number 2439.

▶ ⁽¹⁾ **M2**

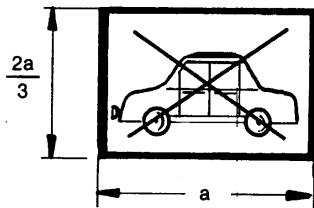
▼ M2

2.4.

$\frac{a}{3}$  **Ar4Nm** $a \geq 8 \text{ mm}$



2439 $\frac{a}{3}$



The belt bearing this type-approval mark is a three-point belt ('A') having a multiple-sensitivity ('m') type 4N ('r4N') retractor, in respect of which EEC component type-approval was granted in the Netherlands ('e4') under the number 2439. This belt shall not be fitted to vehicles of category M₁.

▼ B

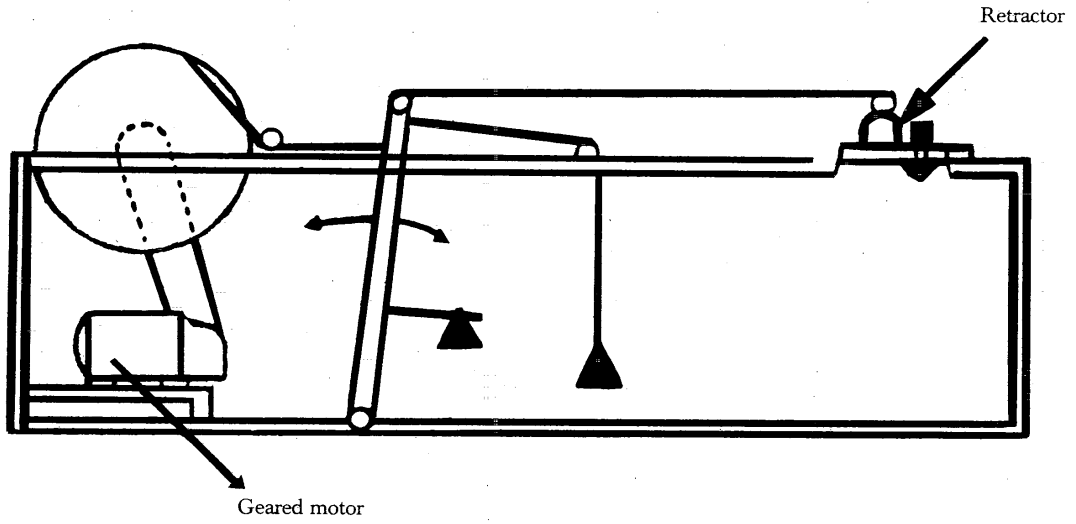
Note:

The EEC component type-approval number and symbol(s) shall be placed close to the rectangle and either above or below the letter 'e' or to the left or right of that letter. The digits of the component type-approval number shall be placed on the same side of the letter 'e' and shall face in the same direction. The additional symbol(s) shall be diametrically opposite the component type-approval number. The use of roman numerals as component type-approval numbers must be avoided so as to prevent any confusion with other symbols.

▼B

ANNEX IV

EXAMPLE OF AN APPARATUS TO TEST DURABILITY OF RETRACTOR MECHANISM



▼B

ANNEX V

EXAMPLE OF AN APPARATUS TO TEST LOCKING OF EMERGENCY LOCKING RETRACTORS

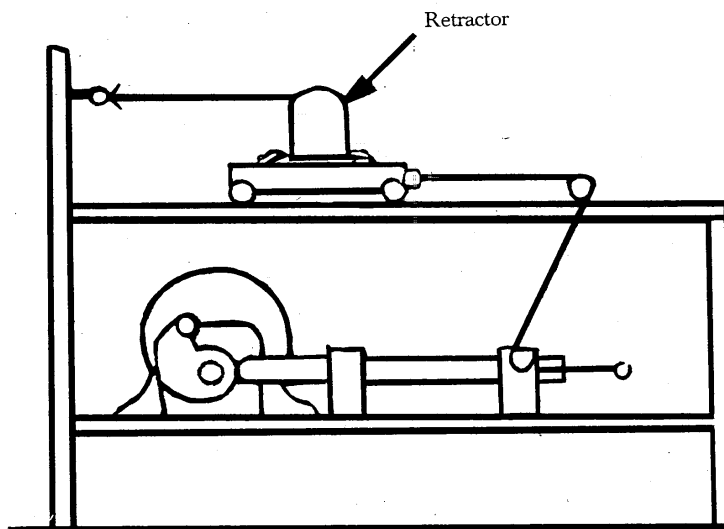
A suitable apparatus is illustrated in the figure and consists of a motor-driven cam, the follower of which is attached by wires to a small trolley mounted on a track. The cam follower incorporates a 'lost motion' device which absorbs any movement should the reel lock before the full stroke of the follower is completed. The cam design and motor speed combination is such as to give the required acceleration at a rate of increase of acceleration as specified in 2.7.7.2.2 of Annex I, and the stroke is arranged to be in excess of the maximum permitted strap movement before locking.

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

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

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

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

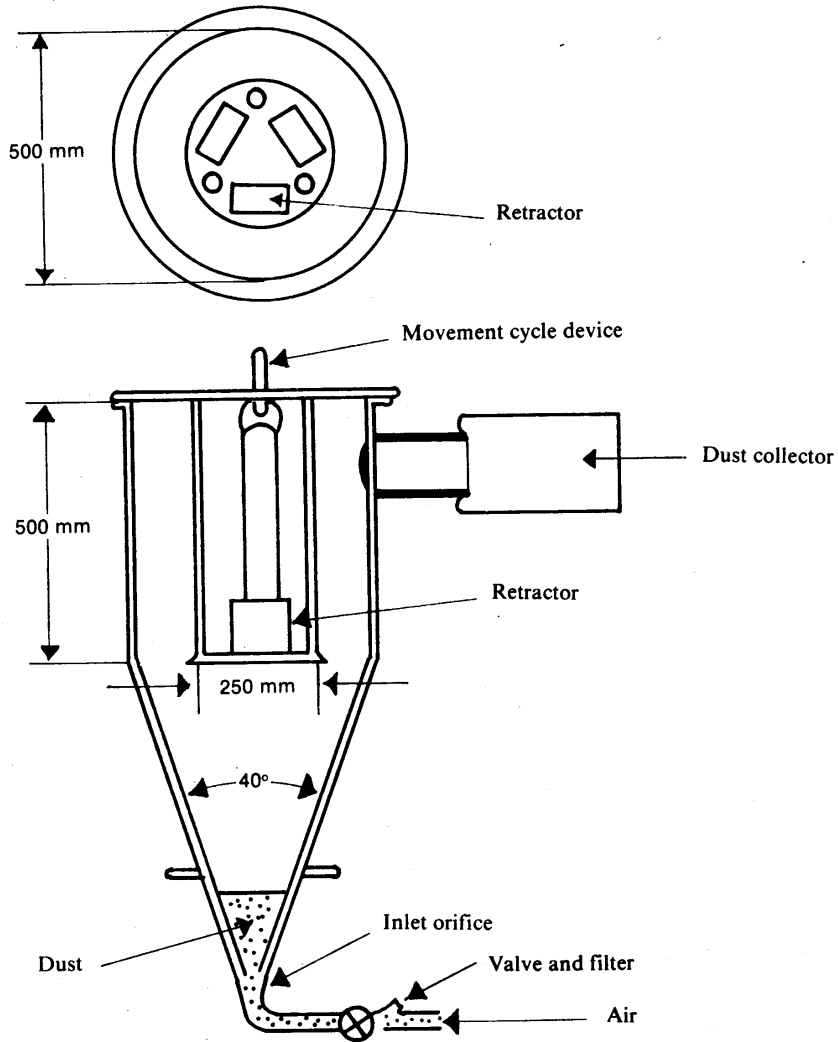


▼ B

ANNEX VI

EXAMPLE OF AN APPARATUS FOR DUST RESISTANCE TESTS

▼ M2



▼B*ANNEX VII*

DESCRIPTION OF TROLLEY, SEAT, ANCHORAGES AND STOPPING DEVICE

1. TROLLEY

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

2. SEAT

► **M2** Except in the case of tests on restraint systems, the seat shall be of rigid construction and present a smooth surface. ◀ The particulars given in fig. 1 hereto shall be respected, care being taken that no metal part can come into contact with the belt.

▼M2

3. ANCHORAGES

The anchorages shall be positioned as shown in Figure 1. The circular marks which correspond to the arrangement of the anchorages, show where the ends of the belt are to be connected to the trolley or to the load transducer, as the case may be. The anchorages for normal use are the points A, B and K if the strap length between the upper edge of the buckle and the hole for the attachment of the strap support is not more than 250 mm. Otherwise, the points A₁ and B₁ shall be used. The structure carrying the anchorages shall be rigid. The upper anchorage must not be displaced by more than 0.2 mm in the longitudinal direction when a load of 98 daN is applied to it in that direction. The trolley shall be so constructed that no permanent deformation shall occur in the parts bearing the anchorages during the test.

If a fourth anchorage is necessary in order to attach the retractor, this anchorage:

- shall be located in the vertical longitudinal plane passing through K,
- shall enable the retractor to be tilted to the angle prescribed by the manufacturer,
- shall be located on the arc of a circle with centre K and with radius KB₁ = 790 mm if the length between the upper strap guide and the strap outlet at the retractor is not less than 540 mm or, in all other cases, on the arc of a circle with centre K and radius 350 mm.

▼B

4. STOPPING DEVICE

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

Each absorber comprises:

- an outer casing formed from a steel tube,
- a polyurethane energy-absorber tube,
- a polished-steel olive-shaped knob penetrating into the absorber,
- a shaft and an impact plate.

▼M2

The dimensions of the various parts of this energy absorber are shown in Figures 2, 3 and 4. The characteristic values of the energy-absorbing material are given below. Immediately before each test, the tubes must be conditioned at a temperature of between 15 and 25 °C for at least 12 hours without being used. The temperature of the stopping device during the dynamic testing of safetybelts and restraint systems must be the same as during the calibration test to within ± 2 °C.

▼M2

The requirements relating to the stopping device are set out in Annex IX.
Any other device giving equivalent results is acceptable.

▼B

CHARACTERISTICS OF THE ABSORBING MATERIAL

(ASTM method D 735 unless otherwise stated)

▼M2

Shore hardness A: 95 ± 2 at 20 ± 5 °C

▼B

Breaking strength: $R_o \geq 343$ daN/cm²

Minimum elongation: A_o 400 %

Modulus:— at 100 % elongation: 108 daN/cm²

— at 300 % elongation: 235 daN/cm²

Low-temperature brittleness (ASTM method D 736): five hours at -55 °C

Compression set (method B): 22 hours at 70 °C ≤ 45 %

Density at 25 °C: 1.05 to 1.10

Ageing in air (ASTM method D 573):

- 70 hours at 100 °C
 - shore hardness A: max. variation ± 3
 - breaking strength: decrease < 10 % of R_o
 - elongation: decrease < 10 % of A_o
 - mass: decrease < 1 %

Immersion in oil (ASTM method No 1 Oil):

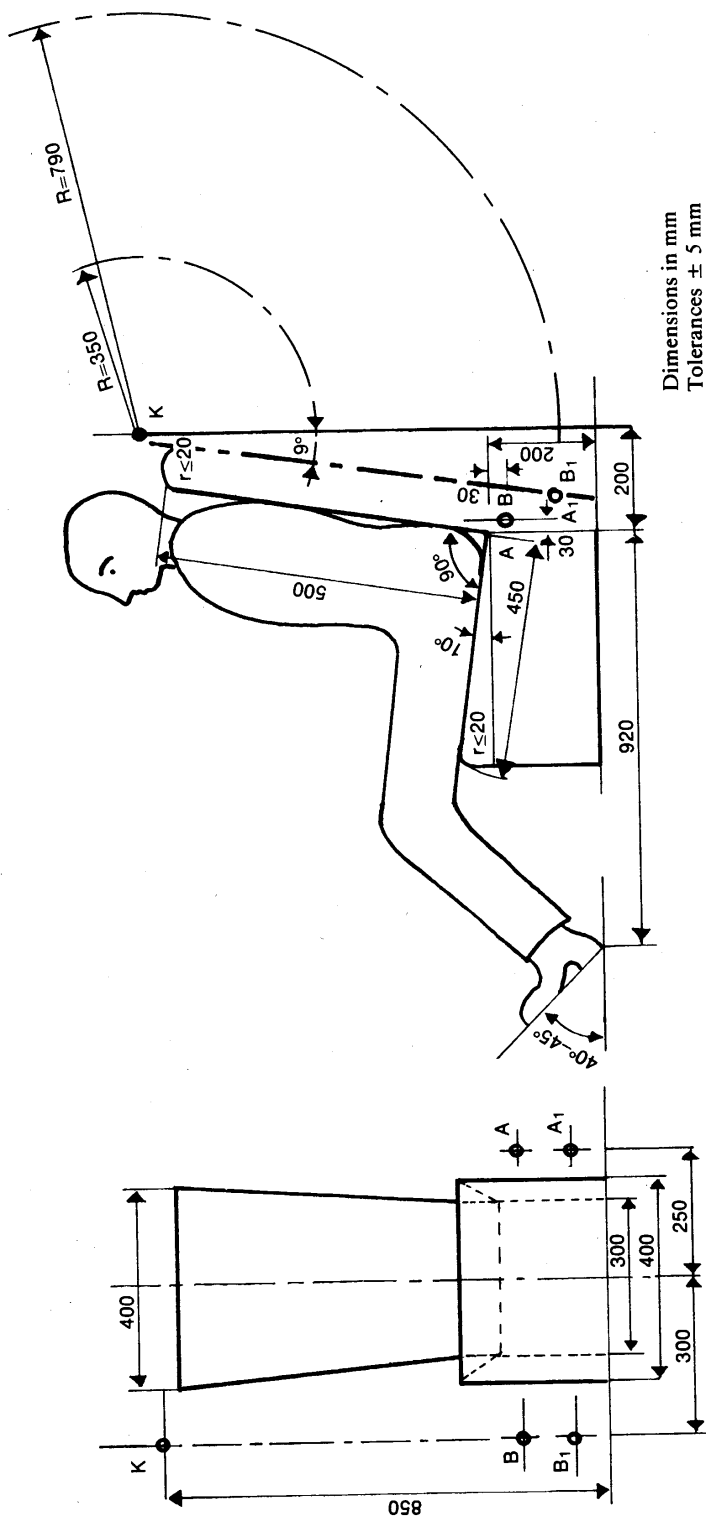
- 70 hours at 100 °C
 - shore hardness A: max. variation ± 4
 - breaking strength: decrease < 15 % of R_o
 - elongation: decrease < 10 % of A_o
 - volume: swelling < 5 %

Immersion in oil (ASTM method No 3 Oil):

- 70 hours at 100 °C
 - breaking strength: decrease < 15 % of R_o
 - elongation: decrease < 15 % of A_o
 - volume: swelling < 20 %

Immersion in distilled water:

- one week at 70 °C
 - breaking strength: decrease < 35 % of R_o
 - elongation: increase 20 % of A_o



Dimensions in mm
Tolerances ± 5 mm

Figure 1
Trolley, seat, anchorage

▼B

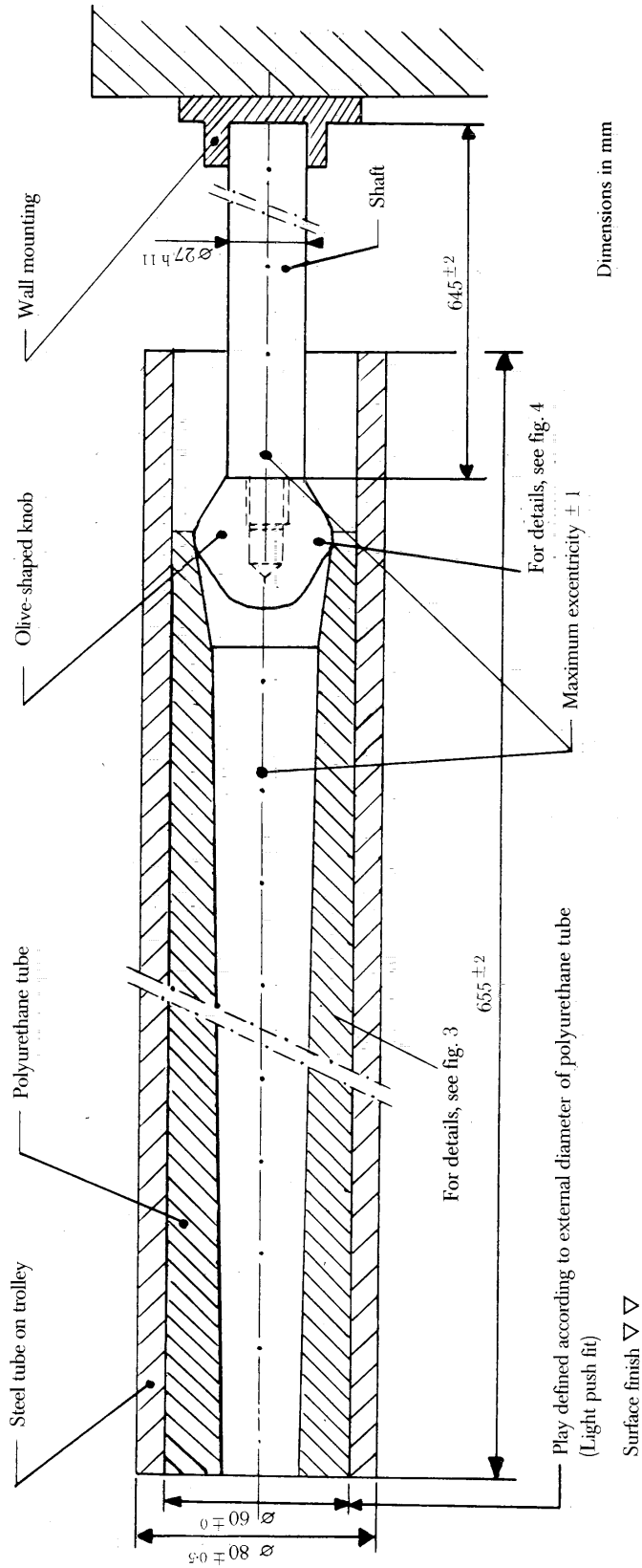


Fig. 2

Stopping device

▼B

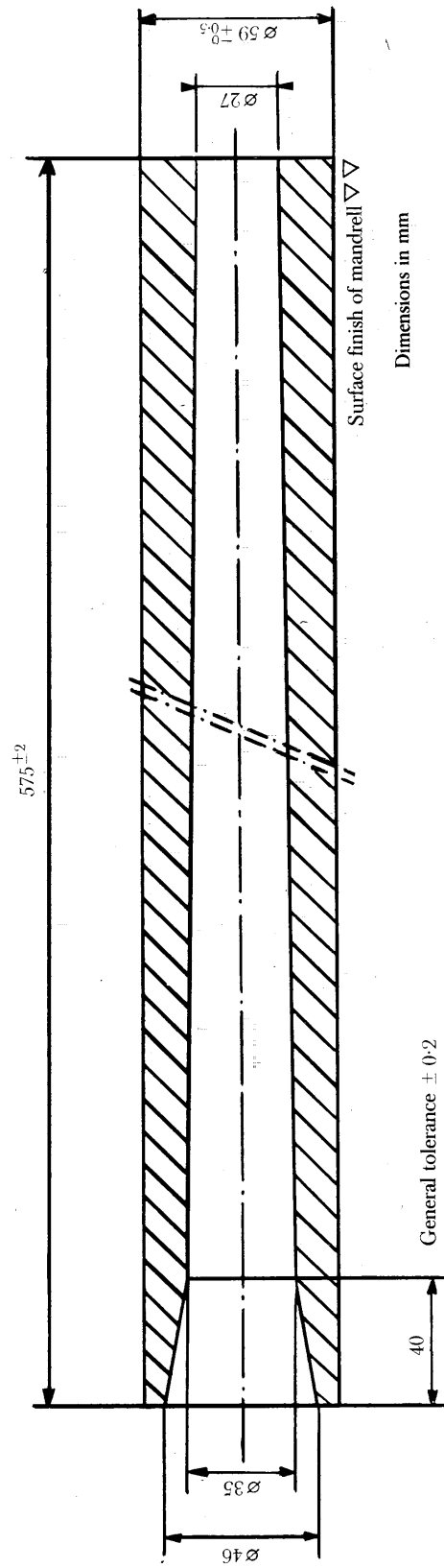


Fig. 3

Stopping device
(polyurethane tube)

▼B

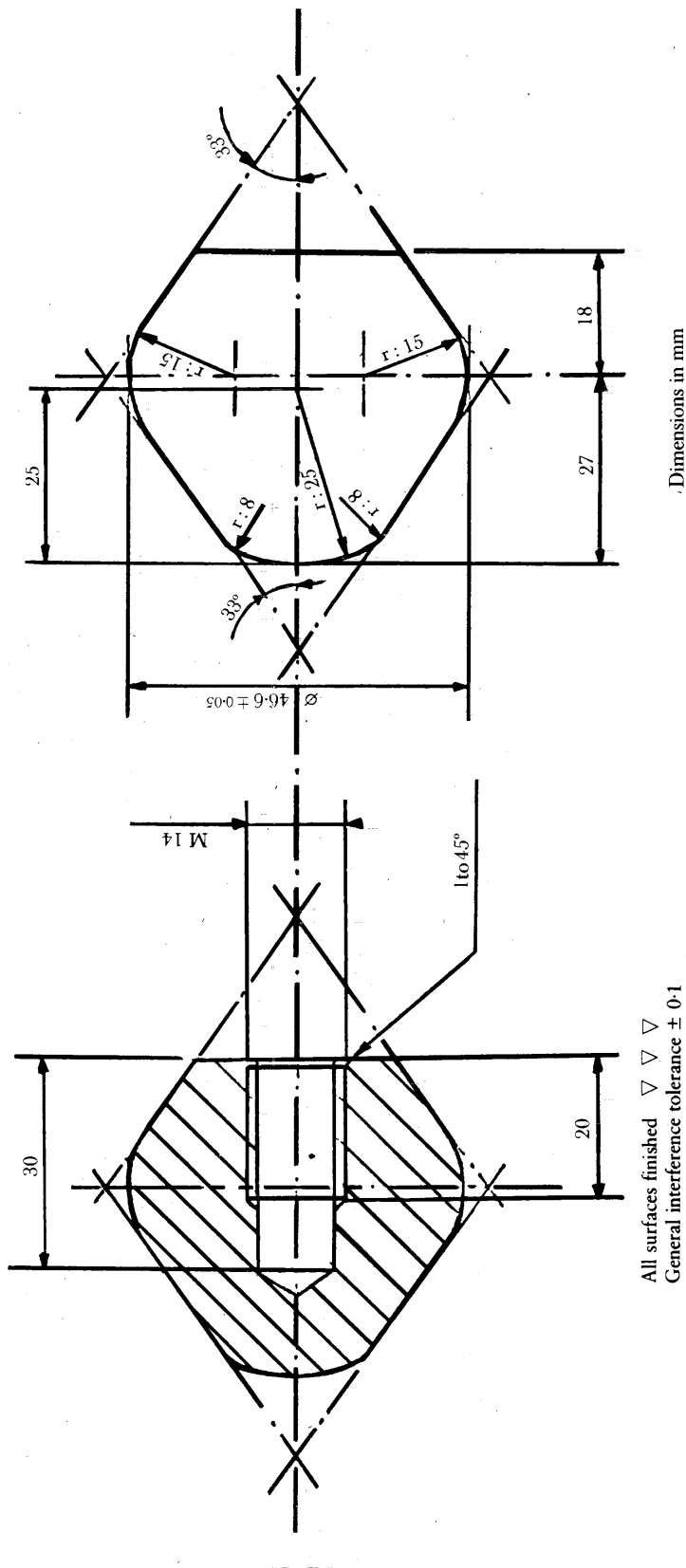


Fig. 4

Stopping device
(olive-shaped knob)

ANNEX VIII

DESCRIPTION OF MANIKIN

1. SPECIFICATIONS OF THE MANIKIN

1.1. General

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

- fig. 1: side view of head, neck and torso;
- fig. 2: front view of head, neck and torso;
- fig. 3: side view of hip, thighs and lower leg;
- fig. 4: front view of hip, thighs and lower leg;
- fig. 5: principal dimensions;
- fig. 6: manikin in sitting position, showing:
 - location of the centre of gravity,
 - location of points at which displacement shall be measured,
 - shoulder height;
- table 1: references, names, materials and principal dimensions of the components of the manikin;
- table 2: mass of head, neck, torso, thigh and lower leg.

1.2. Description of the manikin

1.2.1. Lower leg structure (see figs. 3 and 4)

The lower leg structure consists of three components:

- a sole plate (30),
- a shin tube (29),
- a knee tube (26).

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

The lower leg can rotate rearwards about 120° from the straight position.

1.2.2. Thigh structure (see figs. 3 and 4)

The thigh structure consists of three components:

- a knee tube (22),
- a thigh bar (21),
- a hip tube (20).

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

1.2.3. Torso structure (see figs. 1 and 2)

The torso structure consists of the following components:

- a hip tube (2),
- a roller chain (4),
- ribs (6) and (7),
- a sternum (8),
- chain attachments (3 and, partly, 7 and 8).

1.2.4. Neck (see figs. 1 and 2)

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

1.2.5. Head (see figs. 1 and 2)

The head (15) is hollow; the polyurethane is reinforced by steel bands (17). The chain tensioner which enables the neck to be adjusted consists of a polyamide block (10), a tubular spacer (11) and a tensioning component (12 and 13). The head can rotate at the joint between the first and second cervical vertebrae (the atlas-axis joint), which consists of an adjuster assembly (14 and 18), a spacer (16) and a polyamide block (10).

▼B1.2.6. *Knee joint* (see fig. 4)

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

1.2.7. *Hip joint* (see fig. 4)

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

1.2.8. *Polyurethane*

Type: PU 123 CH compound

Hardness: 50 to 60 shore A

1.2.9. *Overall*

The manikin is covered by a special overall

2. CORRECTION OF THE MASS

In order to calibrate the manikin to certain values and its total mass, the mass distribution must be adjusted by means of six correction weights of 1 kg each which can be fitted to the hip joint. Six other polyurethane weights of 1 kg each can be fitted to the back of the torso.

3. CUSHION

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

- hardness: 7 to 10 shore A,
- thickness: 25 ± 5 mm.

It shall be replaceable.

4. ADJUSTMENT OF THE JOINTS

4.1. **General**

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

4.2. **Knee joint:**

tighten the knee joint;

set the thigh and lower leg vertical;

rotate the lower leg through 30°;

gradually slacken the tensioner until the lower leg starts to fall under its own weight;

lock the tensioner in this position.

4.3. **Hip joints:**

increase the rigidity of the hip joints for the purposes of adjustment;

place the thighs in a horizontal position and the torso in a vertical position;

rotate the torso forwards until it forms an angle of 60° with the thighs;

gradually slacken the tensioner until the torso starts to fall under its own weight;

lock the tensioner in this position.

4.4. **Atlas-axis joint:**

adjust the atlas-axis joint so that it just resists its own weight in the fore and aft directions.

4.5. **Neck:**

the neck can be adjusted by means of the chain tensioner (13);

▼B

when the neck is adjusted, the upper end of the tensioner shall be displaced between 40 and 60 mm when subjected to a horizontal load of 10 daN.

TABLE 1

Reference No	Name	Material	Dimensions
1	Body	polyurethane	—
2	Hip tube	steel	76 × 70 × 100 mm
3	Chain attachments	steel	25 × 10 × 70 mm
4	Roller chain	steel	3/4 mm
5	Shoulder plane	polyurethane	—
6	Ribs (rolled section)	steel	30 × 30 × 3 × 250 mm
7	Ribs	perforated steelplate	400 × 85 × 1.5 mm
8	Sternum	perforated steelplate	250 × 90 × 1.5 mm
9	Discs (6)	polyurethane	ø 90 × 20 mm ø 80 × 20 mm ø 75 × 20 mm ø 70 × 20 mm ø 65 × 20 mm ø 60 × 20 mm
10	Block	polyamide	60 × 60 × 25 mm
11	Tubular spacer	steel	40 × 40 × 2 × 50 mm
12	Tensioning bolt	steel	M 16 × 90 mm
13	Tensioner nut	steel	M 16
14	Tensioner for atlas-axis joint	steel	ø 12 × 130 mm (M 12)
15	Head	polyurethane	—
16	Tubular spacer	steel	ø 18 × 13 × 17 mm
17	Reinforcement plate	steel	30 × 3 × 500 mm
18	Tensioner nut	steel	M 12
19	Thighs	polyurethane	—
20	Hip tube	steel	76 × 70 × 80 mm
21	Thigh bar	steel	30 × 30 × 440 mm
22	Knee tube	steel	52 × 46 × 40 mm
23	Hip connecting tube	steel	70 × 64 × 250 mm
24	Friction plates (4)	steel	160 × 75 × 1 mm
25	Tensioner assembly	steel	M 12 × 320 mm plates and nuts
26	Knee tube	steel	52 × 46 × 160 mm
27	Knee connecting tube	steel	44 × 39 × 190 mm
28	Tensioner plate	steel	Ø 70 × 4 mm
29	Shin tube	steel	50 × 50 × 2 × 460 mm
30	Sole plate	steel	100 × 170 × 3 mm
31	Torso correction weights (6)	polyurethane	1 kg each
32	Cushion	polyethylene foam	350 × 250 × 25 mm
33	Overall	cotton and polyamide straps	
34	Hip joint correction weights (6)	steel	mass 1 kg each

▼B

TABLE 2

Components of manikin	Mass in kilo-grams
Head and neck	4.6 ± 0.3
Torso and arms	40.3 ± 1.0
Thighs	16.2 ± 0.5
Lower leg and foot	9.0 ± 0.5
Total mass including correction weights	74.5 ± 1.0

▼B

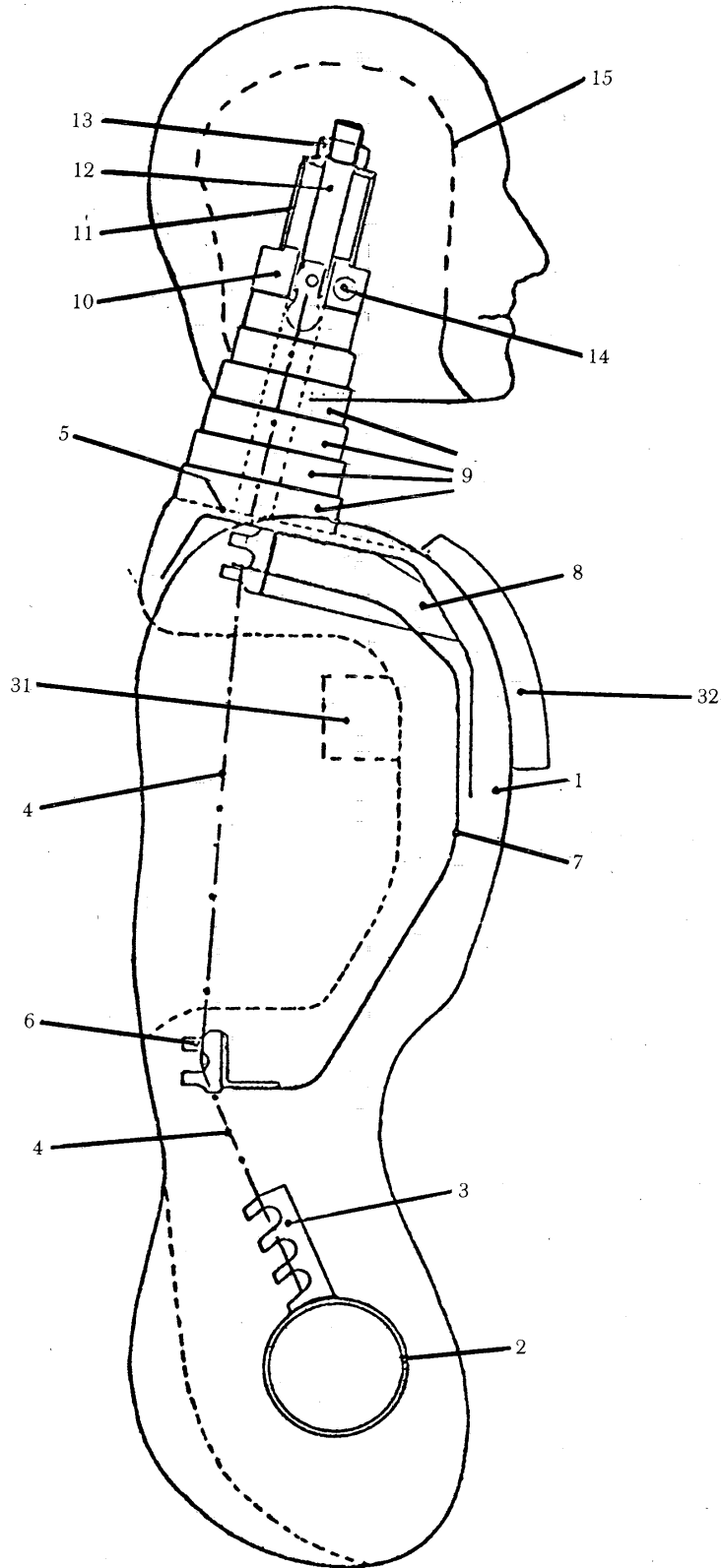


Fig. 1

▼B

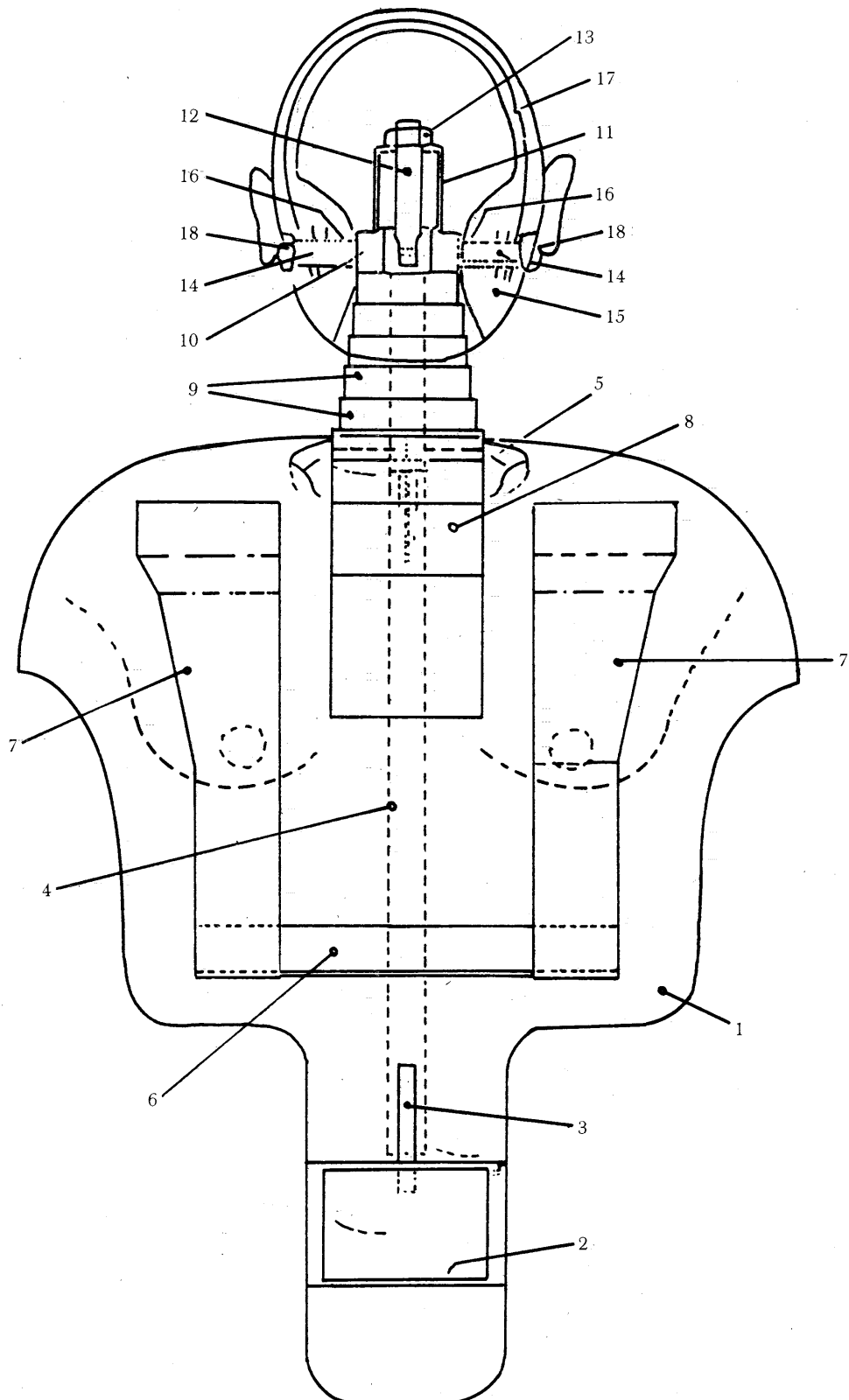


Fig. 2

▼B

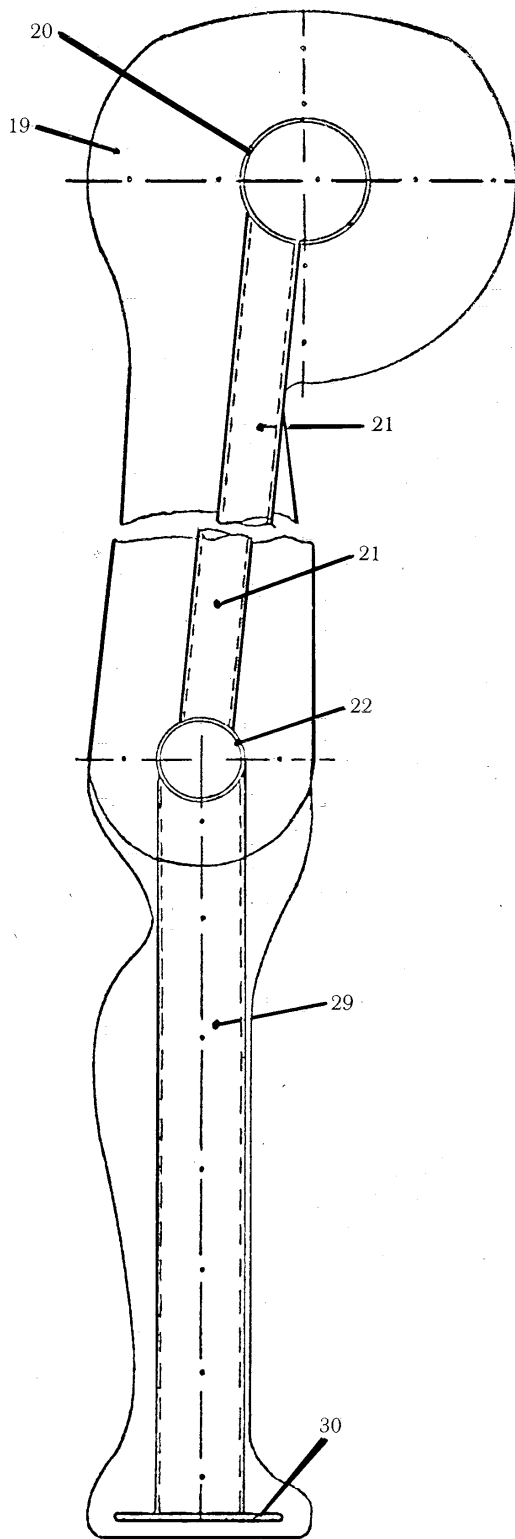


Fig. 3

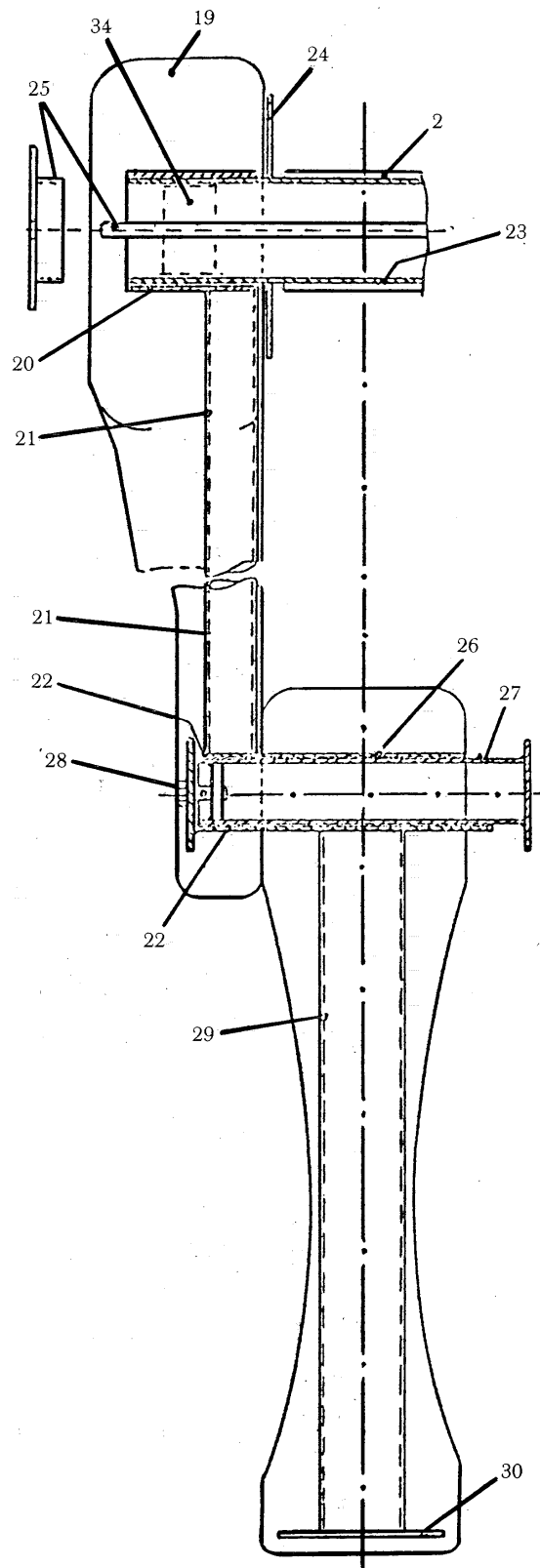
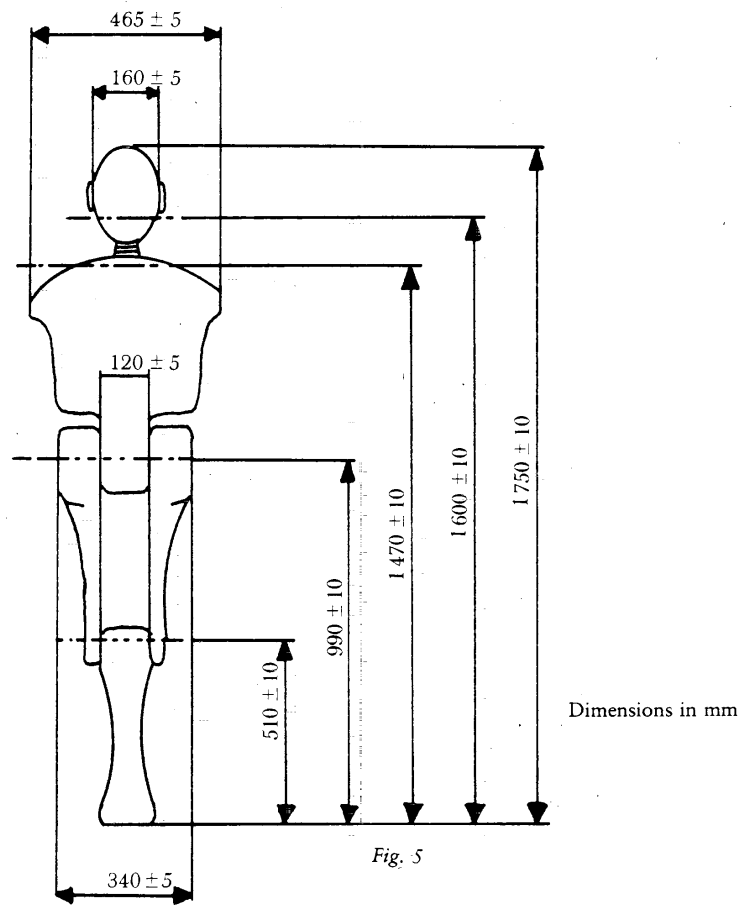


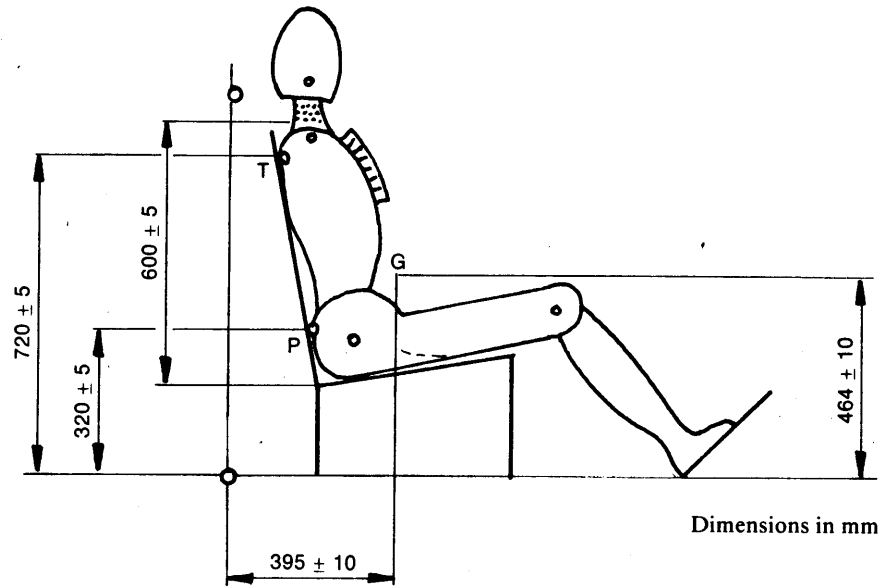
Fig. 4

▼B

▼ M2

Figure 6

Manikin in sitting position as shown in Annex VII, Figure 1



G = centre of gravity.

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

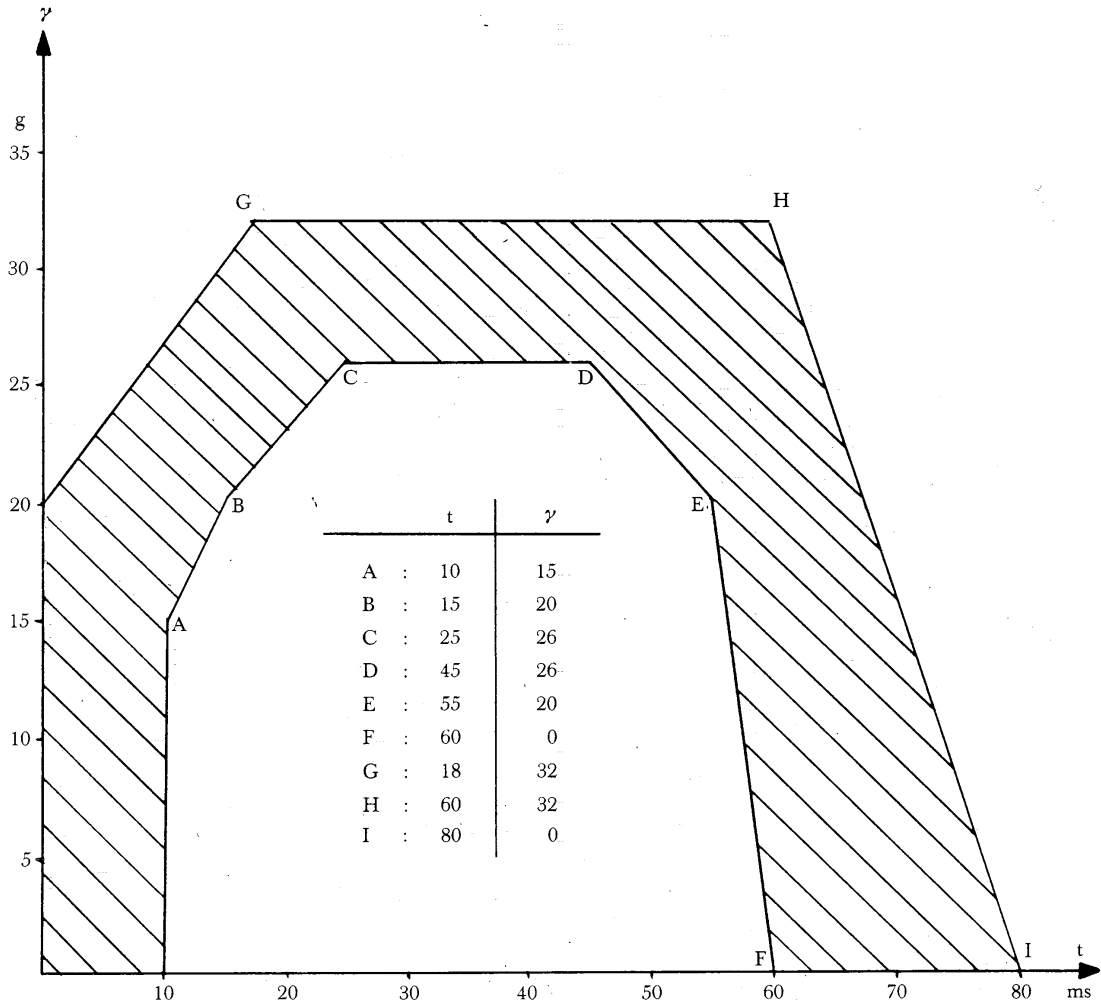
P = pelvis reference point (located at the rear on the centre line of the manikin).

▼B

ANNEX IX

DESCRIPTION OF CURVE OF TROLLEY'S DECELERATION AS
FUNCTION OF TIME

(Curve for testing stopping devices)



The deceleration curve of the trolley weighted with inert masses to produce a total of $455 \text{ kg} \pm 20 \text{ kg}$ for safety belt tests and $910 \text{ kg} \pm 40 \text{ kg}$ for restraint system tests, where the nominal mass of the trolley and vehicle structure is 800 kg , must remain within the hatched area above. If necessary, the nominal mass of the trolley and attached vehicle structure can be increased by increments of 200 kg , in which case an additional inert mass of 28 kg shall be added per increment. In no case shall the total mass of the trolley, the vehicle structure and the inert masses differ from the nominal value for calibration tests by more than $\pm 40 \text{ kg}$. ► **M2** The stopping distance during calibration of the stopping device shall be $400 \pm 20 \text{ mm}$ and the speed of the trolley shall be $50 \pm 1 \text{ km/h}$. ◀

In both the above cases the measurement equipment shall have a response which is substantially flat up to 60 Hz with a roll off at 100 Hz . Mechanical resonances associated with transducer mounting should not distort readout data. Consideration should be given to the effect of cable length and temperature on frequency response ► **M2** (1) ◀.

(1) These requirements are in accordance with Recommendation ISO R 6478/1980.

▼B*ANNEX X***INSTRUCTIONS**

Every safety belt shall be accompanied by instructions covering the following points in the language or languages of the Member State in which it is to be placed on sale:

1. Installation instructions (not required if the manufacturer supplies the vehicle with safety belts already installed) which specify for which vehicle types the assembly is suitable and the correct method of attachment of the assembly to the vehicle, including a warning to guard against chafing of the straps.
2. Instructions for use (they may be included in the vehicle user's handbook if the manufacturer supplies the vehicle with safety belts already installed) comprising the instructions necessary to ensure that the user obtains the greatest benefit from the safety belt. In these instructions reference should be made to:
 - (a) the importance of wearing the belt on all journeys;
 - (b) the correct manner of wearing the belt and in particular:
 - the intended location of the buckle,
 - the need for belts to fit tightly when in use,
 - the correct positioning of the straps and the need to avoid twisting them,
 - the fact that each belt should be used by one occupant only and that a belt must not be put round a child seated on a passenger's lap;
 - (c) the method of fastening and unfastening the buckle;
 - (d) the method of adjusting the belt;
 - (e) the method of operating any retractor which is incorporated in the assembly and the method of checking that it has locked;
 - (f) the recommended methods of cleaning the belt and reassembling it after cleaning where appropriate;
 - (g) the need to replace the safety belt when it has been in use in a serious accident or shows signs of severe fraying or of having been cut;
 - (h) the fact that the belt must not be altered or modified in any way since such changes may render the belt ineffective; in particular where the design permits parts to be disassembled, instructions to ensure correct reassembly must be given;
 - (i) the fact that the belt is intended for use by occupants of adult build;
 - (j) stowage of the belt when not in use.
3. In the case of safety belts fitted with a type 4N retractor, it shall be indicated in the installation instructions and on any packaging, that this belt is not suitable for installation in passenger vehicles with not more than nine seats, including that of the driver.

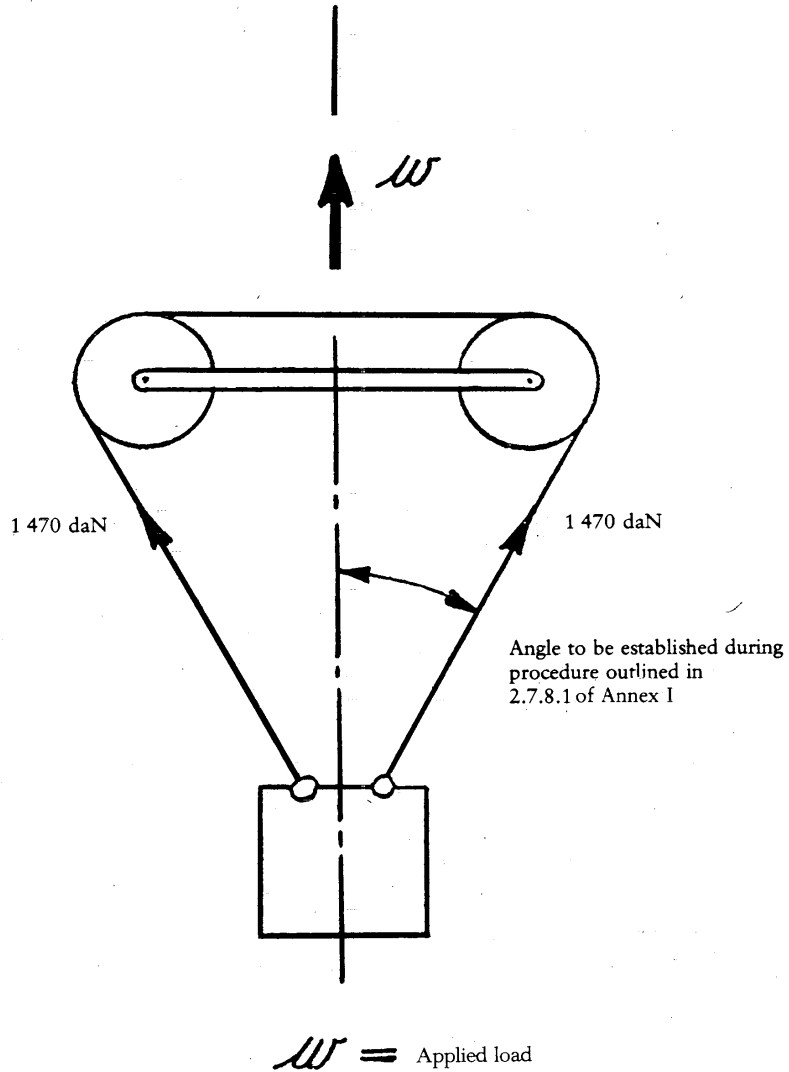
▼M2

▼B

ANNEX XI

DUAL BUCKLE TEST

(outlined in 2.7.6.5 of Annex I)



▼B

ANNEX XII

ABRASION AND MICROSILIP TESTS

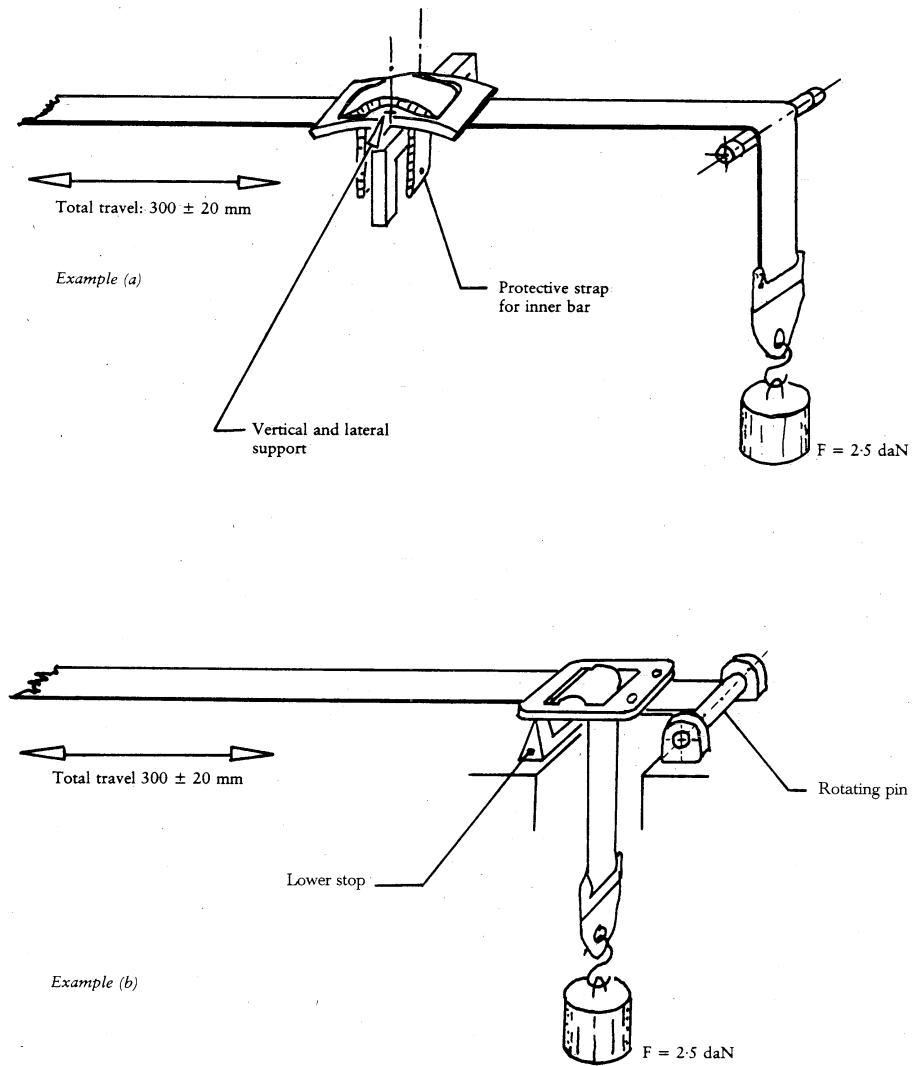


Fig. 1

Type 1 test

Examples of test arrangements corresponding to the type of adjusting device

▼B

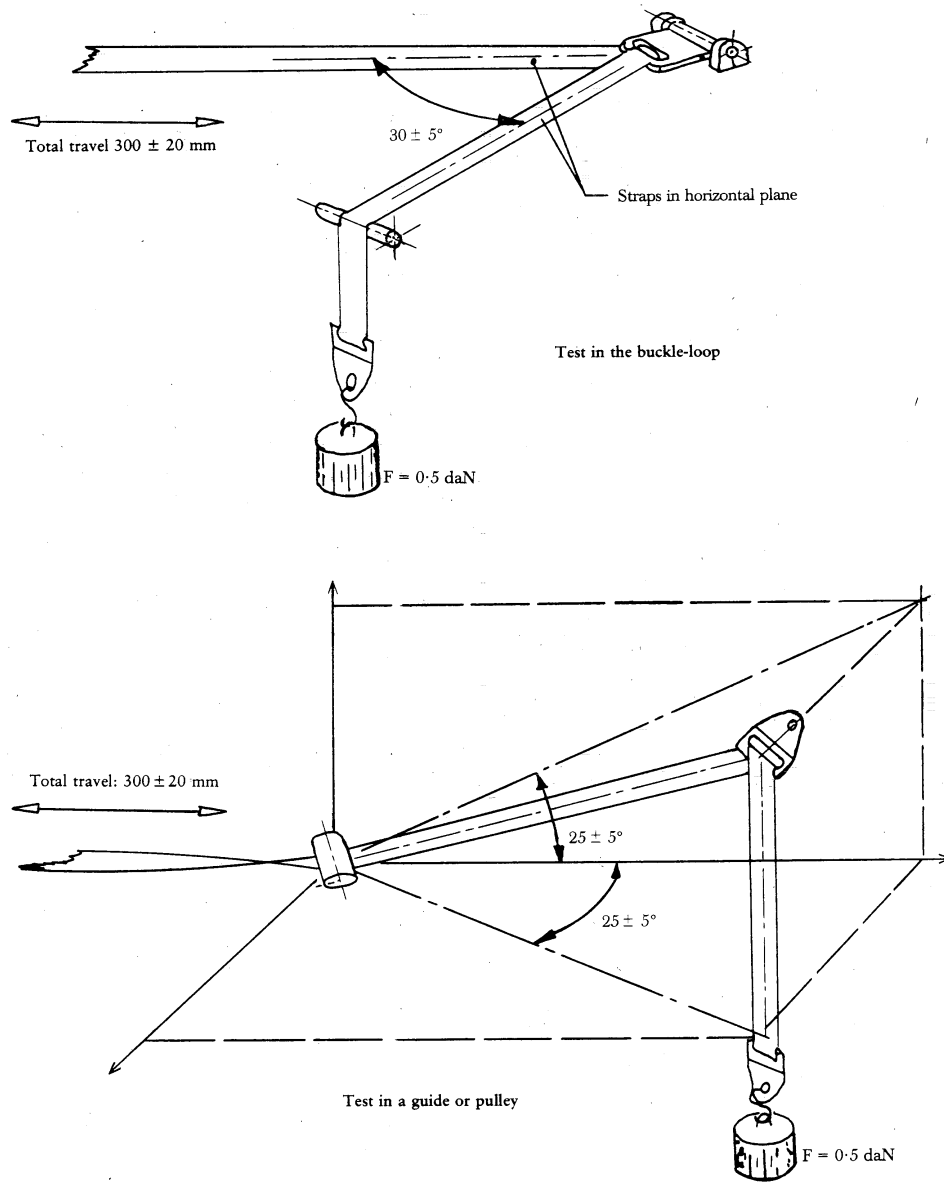


Fig. 2
Type 2 test

▼B

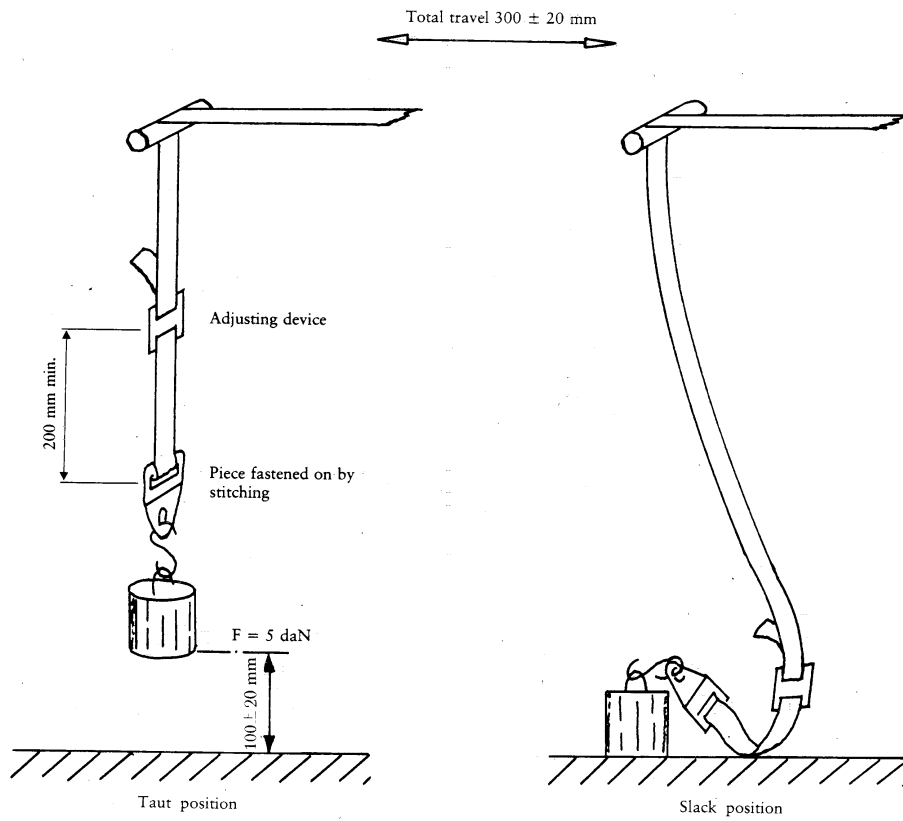


Fig. 3

Type 3 test and micro-slip test

*ANNEX XIII***CORROSION TEST**

1. TEST APPARATUS

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

2. LOCATION OF TEST SAMPLES IN THE MIST CABINET

- 2.1. Samples, except retractors, shall be supported or suspended between 15° and 30° from the vertical and preferably parallel to the principal direction of horizontal flow of mist through the chamber, as determined, in relation to the dominant surface being tested.
- 2.2. Retractors shall be supported or suspended in such a manner that the axes of the reels for storing the strap are normal to the principal direction of horizontal flow of mist through the chamber. The strap opening in the retractor shall also be facing this principal direction.
- 2.3. Each sample shall be so placed as to permit the mist to settle freely on all samples.
- 2.4. Each sample shall be so placed as to prevent salt solution dripping from one sample to another.

3. SALT SOLUTION

- 3.1. The salt solution shall be prepared by dissolving 5 ± 1 parts by mass of sodium chloride in 95 parts of distilled water. The salt shall be sodium chloride substantially free from nickel and copper and containing in the dry state not more than 0.1 % of sodium iodide and not more than 0.3 % of impurities in total.
- 3.2. The solution shall be such that when atomized at 35 °C the collected solution is in the pH range of 6.5 to 7.2.

4. AIR SUPPLY

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

5. CONDITIONS IN THE MIST CHAMBER

- 5.1. The exposure zone of the mist chamber shall be maintained at 35 ± 5 °C. At least two clean mist collectors shall be placed within the exposure zone to prevent drops of solution from the test samples or any other source from accumulating. The collectors shall be placed near the test samples, one as near as possible to the nozzles and the other as far away as possible from the nozzles. The mist shall be such that, for each 80 cm² of horizontal collecting area, an average of between 1.0 and 2.0 ml of solution per hour is collected in each collector when measured over at least 16 hours.
- 5.2. The nozzle or nozzles shall be directed or baffled in such a manner that the spray does not strike directly onto the test samples.

