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II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to the roll-over protection structures of wheeled agricultural or forestry tractors

(77/536/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 with which tractors must comply pursuant to national laws relate *inter alia* to roll-over protection structures and to their attachment to the tractor;

Whereas those 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 rules in order, in particular, to allow the EEC type-approval procedure which was the subject of Council Directive 74/150/EEC of 4 March 1974 on the approximation of the laws of the Member States relating to the type-approval of wheeled agricultural or forestry tractors [3], to be applied in respect of each type of tractor;

Whereas a harmonized component type-approval procedure for roll-over protection structures and their attachment to the tractor makes it possible for each Member State to check compliance with the common construction 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 roll-over protection structure and its attachment to the tractor; whereas the placing of an EEC component type-approval mark on all structures manufactured in conformity with the approved type obviates any need for technical checks on those structures in the other Member States;

Whereas common requirements concerning other elements and characteristics of the roll-over protection structure, in particular those concerning the dimensions, doors, safety glass, devices to prevent continuous rolling if the tractor overturns, and protection of passengers, will be laid down at a later date;

Whereas the harmonized requirements are intended principally to ensure safety on the road and at work throughout the Community; whereas for this reason it is necessary to introduce the obligation for tractors

[1] OJ No C 76, 7. 4. 1975, p. 37.
[2] OJ No C 263, 17. 11. 1975, p. 58.
[3] OJ No L 84, 28. 3. 1974, p. 10.

covered by this Directive to be fitted with roll-over protection structures;

Whereas the approximation of the national laws relating to tractors entails reciprocal recognition by Member States of the 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 roll-over protection structure and its tractor attachment which satisfies the construction and testing requirements laid down in Annexes I, II, III, IV and V hereto.

2. The Member State which has granted EEC component type-approval shall take the measures required to verify, in so far as is necessary and if need be in cooperation with the competent authorities in the other Member States, that production models conform to the approved type. Such verification shall be limited to spot checks.

Article 2

Member States shall for each type of roll-over protection structure and its tractor attachment which they approve pursuant to Article 1, issue to the manufacturer of the tractor or of the roll-over protection structure or to his authorized representative, an EEC component type-approval mark conforming to the model shown in Annex VI hereto.

Member States shall take all appropriate measures to prevent the use of marks liable to create confusion between roll-over protection structures which have been component type-approved pursuant to Article 1 and other devices.

Article 3

1. No Member State may prohibit the placing on the market of roll-over protection structures or their tractor attachment on grounds relating to their construction if they bear the EEC component type-approval mark.

2. Nevertheless, a Member State may prohibit the placing on the market of roll-over protection structures bearing the EEC component type-approval mark which consistently fail to conform to the approved type. That State shall forthwith inform the other Member States and the Commission 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 the competent authorities of the other Member States a copy of the component type-approval certificates, an example of which is given in Annex VII, completed for each type of roll-over protection structure which they approve or refuse to approve.

Article 5

1. If the Member State which has granted EEC component type-approval finds that a number of roll-over protection structures and their tractor attachments 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, if necessary, where there is serious and repeated 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 within one month inform each another of any withdrawal of EEC component type-approval and of the reasons for any such measure.

Article 6

Any decision taken pursuant to the provisions adopted in implementation of this Directive to refuse or withdraw component type-approval for roll-over protection structures and their tractor attachments, or to prohibit their placing on the market or their use, shall set out in detail the reasons on which it is based. Such decision 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 in respect of a tractor on grounds relating to roll-over protection structures or their tractor attachments if these bear the EEC component type-approval mark and if the requirements laid down in Annex VIII have been satisfied.

Article 8

No Member State may refuse or prohibit the sale, registration, entry into service or use of any tractor on grounds relating to the roll-over protection structure and its tractor attachment if these bear the EEC component type-approval mark and if the requirements laid down in Annex VIII have been met.

Article 9

This Directive shall apply to tractors defined in Article 1 of Directive 74/150/EEC having the following characteristics:

— clearance beneath the rear axle of not more than 1 000 mm,

— fixed or adjustable track width of one of the driving axles of 1 150 mm or more,

— possibility of being fitted with a multipoint coupling device for detachable tools and a draw bar,

— mass between 1·5 and 4·5 tonnes, corresponding to the unladen weight of the tractor, as defined in item 2·4 of Annex I to Directive 74/150/EEC, including the roll-over protection structure fitted in compliance with the present Directive and tyres of the largest size recommended by the manufacturer.

Article 10

In the context of EEC type-approval any tractor to which Article 9 refers must be fitted with a roll-over protection structure which satisfies the requirements laid down in Annexes I, II, III and IV.

Article 11

Any amendments necessary to adjust the requirements of the Annexes to this Directive to take account of technical progress shall be adopted in accordance with the procedure laid down in Article 13 of Directive 74/150/EEC.

Article 12

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 13

This Directive is addressed to the Member States.

Done at Luxembourg, 28 June 1977.

For the Council

The President

W. RODGERS

LIST OF ANNEXES

ANNEX I

CONDITIONS FOR EEC COMPONENT TYPE-APPROVAL

1. DEFINITION

1.1. A *roll-over protection structure* (safety cab or frame) means the structure on a tractor the essential purpose of which is to avoid or limit risks to the driver resulting from roll-over of the tractor during normal use.

1.2. The structures mentioned in 1.1 are characterized by the fact that, in the event of roll-over, they ensure an unobstructed space inside them large enough to protect the driver.

2. GENERAL REQUIREMENTS

2.1. Every roll-over protection structure and its attachment to a tractor must be so designed and constructed as to fulfil the essential purpose laid down in 1.

2.2. This requirement shall be checked by one of the two test methods described in Annex III. The method chosen shall take account of the tractor mass as follows:

— for tractors of mass specified by Article 9 — Annex III B,

— for tractors of mass more than 1·5 tonnes and not more than 3·5 tonnes — Annex III A.

3. APPLICATION FOR EEC COMPONENT TYPE-APPROVAL

3.1. The application for EEC component type-approval with regard to the strength of a roll-over protection structure and the strength of its attachment to a tractor shall be submitted by the tractor manufacturer or by the manufacturer of the roll-over protection structure or by their authorized representatives.

3.2. The application for EEC component type-approval shall be accompanied by the undermentioned documents in triplicate and by the following particulars:

— general arrangement drawing either to a scale marked on the drawing or giving the main dimensions of the roll-over protection structure. This drawing must in particular show details of the mounting components,

— photographs from side and rear showing mounting details,

— brief description of the roll-over protection structure including type of construction, details of mounting on the tractor and, where necessary, details of cladding, means of access and escape, details of interior padding and features to prevent continuous rolling and details of heating and ventilation,

— details of materials used in structural parts including attaching brackets and fixing bolts (see Annex V).

3.3. A tractor representative of the tractor type for which the protection structure to be approved is intended shall be submitted to the technical service responsible for conducting the component type-approval tests. This tractor shall be fitted with the roll-over protection structure.

3.4. The holder of EEC component type-approval may request its extension to other tractor types. The competent authority which has granted the original EEC component type-approval shall

grant the extension if the approved roll-over protection structure and the type(s) of tractor for which the extension is requested comply with the following conditions:

— the mass of the unballasted tractor, as defined in 1.3 of Annex II, does not exceed by more than 5% the reference mass used in the test,

— the method of attachment and the tractor's components to which the attachments are made are identical,

— any components such as mudguards and bonnet cowls which may provide support for the roll-over protection device are identical,

— the position of the seat has not been changed.

4. MARKINGS

4.1. Every roll-over protection structure conforming to the approved type shall bear the following markings:

4.1.1. the trade mark or name;

4.1.2. a component type-approval mark conforming to the model in Annex VI;

4.1.3. serial number of the protection structure;

4.1.4. make and type(s) of tractor(s) for which the protection structure is intended.

4.2. All these particulars must appear on a small plate.

4.3. These markings must be visible, legible and indelible.

ANNEX II

CONDITIONS FOR TESTING THE STRENGTH OF A ROLL-OVER PROTECTION STRUCTURE AND OF ITS ATTACHMENT TO A TRACTOR

1. GENERAL REQUIREMENTS

1.1. Test purposes

Tests made using special rigs are intended to simulate such loads as are imposed on a roll-over protection structure when a tractor overturns. These tests, described in Annex III, must enable the strength of the roll-over protection structure and the attaching brackets to the tractor to be assessed.

1.2. Preparation for test

1.2.1. A roll-over protection structure must be tested on a tractor of the type for which it is designed. It must be attached to the tractor in accordance with the instructions of the manufacturer of the tractor and/or those of the manufacturer of the roll-over protection structure.

1.2.2. For the tests a tractor must be fitted with all structural components of the series production which may influence the strength of the roll-over protection structure or which may be necessary for the strength test.

Components which may create a hazarad in the zone of clearance must also be fitted so that they may be examined as to their compliance with the requirements of 4.1 of this Annex.

1.2.3. Tests shall be made with the tractor stationary.

1.3. Tractor mass

The measured mass W used in the formulae (see Annex III A and III B) to calculate the height of the fall of the pendulum weight and the crushing force, shall be at least that defined in 2.4 of Annex I to Directive 74/150/EEC (i.e., excluding optional accessories but including coolant, oils, fuel, tools and driver) plus the roll-over protection structure and less 75 kg. Not included are optional front or rear ballast weights, tyre ballast, mounted implements, mounted equipment or any specialized components.

2. APPARATUS AND EQUIPMENT

2.1. Pendulum weight

2.1.1. A pendulum weight shall be suspended by two chains or wire ropes from pivot points not less than 6 m above the ground. Means shall be provided for adjusting independently the suspended height of the weight and the angle between the weight and the supporting chains or wire ropes.

2.1.2. The weight shall be 2 000 ± 20 kg excluding the weight of the chains or wire ropes which themselves shall not exceed 100 kg. The length of the sides of the impact face shall be 680 ± 20 mm (see Annex IV, fig. 4). The weight shall be filled in such a way that the position of its centre of gravity is constant.

2.1.3. Means shall be provided of pulling the weight back as a pendulum to a height which is determined for each test. A quick-release mechanism shall allow the weight to swing downwards without altering the tilt in relation to the supporting chains or wire ropes.

2.2. **Pendulum supports**

The pendulum pivot points shall be rigidly fixed so that their displacement in any direction does not exceed 1% of the height of fall.

2.3. **Lashings**

2.3.1. The tractor shall be lashed by means of restraining and tensioning devices to ground rails rigidly attached to a non-yielding concrete base. The rails shall be suitably spaced to enable the tractor to be lashed down as illustrated in Annex IV, figs. 5, 6 and 7. For each test the tractor wheels and any axle stands used shall rest on the non-yielding base.

2.3.2. Apart from the tensioning devices and ground rail attachments the tractor shall be lashed down with wire rope of the dimensions specified.

This wire rope shall be any round strand, fibre core, construction 6 × 19 in accordance with ISO 2408. The nominal rope diameter shall be 13 mm.

2.3.3. The central pivot of an articulated tractor shall be supported and lashed down as appropriate for the front, rear and side impacts and for the crushing tests and shall, in addition, be propped from the side for the side impact. The front and rear wheels need not be in line if this makes it more convenient to attach appropriate wire ropes.

2.4. **Wheel prop and beam**

2.4.1. A beam shall be used as a prop for the wheel in the side impact as shown in Annex IV, fig. 7.

2.4.2. A softwood beam of approximately 150 mm square shall be clamped to the floor to brace the tyres on the side opposite the impact as shown in Annex IV, figs. 5, 6 and 7.

2.5. **Props and lashings for articulated tractors**

2.5.1. Additional props and lashings shall be used for articulated tractors. Their purpose is to ensure that the section of the tractor on which the roll-over protection structure is fitted is as rigid as that of a rigid tractor.

2.5.2. Additional specific details are given in Annex III for the impact and crushing tests.

2.6. **Crushing rig**

A rig as shown in Annex IV, fig. 8, shall be capable of exerting a downward force on a roll-over protection structure through a rigid beam approximately 250 mm wide connected to the load-applying mechanism by means of universal joints. Suitable axle stands shall be provided so that the tractor tyres do not bear crushing force.

2.7. **Measuring apparatus**

2.7.1. For the tests laid down in Annex III A and III B a device must be used on which a moving friction collar is tightly fitted on a horizontal rod for the purpose of measuring the difference between maximum momentary deflection and residual deflection during a side impact test.

2.7.2. For the tests laid down in Annex III A, measurements shall be made after the laboratory test to determine whether any part of the protection structure has entered the zone of clearance prescribed in 2 of Annex III A.

2.7.3. For the tests laid down in Annex III B, equipment must be provided — which may include photographic equipment — so that after the laboratory tests it may be established whether any

part of the protection structure has, during these tests, entered or come into contact with the zone of clearance prescribed in 2 of Annex III B.

2.8. **Measurement tolerances**

The following tolerances shall apply to measurements made during the tests:

2.8.1. linear dimensions measured during test (except 2.8.2); protection structure and tractor dimensions, zone of clearance and tyre deflections when lashed for impact tests: ± 3 mm;

2.8.2. height of pendulum weight set for impact tests: ± 6 mm;

2.8.3. measured tractor mass: ± 20 kg;

2.8.4. load applied in crushing tests: ± 2%

2.8.5. angle of weight-supporting chains or wire ropes at the point of impact: ± 2°.

3. TESTS

3.1. **General requirements**

3.1.1. *Sequence of tests*

3.1.1.1. The list and sequence of tests shall be as follows. The item numbers are those in which the tests are described in Annex III A and III B:

1. impact from the rear:	1.1,
2. crushing test at the rear:	1.4,
3. impact from the front:	1.2,
4. impact from the side:	1.3,
5. crushing test at the front:	1.5.

3.1.1.2. If, during the test, any part of the restraining equipment moves or breaks, the test shall be repeated.

3.1.1.3. No repairs or adjustments to the tractor or roll-over protection structure may be carried out during the test.

3.1.1.4. The tractor gear-box shall be in neutral and the brakes off throughout the test.

3.1.2. *Track width*

A track width setting for the rear wheels shall be chosen such that as far as possible the roll-over protection structure is not supported by the tyres during the tests.

3.1.3. *Removal of non-hazard-creating components*

All components of the tractor and roll-over protection structure which, as complete units, constitute protection for the driver — including weather protection — shall be supplied with the tractor to be tested. It is permissible to remove front, side and rear windows of safety glass or similar material and any detachable panels, fittings and accessories which have no function of structural strength and which cannot create a hazard in the event of overturning.

3.1.4. *Direction of impacts*

The side of the tractor on which the side impact is truck shall be that which is likely to give the greatest distortion. The rear impact shall be on the corner furthest from the side impact, and the front impact on the corner nearest the side impact.

3.1.5. *Tyre pressures and deflections*

Tyres shall not be water ballasted. Pressures and deflections in those tyres which are lashed in the various tests shall be in accordance with the following table:

	Tyre pressure (bar)				Deflection (mm)	
	Radial-ply tyres		Diagonal-ply tyres		Front	Rear
	Front	Rear	Front	Rear		
Four-wheel drive, front and rear wheels of the same size	1·20	1·20	1·00	1·00	25	25
Four-wheel drive, front wheels smaller than rear	1·80	1·20	1·50	1·00	20	25
Two-wheel drive	2·40	1·20	2·00	1·00	15	25

4. INTERPRETATION OF RESULTS

4.1. A roll-over protection structure submitted for EEC component type-approval shall be considered as having satisfied requirements concerning strength if it fulfils the following conditions:

4.1.1. it is free from fractures and cracks as described in 3.1 of Annex III A and III B;

4.1.2. for Annex III A tests: no part of the zone of clearance is outside the roll-over protection structure;

for Annex III B tests: no part of the zone of clearance has been entered by the roll-over protection structure during any of the impact or crushing tests or is outside the roll-over protection structure, as described in 3.2 of Annex III B;

4.1.3. for Annex III A tests: the difference between the maximum momentary deflection and residual deflection, referred to in 3.3 of Annex III A, does not exceed 15 cm;

For Annex III B tests: during the side impact test the difference between the maximum momentary deflection and the residual deflection, referred to in 3.3 of Annex III B does not exceed 25 cm.

4.2. There is no other feature presenting a particular hazard to the driver e.g. glass of a type likely to shatter dangerously, insufficient padding inside the roof or where the driver's head may strike.

5. TEST REPORT

5.1. The test report shall be attached to the EEC component type-approval certificate referred to in Annex VII. The presentation of the report shall be as shown in Annex V. The report shall include:

5.1.1. a general description of the roll-over protection structure's shape and construction including materials and fixings; external dimensions of tractor with protection structure fitted; main interior dimensions; minimum clearance from steering wheel; lateral distance from steering wheel to protection structure sides; height of protection structure roof above seat or seat reference point and above foot platform if there is one; details of provisions for normal entry and

exit and for escape as determined by the protection structure parts; and details of heating and, where appropriate, ventilation system;

5.1.2. details of any special features such as devices to prevent the continuous rolling of the tractor;

5.1.3. a brief description of any interior padding intended to minimize head or shoulder injuries or to effect noise reduction;

5.1.4. a statement of the type of windscreen and glazing fitted.

5.2. The report must identify clearly the tractor type (make, type, commercial description, etc.) used for testing and the types for which the roll-over protection structure is intended.

5.3. If EEC component type-approval is being extended for other tractor types, the report must include the exact reference of the report of the original EEC component type-approval as well as precise indications regarding the requirements laid down in 3.4 of Annex I.

ANNEX III

TEST PROCEDURES

A — TEST METHOD I

1. IMPACT AND CRUSHING TESTS

1.1. **Impact at the rear**

1.1.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or wire ropes are at an angle of 20° to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle to the vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is parallel to the roll-over protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining at an angle of 20° to the vertical. Steps must be taken to reduce the tendency of the weight to turn about the point of contact. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a rearward overturning accident, normally the upper edge. The position of the centre of gravity of the weight shall be one-sixth of the width of the top of the roll-over protection structure inwards from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the top of the roll-over protection structure.

However, if a curve in the back of the roll-over protection structure starts at a greater distance than this inside this vertical plane, the impact shall be administered at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see Annex IV, fig. 9).

If a protruding member would present an inadequate area for the weight, a steel plate of appropriate thickness and depth and about 300 mm in length shall be fastened to that member in such a manner that the strength of the roll-over protection structure is not affected.

1.1.2. Tractors with rigid bodies shall be lashed down. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1·5 m in front of the front axle. They shall either be in the plane in which the centre of gravity of the pendulum will swing or more than one lashing shall give a resultant force in this plane, as in Annex IV, fig. 5.

The lashings shall be tightened so that the deflections in the front and rear tyres are as indicated in 3.1.5 of Annex II. When the lashings have been tightened, a wooden beam 150 mm square shall be clamped in front of the rear wheels and driven tight against them.

1.1.3. Articulated tractors shall have both axles lashed down. The axle of that section of the tractor on which the roll-over protection structure is mounted shall be treated as the rear axle in Annex IV, fig. 5. The point of articulation will then be supported by a beam 100 mm square and will be lashed down firmly by means of wire ropes attached to the ground rails.

1.1.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 125 + 0{\cdot}020\ W$$

where H is the height of fall in millimetres and W the mass of the tractor as defined in 1.3 of Annex II.

The weight shall then be released and allowed to crash against the roll-over protection structure.

1.2. **Impact at the front**

1.2.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or wire ropes are at an angle of 20° to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle to the vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is parallel to the roll-over protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining at an angle of 20° to the vertical. Steps must be taken to reduce the tendency of the weight to turn about the point of contact. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the roll-over protection structure likely to hit the ground first if the tractor overturned sideways whilst travelling forward, normally the top front corner. The position of the centre of gravity of the weight shall be not more than 80 mm from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the top of the roll-over protection structure.

However, if a curve in the front of the roll-over protection structure starts at a greater distance than 80 mm inside this vertical plane, the impact shall be administered at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see Annex IV, fig. 9).

1.2.2. Tractors with rigid bodies shall be lashed down as indicated in Annex IV, fig. 6. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1·5 m in front of the front axle.

The lashings shall be tightened so that the deflections in the front and rear tyres are as indicated in 3.1.5 of Annex II. When the lashings have been tightened, a wooden beam approximately 150 mm square shall be clamped behind the rear wheels and driven tight against them.

1.2.3. Articulated tractors shall have both axles lashed down. The axle of that section of the tractor on which the roll-over protection structure is mounted shall be treated as the front axle in Annex IV, fig. 6. The point of articulation shall then be supported by a beam approximately 100 mm square and shall be lashed down firmly by means of wire ropes attached to the ground rails.

1.2.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 125 + 0{\cdot}020\ W.$$

1.3. **Impact at the side**

1.3.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or wire ropes are vertical unless the protection structure at the point of contact is, during deflection, other than vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is parallel to the protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a sideways overturning accident, normally the upper edge. Unless it is certain that another part of this edge would hit the ground first, the point of impact shall be in the plane at right angles to the median plane of the tractor and passing through the middle of the seat at the mid-point of adjustment. Steps must be taken to reduce the tendency of the weight to turn about the point of contact.

1.3.2. For rigid tractors, any axle the position of which is rigid relative to the protection structure shall be lashed down on the side on which the impact is to be administered. In the case of a two-wheel drive tractor this will normally be the rear axle; this arrangement is shown in

Annex IV, fig. 7. The two lashings shall pass over the axle from points directly below it, one passing to a point of attachment approximately 1·5 m in front of the axle and the other to a point approximately 1·5 m behind the axle. The lashings shall be tightened so that there is a deflection in the tyre adjacent to the lashing as indicated in 3.1.5 of Annex II. After lashing, a wooden beam shall be placed as a prop against the wheel opposite the weight and secured to the floor so that it is held tightly against the wheel rim during impact as shown in Annex IV, fig. 7. The length of the beam shall be chosen so that when in position against the wheel it is at an angle of 30 ± 3° to the horizontal. Its length shall be 20 to 25 times its thickness and its width two to three times its thickness. Both axles shall be prevented from moving sideways by means of a beam clamped to the floor against the outside of the wheel on the side opposite that on which the impact is to be administered.

1.3.3. An articulated tractor must be lashed down so that the section of the tractor bearing the protection structure is fixed rigidly to the ground as in the case of a non-articulated tractor.

Both axles of articulated tractors shall be lashed to the ground. The axle and wheels of that section of the tractor on which the protection structure is mounted shall be lashed and propped as in Annex IV, fig. 7. The point of articulation shall be supported by a beam at least 100 mm square and lashed down to the ground rails. A prop will be positioned against the point of articulation and secured to the floor so that it has the same effect as a prop against the rear wheel and provides support similar to that achieved for a rigid tractor.

1.3.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 125 + 0{\cdot}150\ W.$$

1.4. **Crushing at the rear**

The tractor shall be positioned in the rig described in 2.6 of Annex II and shown in Annex IV, figs. 8 and 10, in such a way that the rear edge of the beam is over the rearmost top load-bearing part of the protection structure and the median longitudinal plane of the tractor is midway between the points of application of force to the beam.

The axle stands shall be placed under the axles in such a way that the tyres do not bear the crushing force. The force applied shall correspond to twice the mass of the tractor as defined in 1.3 of Annex II. It may be necessary to lash down the front of the tractor.

1.5. **Crushing at the front**

1.5.1. This shall be identical to the crushing test at the rear except that the front edge of the beam shall be over the frontmost top part of the roll-over protection structure.

1.5.2. Where the front part of the protection structure roof will not sustain the full crushing force, the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the roll-over protection structure with that part of the front of the tractor capable of supporting the tractor's mass when overturned. The force shall then be removed and the tractor re-positioned so that the beam is over that point of the protection structure which would then support the rear of the tractor when completely overturned, as shown in Annex IV, fig. 10, and the full force reapplied.

2. ZONE OF CLEARANCE

2.1. The 'zone of clearance' is defined by planes as follows, the tractor being on a horizontal surface:

— horizontal, 95 cm above the compressed seat;

— vertical, perpendicular to the median plane of the tractor and 10 cm behind the back of the seat;

— vertical, parallel to the median plane of the tractor and 25 cm to the left of the centre of the seat;

— vertical, parallel to the median plane of the tractor and 25 cm to the right of the centre of the seat;

— an inclined plane in which lies a horizontal line which is at right angles to the median plane of the tractor, 95 cm above the compressed seat and 45 cm (plus the normal fore and aft movement of the seat) in front of the back of the seat. This inclined plane passes in front of the steering wheel and at its nearest point is 4 cm from the rim of the steering wheel.

2.2. The back of the seat shall be determined ignoring any padding thereon. The seat shall be in its rearmost adjustment for normal seated operation of the tractor and in its highest position if this is independently variable. Where the suspension of the seat is adjustable it shall be at its mean setting and the load on it shall be 75 kg.

3. MEASUREMENTS TO BE MADE

3.1. **Fractures and cracks**

After each test all structural members, joints and attaching brackets on the tractor shall be visually examined for fractures or cracks, any small cracks in unimportant parts being ignored.

3.2. **Zone of clearance**

3.2.1. After each test the roll-over protection structure shall be examined to see whether any part of the protection structure has entered a zone of clearance round the driving seat as defined in 2.

3.2.2. In addition, the protection structure shall be examined to determine whether any part of the zone of clearance is outside the protection of the protection structure. For this purpose it shall be considered to be outside the protection of the structure if any part of it would have come in contact with flat ground if the tractor had overturned towards the direction from which the impact came. For this purpose the tyre and track setting shall be assumed to be the smallest indicated by the manufacturer.

3.3. **Maximum momentary deflection**

During the side impact test the difference between the maximum momentary deflection and the residual deflection at a height of 950 mm above the loaded seat shall be recorded. One end of the rod described in 2.7.1 of Annex II shall be attached to the upper part of the roll-over protection structure and the other end passed through a hole in the vertical standard. The position of the friction collar on the rod after the impact indicates the maximum momentary deflection.

3.4. **Permanent deflection**

After the final compression test the permanent deflection of the protection structure shall be recorded. For this purpose, before the start of the test, the positions of the main roll-over protection structure members in relation to the seat shall be recorded.

B — TEST METHOD II

1. IMPACT AND CRUSHING TESTS

1.1. **Impact at the rear**

1.1.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or

wire ropes are at an angle of 20° to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle to the vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is parallel to the roll-over protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining at an angle of 20° to the vertical. Steps must be taken to reduce the tendency of the weight to turn about the point of contact. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the roll-over protection structure likely to hit the ground first in a rearward overturning accident, normally the upper edge. The position of the centre of gravity of the weight shall be one-sixth of the width of the top of the roll-over protection structure inwards from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the top of the roll-over protection structure.

However, if a curve in the back of the roll-over protection structure starts at a greater distance than this inside this vertical plane, the impact shall be administered at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see Annex IV, fig. 9).

If a protruding member would present an inadequate area for the weight, a steel plate of appropriate thickness and depth and about 300 mm in length shall be fastened to that member in such a manner that the strength of the roll-over protection structure is not affected.

1.1.2. Tractors with rigid bodies shall be lashed down. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1·5 m in front of the front axle. They shall either be in the plane in which the centre of gravity of the pendulum will swing or more than one lashing shall give a resultant force in this plane, as in Annex IV, fig. 5.

The lashing shall be tightened so that the deflections in the front and rear tyres are as indicated in 3.1.5 of Annex II. After the lashings have been tightened a wooden beam 150 mm square shall be clamped in front of the rear wheels and driven tight against them.

1.1.3. Articulated tractors shall have both axles lashed down. The axle for that section of the tractor on which the roll-over protection structure is mounted shall be treated as the rear axle in Annex IV, fig. 5. The point of articulation will then be supported by a beam 100 mm square minimum and will be lashed down firmly by means of wire ropes attached to the ground rails.

1.1.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 2{\cdot}165 \times 10^{-8} \times WL^2 \text{ or } H = 5{\cdot}73 \times 10^{-2} \times I$$

where:

H = the height of fall in millimetres,

W = the mass of the tractor as defined in 1.3 of Annex II,

L = the maximum tractor wheelbase in millimetres,

I = the moment of inertia of the rear axle, with wheels removed, in kilograms per square metre (kg/m^2).

The weight shall then be released and allowed to crash against the roll-over protection structure.

1.1.5. There shall be no rear impact in the case of a tractor at least 50% of the mass of which, as defined in 1.3 of Annex II, bears on the front axle.

1.2. **Impact at the front**

1.2.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or wire ropes are at an angle of 20° to the vertical unless the roll-over protection structure at the point of contact has, during deflection, a greater angle to the vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is

parallel to the roll-over protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining at an angle of 20° to the vertical. Steps must be taken to reduce the tendency of the weight to turn about the point of contact. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the protection structure likely to hit the ground first if the tractor overturned sideways whilst travelling forward, normally the top front corner. The position of the centre of gravity of the weight shall be not more than 80 mm from a vertical plane parallel to the median plane of the tractor touching the outside extremity of the top of the roll-over protection structure.

However, if a curve in the front of the roll-over protection structure starts at a greater distance than 80 mm inside this vertical plane, the impact shall be administered at the beginning of the curve, i.e. at the point where this curve is tangential to a line at right angles to the median plane of the tractor (see Annex IV, fig. 9).

1.2.2. Tractors with rigid bodies shall be lashed down as illustrated in Annex IV, fig. 6. The points of attachment of the lashings shall be approximately 2 m behind the rear axle and 1·5 m in front of the front axle.

The lashings shall be tightened so that the deflections in the front and rear tyres are as indicated in 3.1.5 of Annex II. When the lashings have been tightened, a wooden beam 150 mm square shall be clamped behind the rear wheels and driven tight against them.

1.2.3. Articulated tractors shall have both axles lashed down. The axle of that section of the tractor on which the roll-over protection structure is mounted shall be treated as the front axle in Annex IV, fig. 6. The point of articulation shall then be supported by a beam 100 mm square minimum and shall be lashed down firmly by means of wire ropes attached to the ground rails.

1.2.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 125 + 0{\cdot}020\ W.$$

1.3. **Impact at the side**

1.3.1. The tractor shall be so placed in relation to the weight that the weight will strike the roll-over protection structure when the impact face of the weight and the supporting chains or wire ropes are vertical unless the protection structure at the point of contact is, during deflection, other than vertical. In this case the impact face of the weight shall be adjusted by means of an additional support so that it is parallel to the protection structure at the point of impact at the moment of maximum deflection, the supporting chains or wire ropes remaining vertical. The suspended height of the weight shall be so adjusted that the locus of its centre of gravity passes through the point of contact.

The point of impact shall be that part of the protection structure likely to hit the ground first in a sideways overturning accident, normally the upper edge. Unless it is certain that another part of this edge would hit the ground first, the point of impact shall be in the plane at right angles to the median plane of the tractor and passing through the middle of the seat at the mid-point of adjustment. Steps must be taken to reduce the tendency of the weight to turn about the point of contact.

1.3.2. For rigid tractors, any axle the position of which is rigid relative to the protection structure shall be lashed down on the side on which the impact is to be administered. In the case of a two-wheel drive tractor this will normally be the rear axle; this arrangement is shown in Annex IV, fig. 7. The two lashings shall pass over the axle from points directly below it, one passing to a point of attachment approximately 1·5 m in front of the axle and the other to a point approximately 1·5 m behind the axle. The lashings shall be tightened so that there is a deflection in the tyre adjacent to the lashing as indicated in 3.1.5 of Annex II. After lashing, a wooden beam shall be placed as a prop against the wheel opposite the weight and secured to the floor so that it is held tightly against the wheel rim during impact as shown in Annex

IV, fig. 7. The length of the beam shall be chosen so that when in position against the wheel it is at an angle of 30 ± 3° to the horizontal. Its length shall be 20 to 25 times its thickness and its width two to three times its thickness. Both axles shall be prevented from moving sideways by means of a beam clamped to the floor against the outside of the wheel on the side opposite that on which the impact is to be administered.

1.3.3. An articulated tractor must be lashed down so that the section of the tractor bearing the protection structure is fixed rigidly to the ground as in the case of a non-articulated tractor.

Both axles of articulated tractors shall be lashed to the ground. The axle and wheels of that section of the tractor on which the protection structure is mounted shall be lashed and propped as in Annex IV, fig. 7. The point of articulation shall be supported by a beam at least 100 mm square and lashed down to the ground rails. A prop will be positioned against the point of articulation and secured to the floor so that it has the same effect as a prop against the rear wheel and provides support similar to that achieved for a rigid tractor.

1.3.4. The weight shall be pulled back so that the height of its centre of gravity above that at the point of impact is given by the formula:

$$H = 125 + 0{\cdot}150\ W.$$

1.4. **Crushing at the rear**

The tractor shall be positioned in the rig described in 2.6 of Annex II and shown in Annex IV, figs. 8 and 10 in such a way that the rear edge of the beam is over the rearmost top load-bearing part of the roll-over protection structure and the median longitudinal plane of the tractor is midway between the points of application of force to the beam.

The axle stands shall be placed under the axles in such a way that the tyres do not bear the crushing force. The force applied shall correspond to twice the mass of the tractor as defined in 1.3 of Annex II. It may be necessary to lash down the front of the tractor.

1.5. **Crushing at the front**

1.5.1. This test shall be identical to the crushing test at the rear except that the front edge of the beam shall be over the frontmost top part of the roll-over protection structure.

1.5.2. Where the front part of the roll-over protection structure roof cannot sustain the full crushing force, the force shall be applied until the roof is deflected to coincide with the plane joining the upper part of the roll-over protection structure with that part of the front of the tractor capable of supporting the tractor's mass when overturned. The force shall then be removed and the tractor re-positioned so that the beam is over that point of the roll-over protection structure which would then support the rear of the tractor when completely overturned as shown in Annex IV, fig. 10, and the full force reapplied.

2. ZONE OF CLEARANCE

2.1. The zone of clearance is illustrated in Annex IV, fig. 3, and is defined in relation to a vertical reference plane generally longitudinal to the tractor and passing through a seat reference point, described in 2.3, and the centre of the steering wheel. The reference plane shall be assumed to move horizontally with the seat and steering wheel during impacts but to remain perpendicular to the floor of the tractor or of the roll-over protection structure if this is resiliently mounted.

Where the steering wheel is adjustable, its position should be that for normal seated driving.

2.2. The boundaries of the zone shall be taken as:

2.2.1. vertical planes 250 mm on either side of the reference plane extending upwards from the seat reference point for 300 mm;

2.2.2. parallel planes extending from the upper edge of planes 2.2.1 to a maximum height of 900 mm above the seat reference point and inclined in such a way that the upper edge of the plane on the side from which the side impact is struck is at least 100 mm from the reference plane;

2.2.3. a horizontal plane 900 mm above the seat reference point;

2.2.4. an inclined plane perpendicular to the reference plane and including a point 900 mm directly above the seat reference point and the rearmost point of the seat structure including its suspension;

2.2.5. a vertical plane perpendicular to the reference plane extending downwards from the rearmost point of the seat;

2.2.6. a curvilinear surface, perpendicular to the reference plane, with a radius of 120 mm tangential to planes 2.2.3 and 2.2.4;

2.2.7. a curvilinear suface, perpendicular to the reference plane, having a radius of 900 mm and extending forward for 400 mm from and tangential to plane 2.2.3 at a point 150 mm forward of the seat reference point;

2.2.8. an inclined plane perpendicular to the reference plane, joining surface 2.2.7 at its forward edge and passing 40 mm from the steering wheel. In the case of a high steering wheel position this plane is replaced by a tangent plane to surface 2.2.7;

2.2.9. a vertical plane, perpendicular to the reference plane, 40 mm forward of the steering wheel;

2.2.10. a horizontal plane through the seat reference point.

2.3. **Seat location and seat reference point**

2.3.1. For the purpose of defining the zone of clearance in 2.1, the seat shall be at the rearmost point of any horizontal adjustment range. It shall be set at the mid-point of the vertical adjustment range where this is independent of adjustment of its horizontal position.

The reference point shall be established using the apparatus illustrated in Annex IV, figs. 1 and 2, to simulate loading by a human occupant. The apparatus shall consist of a seat pan board and backrest boards. The lower backrest board shall be jointed in the region of the ischium humps (A) and loin (B), the joint (B) being adjustable in height.

2.3.2. The reference point is defined as the point in the median longitudinal plane of the seat where the tangential plane of the lower backrest and a horizontal plane intersect. This horizontal plane cuts the lower surface of the seat pan board 150 mm in front of the abovementioned tangent.

2.3.3. Where a seat suspension is provided with adjustment for the weight of the driver, this shall be set so that the seat is at the mid-point of its dynamic range.

The apparatus shall be positioned on the seat. It shall then be loaded with a force of 550 N at a point 50 mm in front of joint (A), and the two parts of the backrest board shall be lightly pressed tangentially against the backrest.

2.3.4. If it is not possible to determine definite tangents to each area of the backrest (above and below the lumbar region) the following should be done:

2.3.4.1. where no definite tangent to the lower area is possible: the lower part of the backrest board is pressed against the backrest vertically;

2.3.4.2. where no definite tangent to the upper area is possible: the joint (B) is fixed at a height of 230 mm above the seat reference point, if the lower part of the backrest board is vertical. Then the two parts of the backrest board are lightly pressed against the backrest tangentially.

3. MEASUREMENTS TO BE MADE

3.1. **Fractures and cracks**

After each test all structural members, joints and attaching brackets on the tractor shall be visually examined for fractures or cracks, any small cracks in unimportant parts being ignored.

3.2. **Zone of clearance**

3.2.1. During each test the roll-over protection structure shall be examined to see whether any part of the roll-over protection structure has entered a zone of clearance round the driving seat as defined in 2.1 and 2.2.

3.2.2. In addition, the roll-over protection structure shall be examined to determine whether any part of the zone of clearance is outside the protection of the roll-over protection structure. For this purpose it shall be considered to be outside the protection of the roll-over protection structure if any part of it would have come in contact with flat ground if the tractor had overturned towards the direction from which the impact came. For this purpose the tyre and track setting shall be assumed to be the smallest specified by the manufacturer.

3.3. **Maximum momentary deflection**

During the side impact test the difference between the maximum momentary deflection and the residual deflection at a height of 900 mm above and 150 mm forward of the seat reference point shall be recorded. One end of the rod described in 2.7.1 of Annex II shall be attached to the upper part of the roll-over protection structure and the other end passed through a hole in the vertical standard. The position of the friction collar on the rod after the blow indicates the maximum momentary deflection.

3.4. **Permanent deflection**

After the final compression test the permanent deflection of the protection structure shall be recorded. For this purpose, before the start of the test, the position of the main roll-over protection structure members in relation to the seat reference point shall be recorded.

ANNEX IV

FIGURES

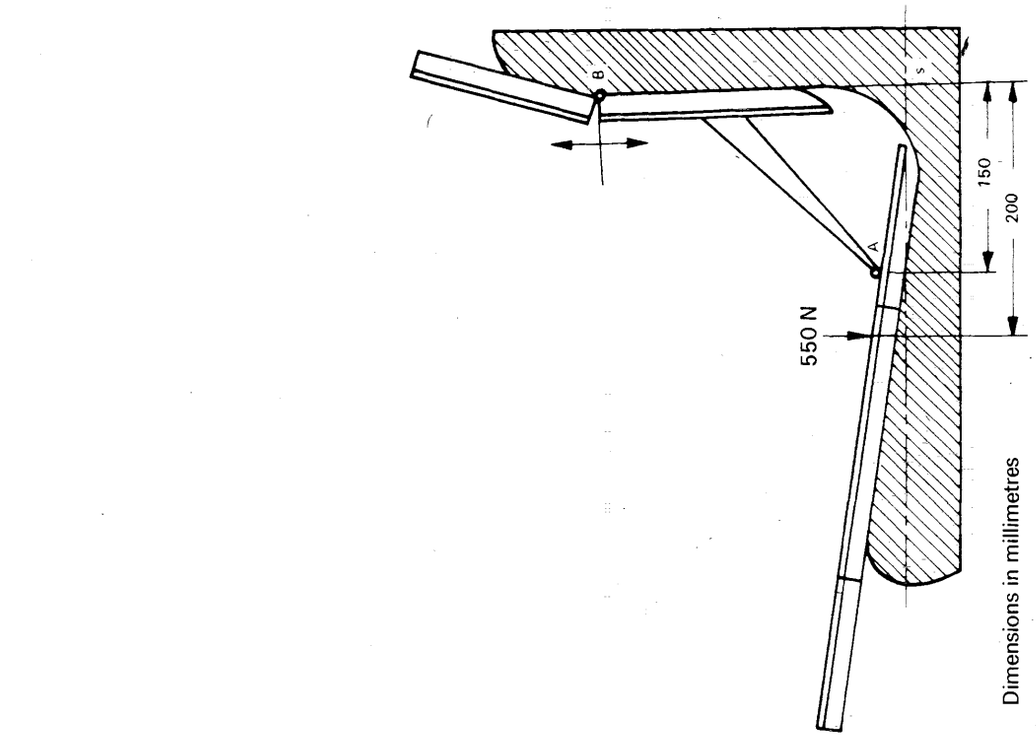


Fig. 2

Method of determining seat reference point

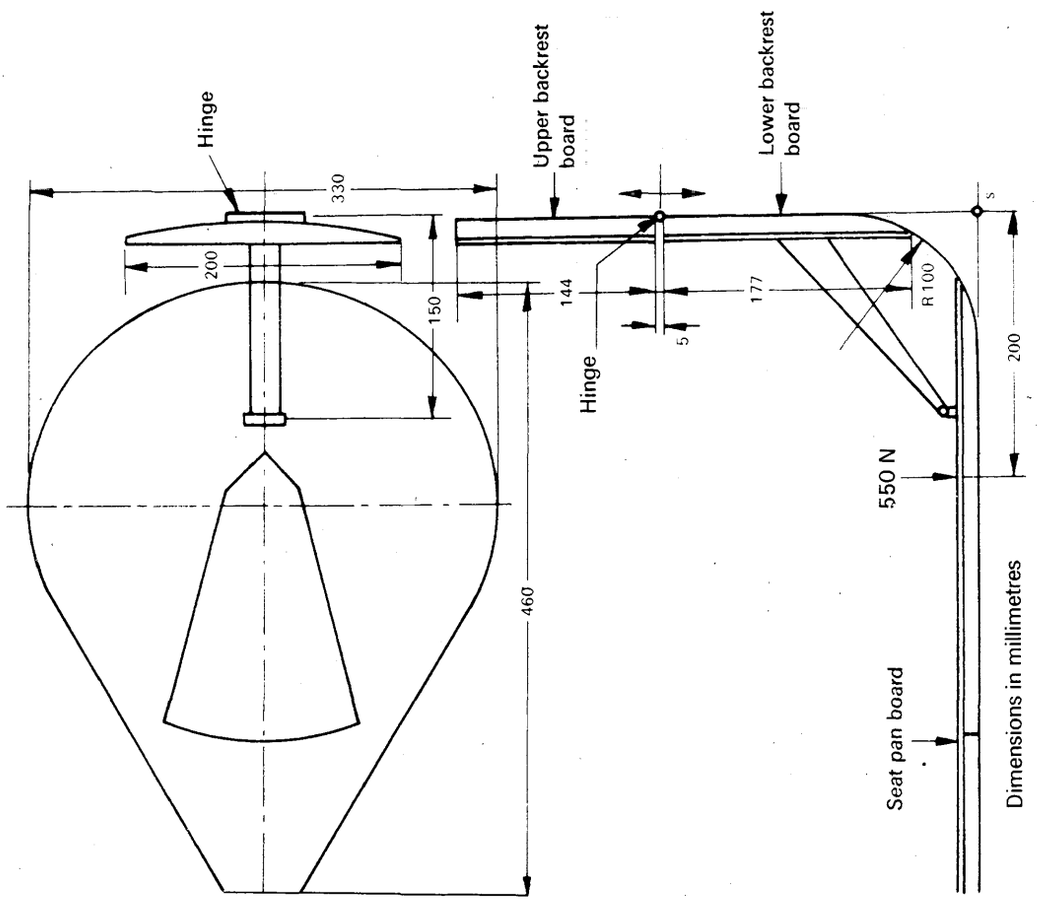
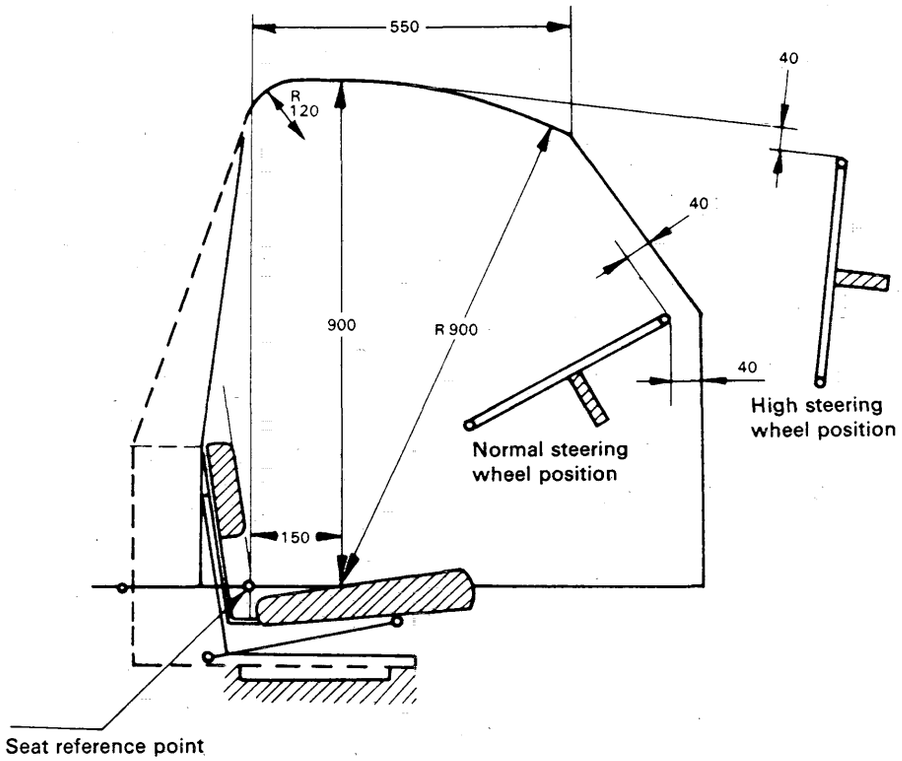


Fig. 1

Apparatus for determination of seat reference point



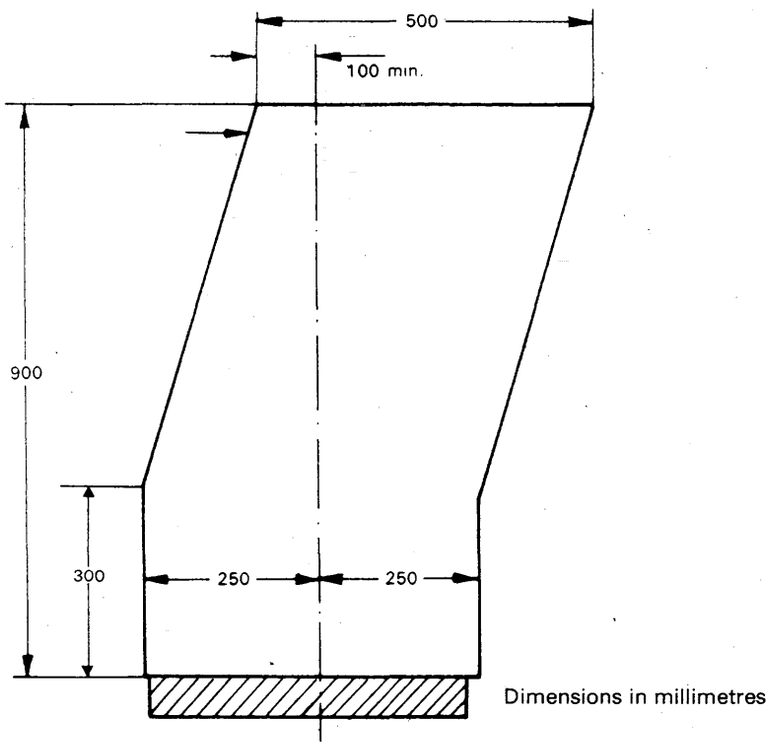


Fig. 3

Zone of clearance

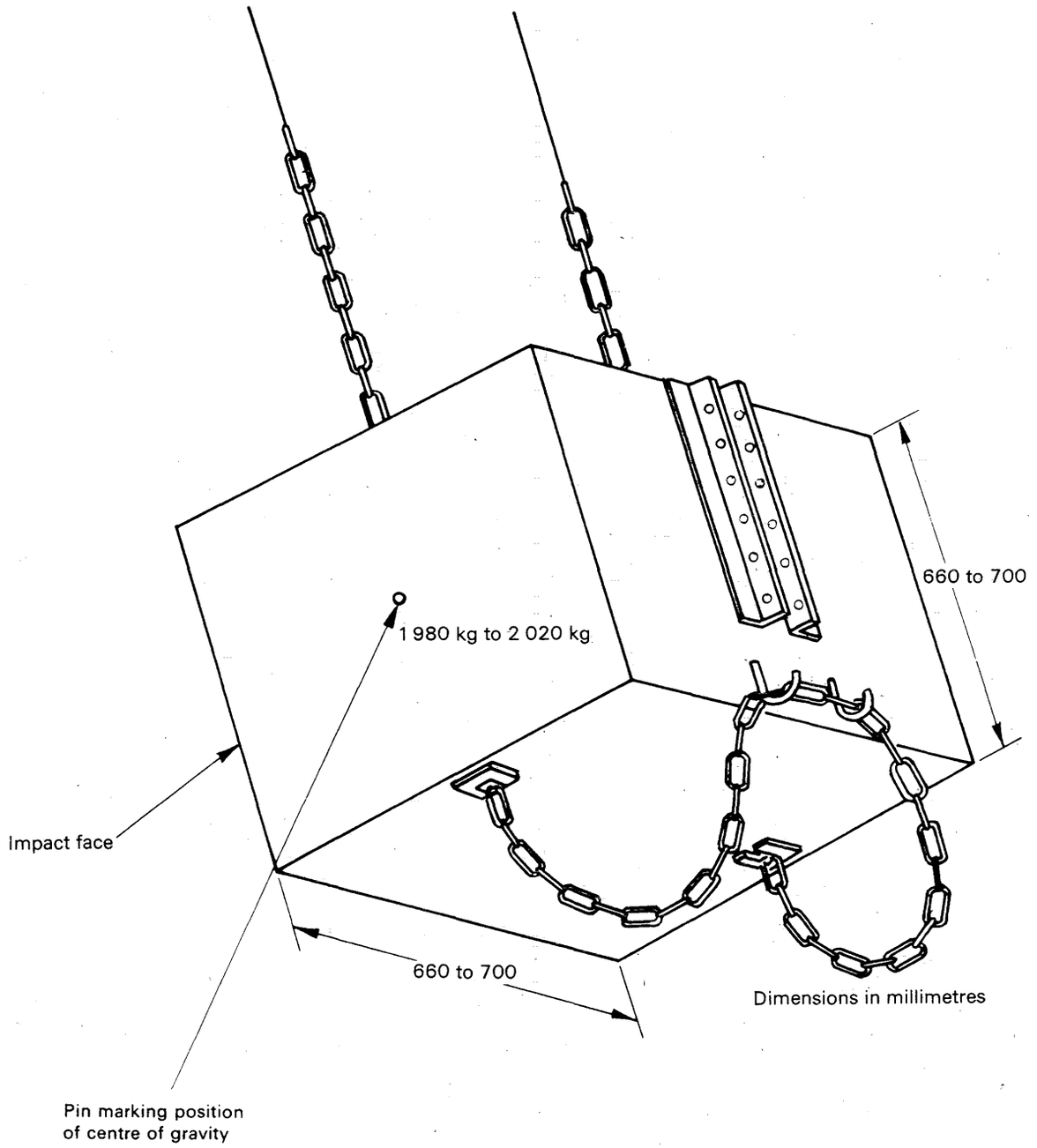


Fig. 4

Illustration of weight

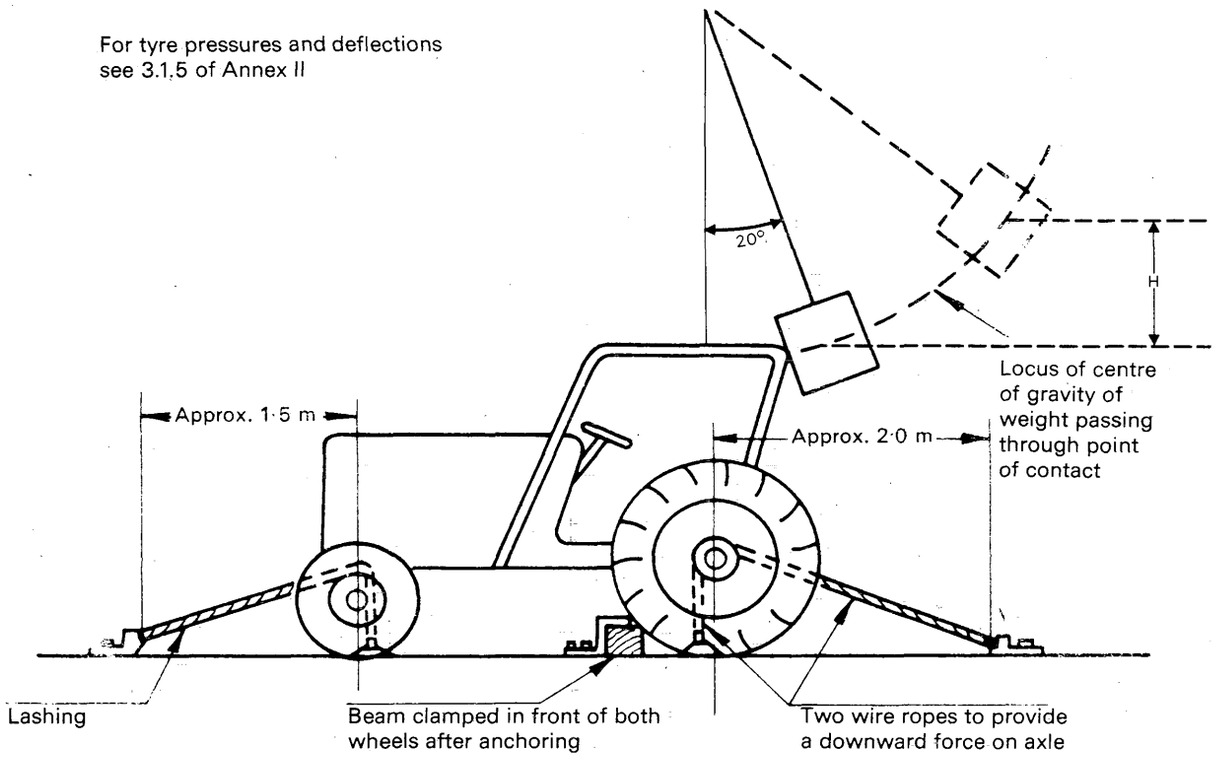


Fig. 5

Impact from rear

Note:

The configuration of the roll over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

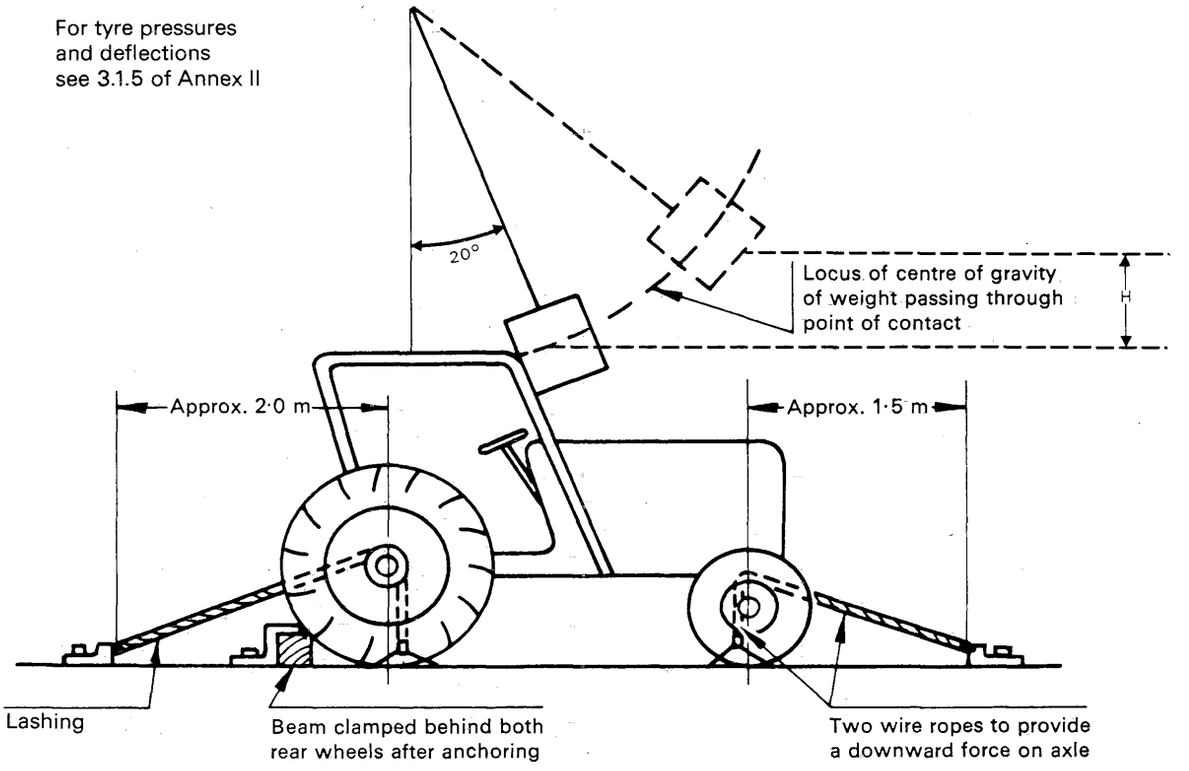


Fig. 6

Impact from front

Note:

The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

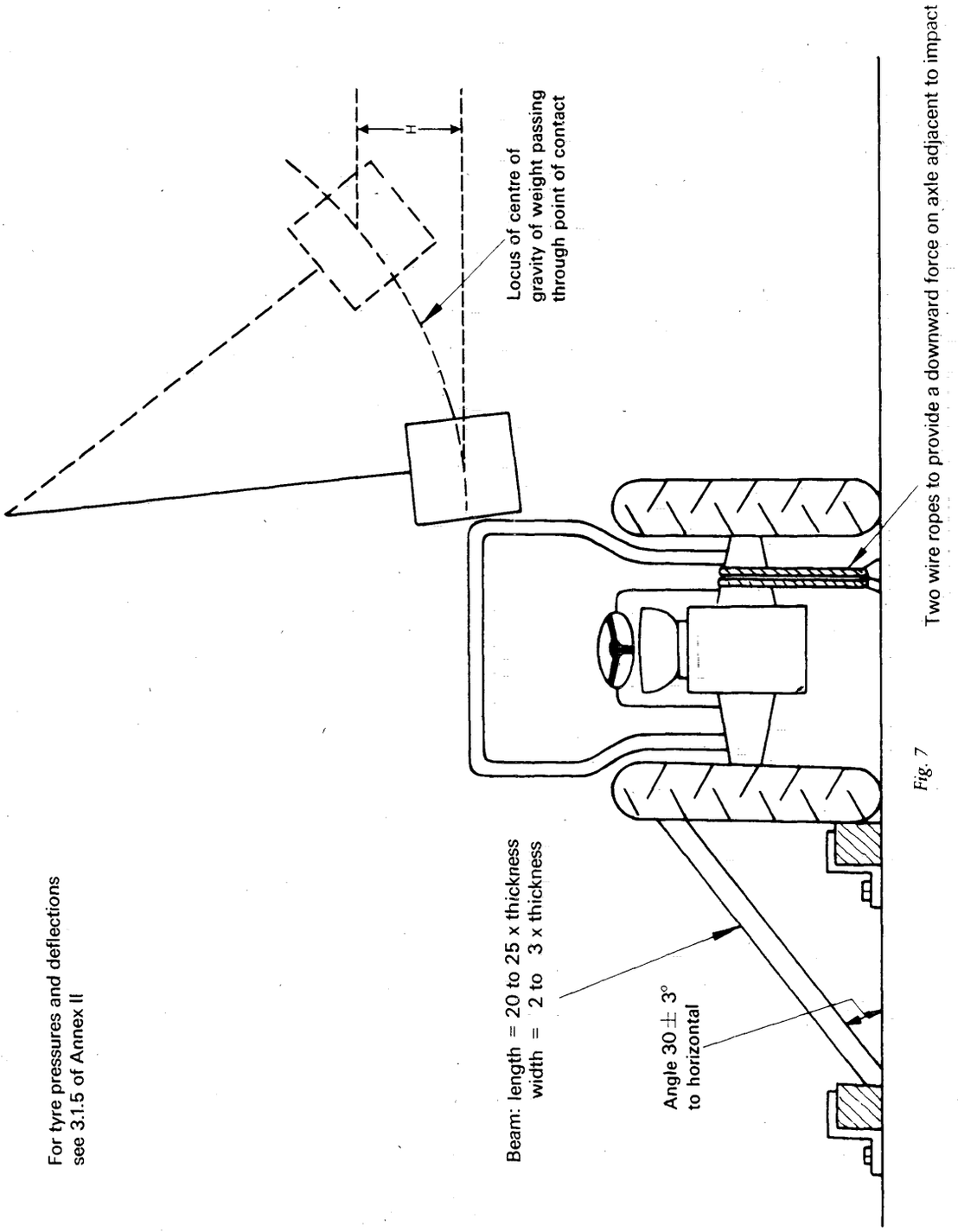


Fig. 7

Impact from side

Note: The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

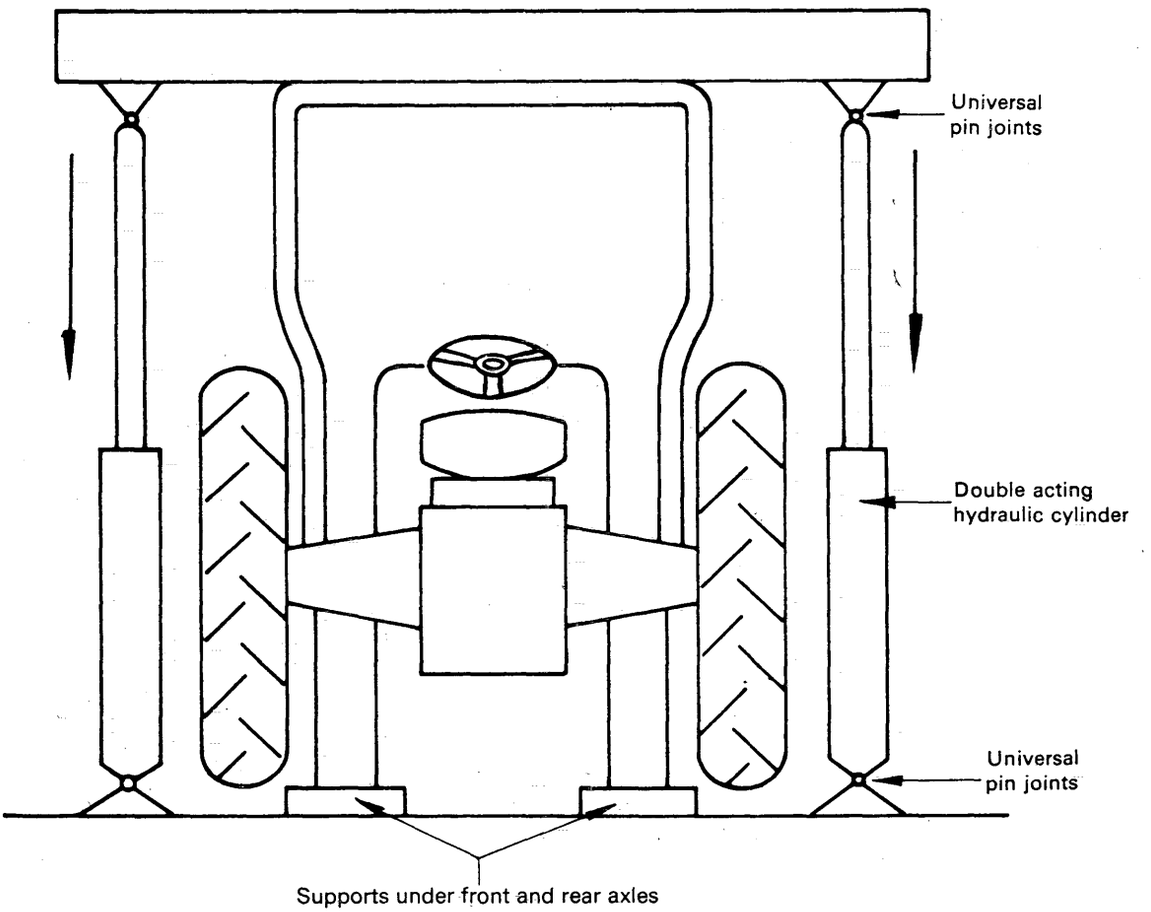
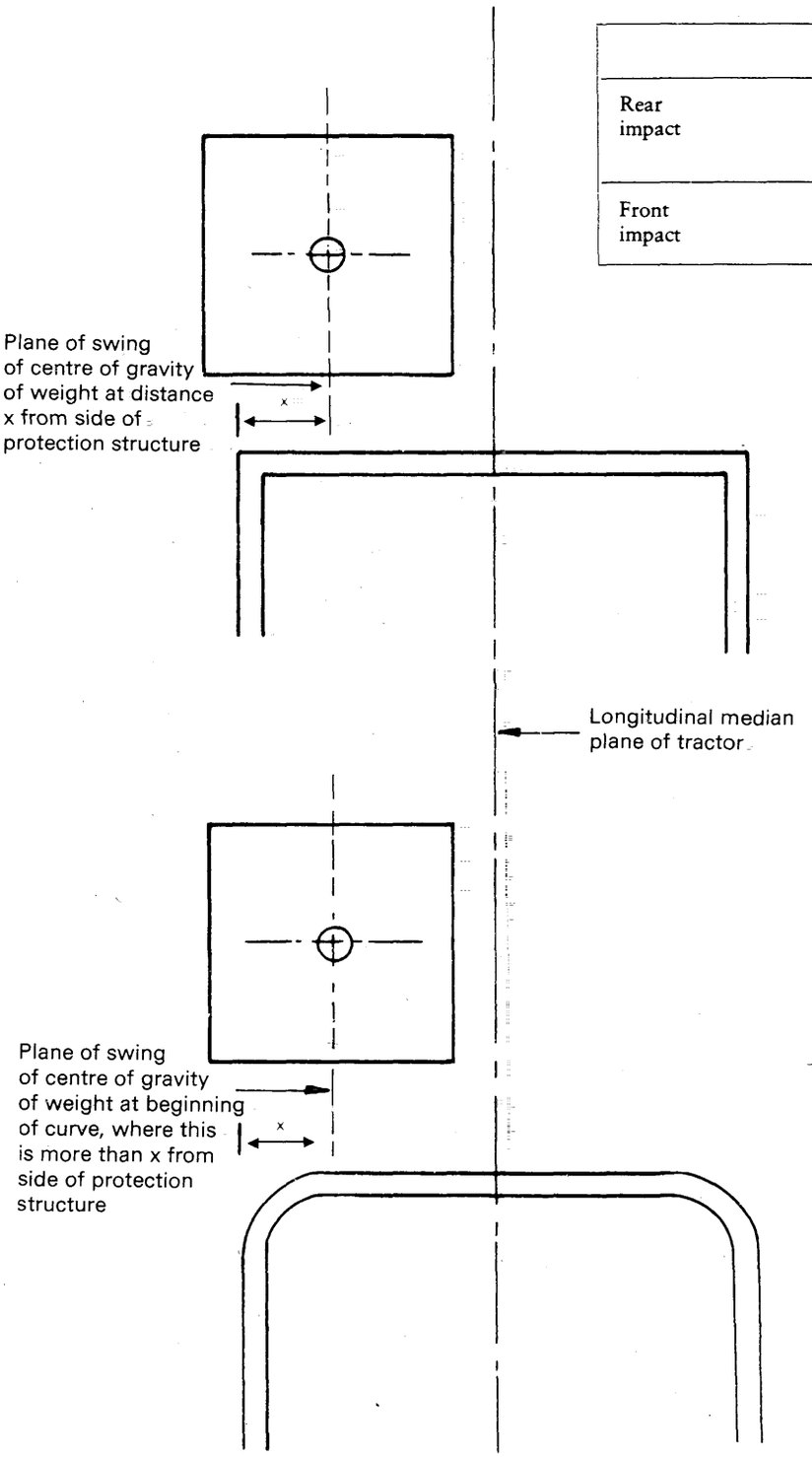


Fig. 8

Crushing test

Note:

The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.



	Value of x
Rear impact	One sixth of width of top of protection structure (see 1.1.1 of Annex III A or III B
Front impact	80 mm (see 1.2.1 of Annex III A or III B

Fig. 9

Plan view of protection structure and weight showing location of plane of swing in front and rear impact tests

Note:

Weight shown on left side of median plane. For each test, the sides on which front and rear impacts are struck and determined in 3.1.4 of Annex II.

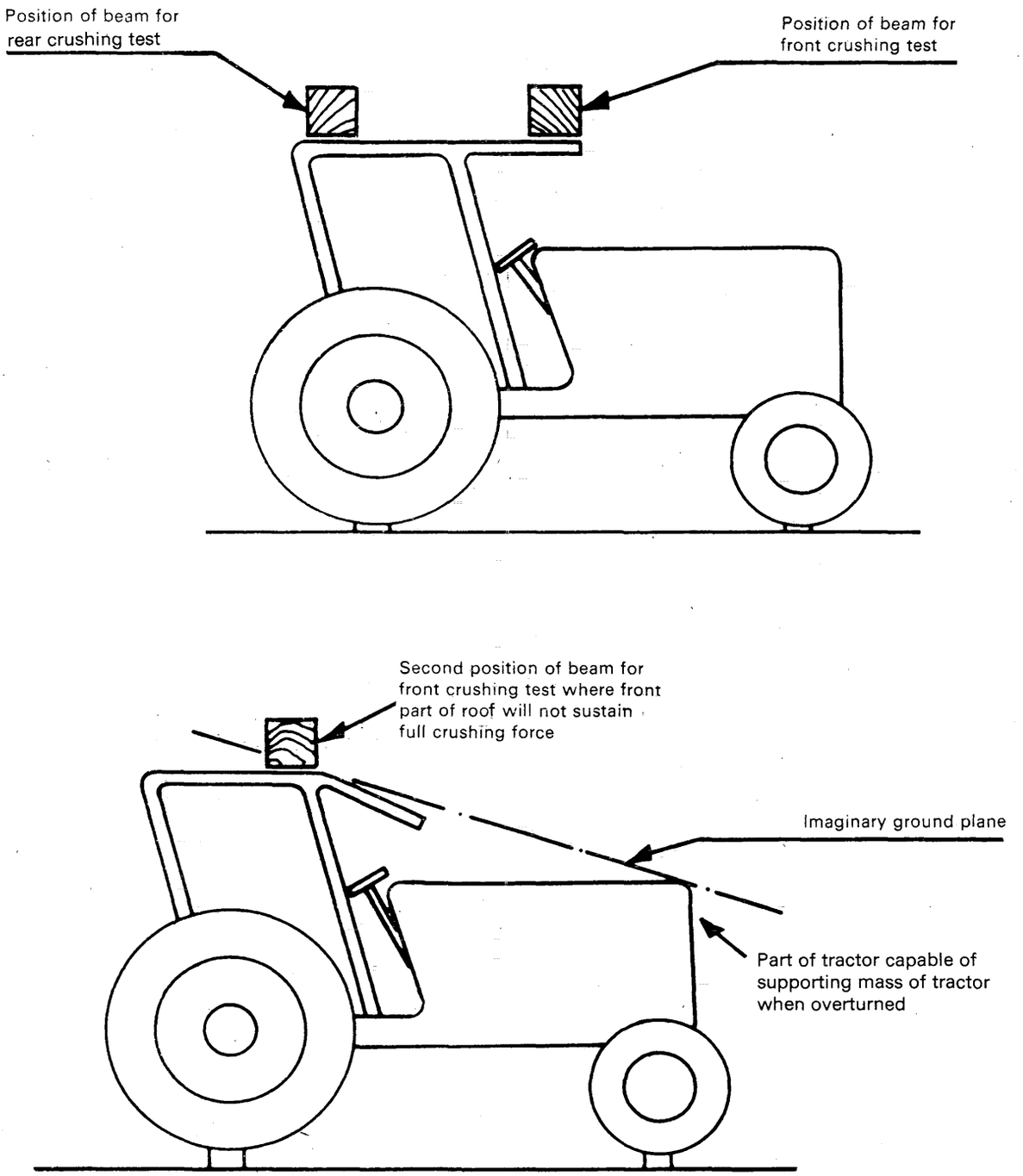


Fig. 10

Position of beam in crushing tests

Note:

The configuration of the roll-over protection structure shown is solely for the purpose of illustration and for dimensional reference. It does not purport to denote design requirements.

ANNEX V

MODEL

REPORT RELATING TO THE EEC COMPONENT TYPE-APPROVAL TEST OF A ROLL-OVER PROTECTION STRUCTURE (SAFETY FRAME OR CAB) WITH REGARD TO ITS STRENGTH AS WELL AS TO THE STRENGTH OF ITS ATTACHMENT TO THE TRACTOR

Protection structure	
Make	
Type	
Tractor make	
Tractor type	
Test method	I/II (1)

Identification of test station

EEC component type-approval No .....

1. Trade mark or name of protection structure .....
.....

2. Name and address of manufacturer of tractor or protection structure .....
.....

3. If applicable, name and address of tractor or protection structure manufacturer's authorized representative .....
.....

4. **Specifications of tractor on which the tests are carried out**

4.1. Trade mark or name .....

4.2. Type and commercial description .....

4.3. Serial number .....

4.4. Mass of unballasted tractor with roll-over protection structure fitted, without driver .....kg

4.5. Wheelbase/moment of inertia (1) ..... mm / kg/m² (1)

4.6. Tyre sizes: front .....
rear .....

5. **Extension of EEC component type-approval for other tractor types**

5.1. Trade mark or name .....

(1) Delete where inapplicable.

5.2. Type and commercial description .....

5.3. Mass of unballasted tractor, with roll-over protection structure fitted, without driver.....kg

5.4. Wheelbase/moment of inertia (1) ..... mm / kg/m² (1)

5.5. Tyre sizes: front .....

rear .....

6. **Specifications of roll-over protection structure**

6.1. General arrangement drawing of both the roll-over protection structure and its attachment to the tractor

6.2. Photographs from side and rear showing mounting details

6.3. Brief description of roll-over protection structure including type of construction, details of mounting on the tractor, details of cladding, means of access and escape, details of interior padding, features to prevent continous rolling and details of heating and ventilation

6.4. Dimensions

6.4.1. Height of roof members above the loaded tractor seat above the seat reference point (2) ..... mm

6.4.2. Height of roof members above the tractor foot platform ..... mm

6.4.3. Interior with of the roll-over protection structure at 950 mm above the loaded seat/at 900 mm above the seat reference point (2) ..... mm

6.4.4. Interior width of the roll-over protection structure at a point above the seat at the height of the centre of the steering wheel ..... mm

6.4.5. Distance from the centre of steering wheel to the right-hand side of roll-over protection structure ..... mm

6.4.6. Distance from the centre of the steering wheel to the left-hand side of roll-over protection structure ..... mm

6.4.7. Minimum distance from the steering wheel rim to the roll-over protection structure.....mm

6.4.8. Width of the doorways:

at the top .....mm

in the middle ..... mm

at the bottom .....mm

6.4.9. Height of the doorways:

above foot platform ..... mm

(1) Delete where inapplicable.
(2) According to the test method used.

above highest mounting step ..... mm

above lowest mounting step .....mm

6.4.10. Overall height of the tractor with the roll-over protection structure fitted ..... mm

6.4.11. Overall width of the roll-over protection structure ..... mm

6.4.12. Horizontal distance to the rear of the protection structure from the back of the loaded seat at a height of 950 mm/from the seat reference point at a height of 900 mm (1) .....

..... mm

6.5. Details and quality of materials used, standards used .....

.....

Main frame .....(material and dimensions)

Mountings ..... (material and dimensions)

Cladding ..... (material and dimensions)

Roof .....(material and dimensions)

Interior padding .....(material and dimensions)

Assembly and mounting bolts .....(grade and dimensions)

7. Test results

7.1. Impact and crushing tests

Impact tests were made to the left/right-hand (2) rear and to the right/left-hand (2) front and right/left-hand side (2). The reference mass used for calculating impact energies and crushing forces was .....kg

The test requirements concerning fractures or cracks, maximum instantaneous deflection and the zone of clearance were satisfactorily fulfilled

7.2. Deflection measured after the tests

Permanent deflection:

rear: left-hand ..... mm

right-hand .....mm

front: left-hand ..... mm

right-hand .....mm

side sideways:

front .....mm

rear ..... mm

top downwards:

front..... mm

rear ..... mm

(1) According to the test method used.
(2) Delete where inapplicable.

Difference between maximum momentary and residual deflection during sideways impact test ..... mm

8. Report number .....

9. Report date .....

10. Signature .....

ANNEX VI

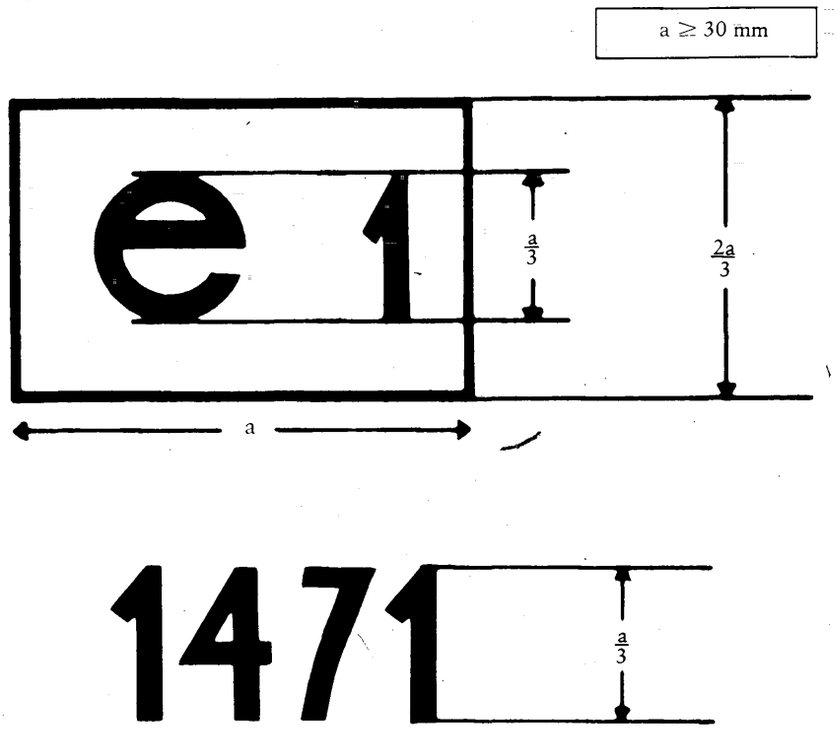
MARKS

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

1 for Germany,
2 for France,
3 for Italy,
4 for the Netherlands,
6 for Belgium,
11 for the United Kingdom,
13 for Luxembourg,
DK for Denmark,
IRL for Ireland.

It must also include in the vicinity of the rectangle the EEC component type-approval number which corresponds to the number of the EEC component type-approval certificate issued with regard to the strength of the type of roll-over protection structure and its attachment to the tractor.

Example of an EEC component type-approval mark



The roll-over protection structure bearing the EEC component type-approval mark shown above is a structure for which EEC component type-approval was granted in Germany (e 1) under the number 1471.

ANNEX VII

MODEL

EEC COMPONENT TYPE-APPROVAL CERTIFICATE

Name of competent authority

Notification concerning the granting, refusal, withdrawal or extension of EEC component type-approval with regard to the strength of a roll-over protection structure (safety cab or frame) and to the strength of its attachment to the tractor

EEC component type-approval No .....
..... extension (1)

1. Trade name or mark of protection structure .....
.....

2. Name and address of manufacturer of protection structure .....
.....

3. If applicable, name and address of authorized representative of manufacturer of protection structure .....

4. Trade mark or name, type and commercial description of tractor for which protection structure is intended .....
.....

5. Extension of EEC component type-approval for the following tractor type(s) .....

5.1. The mass of the unballasted tractor, as defined in 1.3 of Annex II, exceeds/does not exceed (2) the reference mass used for the test by more than 5%.

5.2. The method of attachment and points of attachment are/are not (2) identical.

5.3. All the components likely to serve as supports for the roll-over protection structure are/are not (2) identical.

6. Submitted for EEC component type-approval on .....

7. Test station .....
.....

8. Date and number of the report of the test station .....

9. Date of granting/refusal/withdrawal of EEC component type-approval (2) .....

10. Date of granting/refusal/withdrawal of the extension of EEC component type-approval (2) .....
.....

11. Place .....

12. Date .....

13. The following documents, bearing the component type-approval number shown above, are annexed to this certificate (e.g. report of the test station) .....

14. Remarks, if any .....

15. Signature .....

(1) If applicable, state whether this is the first, second, etc. extension of the original EEC component type-approval.
(2) Delete where inapplicable.

ANNEX VIII

CONDITIONS FOR EEC TYPE-APPROVAL

1. The application for EEC type-approval of a tractor, with regard to the strength of a roll-over protection structure and the strength of its attachment to the tractor shall be submitted by the tractor manufacturer or by his authorized representative.

2. A tractor representative of the tractor type to be approved, on which a protection structure and its attachment, duly approved, are mounted, shall be submitted to the technical services responsible for conducting the type-approval tests.

3. The technical service responsible for conducting the type-approval tests shall check whether the approved type of protection structure is intended to be mounted on the type of tractor for which the type-approval is requested. In particular, it shall ascertain that the attachment of the protection structure corresponds to that which was tested when the EEC component type-approval was granted.

4. The holder of the EEC type-approval may ask for its extension for other types of protection structures.

5. The competent authorities shall grant such extension on the following conditions:

5.1. the new type of roll-over protection structure and its tractor attachment have received EEC component type-approval;

5.2. it is designed to be mounted on the type of tractor for which the extension of the EEC type-approval is requested;

5.3. the attachment of the protection structure to the tractor corresponds to that which was tested when EEC component type-approval was granted.

6. A certificate, of which a model is shown in Annex IX, shall be annexed to the EEC type-approval certificate for each type-approval or type-approval extension which has been granted or refused.

7. If the application for EEC type-approval for a type of tractor is introduced at the same time as the request for EEC component type-approval for a type of roll-over protection structure intended to be mounted on the type of tractor for which EEC type-approval is requested, the checks laid down in 2 and 3 will not be made.

ANNEX IX

MODEL

Name of competent authority

ANNEX TO THE EEC TYPE-APPROVAL CERTIFICATE FOR A TRACTOR TYPE WITH REGARD TO THE STRENGTH OF ROLL-OVER PROTECTION STRUCTURES (SAFETY CAB OR FRAME) AND THE STRENGTH OF THEIR ATTACHMENT TO THE TRACTOR

(Articles 4 (2) and 10 of Council Directive 74/150/EEC of 4 March 1974 on the approximation of the laws of the Member States relating to the type-approval of wheeled agricultural or forestry tractors)

EEC type-approval No .....

..... extension (1)

1. Trade name or mark of tractor .....
2. Tractor type .....
3. Name and address of tractor manufacturer .....
4. If applicable, name and address of manufacturer's authorized representative .....
5. Trade name or mark of roll-over protection structure .....
6. Extension of EEC type-approval for the following type(s) of protection structure .....
7. Tractor submitted for EEC type-approval on .....
8. Technical service responsible for EEC type-approval conformity control .....
9. Date of report issued by that service .....
10. Number of report issued by that service .....
11. EEC type-approval with regard to the strength of the roll-over protection structures and the strength of their attachment to the tractor has been granted/refused (2)
12. The extension of the EEC type-approval with regard to the strength of the roll-over protection structures and the strength of their attachment to tractor has been granted/refused (2)
13. Place .....
14. Date .....
15. Signature .....

(1) If applicable, state whether this is the first, second, etc. extension of the original EEC type-approval.

(2) Delete where inapplicable.

COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to the measures to be taken against the emission of pollutants from diesel engines for use in wheeled agricultural or forestry tractors

(77/537/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 tractors must satisfy pursuant to national laws relate *inter alia* to the emission of pollutants from diesel engines for use in tractors;

Whereas those requirements differ from one Member State to another; whereas it is therefore necessary that all the Member States adopt the same requirements, either in addition to or in place of their existing rules, in order, in particular, to allow the EEC type-approval procedure which was the subject of Council Directive 74/150/EEC of 4 March 1974 on the approximation of the laws of the Member States relating to the type-approval of wheeled agricultural or forestry tractors [3], to be applied in respect of each type of tractor;

Whereas the approximation of national laws relating to tractors entails reciprocal recognition by Member States of the tests carried out by each of them on the basis of common requirements,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. 'Agricultural or forestry tractor' means any motor vehicle, fitted with wheels or endless tracks, having at least two axles, the main function of which lies in its tractive power and which is specially designed to tow, push, carry or power certain tools, machinery or trailers intended for agricultural or forestry use. It may be equipped to carry a load and passengers.

2. This Directive shall apply only to tractors defined in paragraph 1 which are fitted with pneumatic tyres and which have two axles and a maximum design speed between 6 and 25 kilometres per hour.

Article 2

No Member State may refuse to grant a tractor EEC type-approval or national type-approval on the grounds that pollutants are emitted by the diesel engine which drives the tractor if the tractor satisfies the requirements laid down in Annexes I, II, III, IV and VI.

Article 3

No Member State may refuse the registration or may prohibit the sale, entry into service or use of any tractor on the grounds that pollutants are emitted by the diesel engine which drives the tractor if the tractor satisfies the requirements laid down in Annexes I, II, III, IV and VI.

Article 4

The Member State which has granted type-approval shall take the necessary measures to ensure that it is informed of any modification of a part or characteristic

[1] OJ No C 125, 8. 6. 1976, p. 51.
[2] OJ No C 197, 23. 8. 1976, p. 16.
[3] OJ No L 84, 28. 3. 1974, p. 10.

referred to in 2.2 of Annex I. The competent authorities of that State shall determine whether fresh tests should be carried out on the modified tractor and a fresh report drawn up. Where such tests reveal a failure to comply with the requirements of this Directive, the modification shall not be approved.

Article 5

The amendments necessary to adapt the provisions of Annexes I to X to this Directive to take account of technical progress shall be adopted in accordance with the procedure laid down in Article 13 of Directive 74/150/EEC.

Article 6

1. Member States shall bring into force provisions containing 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 7

This Directive is addressed to the Member States.

Done at Luxembourg, 28 June 1977.

For the Council

The President

W. RODGERS

ANNEX I (1)

DEFINITIONS, APPLICATION FOR EEC TYPE-APPROVAL, SYMBOL OF THE CORRECTED ABSORPTION COEFFICIENT, SPECIFICATIONS AND TESTS AND CONFORMITY OF PRODUCTION

(1.)

2. DEFINITIONS

For the purposes of this Directive:

(2.1.)

2.2. *'tractor type as regards the limitation of the emission of pollutants from the engine'* means tractors which do not differ in such essential respects as the tractor and engine characteristics defined in Annex II;

2.3. *'diesel engine'* means an engine which works on the compression-ignition principle;

2.4. *'cold-start device'* means a device which by its operation temporarily increases the amount of fuel supplied to the engine and is intended to facilitate the starting of the engine;

2.5. *'opacimeter'* means an instrument for continuous measurement of the absorption coefficients of the light by the exhaust gases emitted by tractors.

3. APPLICATION FOR EEC TYPE-APPROVAL

3.1. The application for approval must be submitted by the tractor manufacturer or by his duly accredited representative.

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

3.2.1. a description of the engine type including all the particulars referred to in Annex II;

3.2.2. drawings of the combustion chamber and of the upper face of the piston.

3.3. An engine and the equipment prescribed in Annex II to this Regulation, for fitting to the tractor to be approved, shall be submitted to the technical service conducting the approval tests defined in 5. However, if the manufacturer so requests and the technical service conducting the approval tests agrees, a test may be carried out on a tractor representative of the tractor type to be approved.

3a. EEC TYPE-APPROVAL

A certificate conforming to that shown in Annex X shall be attached to the EEC type-approval certificate.

4. SYMBOL OF THE CORRECTED ABSORPTION COEFFICIENT

(4.1.)

(4.2.)

(4.3.)

(1) The text of the Annexes is similar to that of Regulation No 24 of the UN Economic Commission for Europe; in particular the breakdown into items is the same. For this reason, where an item of Regulation No 24 has no counterpart in this Directive, its number is given in brackets as a token entry.

4.4. To every tractor conforming to a tractor type approved under this Regulation there shall be affixed, conspicuously and in a readily accessible place specified in the Annex to the type-approval certificate shown in Annex X, a symbol being a rectangle surrounding a figure expressing in m^{-1} the corrected absorption coefficient obtained, at the time of approval, during the test under free acceleration, and determined at the time of approval by the method described in 3.2 of Annex IV.

4.5. The symbol must be clearly legible and indelible.

4.6. Annex IX gives an example of the symbol.

5. SPECIFICATIONS AND TESTS

5.1. **General**

The components liable to affect the emission of pollutants shall be so designed, constructed and assembled as to enable the tractor in normal use, despite the vibration to which it may be subjected, to comply with the provisions of this Directive.

5.2. **Specifications concerning cold-start devices**

5.2.1. The cold-start device shall be so designed and constructed that it cannot be brought into or kept in action when the engine is running normally.

5.2.2. The provisions of 5.2.1 above shall not apply if at least one of the following conditions is met:

5.2.2.1. the light absorption coefficient of the gases emitted by the engine at steady speeds when measured by the method described in Annex III with the cold-start device operating is within the limits prescribed in Annex VI;

5.2.2.2. keeping the cold-start device in operation causes the engine to stop within a reasonable time.

5.3. **Specifications concerning the emission of pollutants**

5.3.1. The emission of pollutants by the tractor type submitted for approval shall be measured by the two methods described in Annexes III and IV, relating respectively to tests at steady speeds and to tests under free acceleration (1).

5.3.2. The emission of pollutants, as measured by the method described in Annex III, shall not exceed the limits prescribed in Annex VI.

5.3.3. In the case of engines with an exhaust-driven supercharger, the absorption coefficient measured under free acceleration shall not exceed the limit prescribed in Annex VI for the nominal flow value corresponding to the maximum absorption coefficient measured during the tests at steady speeds, plus 0·5 m^{-1}.

5.4. Equivalent measuring instruments shall be allowed. If an instrument other than those described in Annex VII is used, proof of its equivalence for the engine considered shall be required.

(6.)

7. CONFORMITY OF PRODUCTION

7.1. Every tractor in the series must conform, with regard to components affecting the emission of pollutants by the engine, to the tractor type approved.

(7.2.)

(1) A test under free acceleration shall be carried out, particularly in order to provide a reference figure for administrations which use this method to check vehicles in use.

7.3. As a general rule conformity of the tractor with the approved type as regards the emission of pollutants from diesel motors shall be verified on the basis of the description given in the Annex to the EEC approval certificate shown in Annex X. In addition:

7.3.1. where a check is carried out on a vehicle taken from the series, the tests shall be carried out as follows:

7.3.1.1. a tractor which has not been run in shall be subjected to the test under free acceleration described in Annex IV. The vehicle shall be deemed to conform to the approved type if the absorption coefficient determined does not exceed the figure shown in the approval mark by more than 0·5 m^{-1};

7.3.1.2. if the figure determined in the test referred to in 7.3.1.1 above exceeds the figure shown in the approval mark by more than 0·5 m^{-1}, a tractor of the type considered or its engine shall be subjected to the test at steady speeds as described in Annex III. The emission levels shall not exceed the limits prescribed in Annex VI.

(8.)

(9.)

ANNEX II

ESSENTIAL CHARACTERISTICS OF THE TRACTOR AND THE ENGINE AND INFORMATION CONCERNING THE CONDUCT OF TESTS (1)

1. **Description of engine**

1.1. Make .....

1.2. Type .....

1.3. Cycle: four-stroke/two-stroke (2)

1.4. Bore ..... mm

1.5. Stroke ..... mm

1.6. Number of cylinders .....

1.7. Cylinder capacity ..... cm^3

1.8. Compression ratio (3) .....

1.9. System of cooling .....

1.10. Supercharger with/without (2) description of the system .....

.....

1.11. Air filter: drawings, or makes and types .....

2. **Additional anti-smoke devices** (if any, and if not covered by another heading)

Description and diagrams .....

3. **Air intake and fuel feed**

3.1. Description and diagrams of air intakes and their accessories (heating device, intake silencer, etc.)

.....

3.2. Fuel feed

3.2.1. Feed pump

Pressure (3) ..... or characteristic diagram (3) .....

.....

3.2.2. Injector .....

3.2.2.1. Pump

3.2.2.1.1. Make(s) .....

(1) In the case of non-conventional engines and systems, particulars equivalent to those referred to below shall be supplied by the manufacturer.
(2) Delete where inapplicable.
(3) Specify the tolerance.

3.2.2.1.2. Type(s) .....

3.2.2.1.3. Delivery ..... mm^3 per stroke at pump speed of ..... rpm (1)

at full injection; or characteristic diagram (1) (2) .....

Mention the method used: On engine/on pump test bench (2)

3.2.2.1.4. Injection advance .....

3.2.2.1.4.1. Injection advance curve .....

3.2.2.1.4.2. Timing .....

3.2.2.2. Injection piping

3.2.2.2.1. Length .....

3.2.2.2.2. Internal diameter .....

3.2.2.3. Injector(s)

3.2.2.3.1. Make(s) .....

3.2.2.3.2. Type(s) .....

3.2.2.3.3. Starting pressure ..... bar (1)

or characteristic diagram (1) (2) .....

3.2.2.4. Governor

3.2.2.4.1. Make(s) .....

3.2.2.4.2. Type(s) .....

3.2.2.4.3. Speed at which cut-off starts under load: ..... rpm

3.2.2.4.4. Maximum no-load speed: ..... rpm

3.2.2.4.5. Idling speed: ..... rpm

3.3. Cold-start system

3.3.1. Make(s) .....

3.3.2. Type(s) .....

3.3.3. Description .....

4. Valve timing

4.1. Maximum lift of valves and angles of opening and closing in relation to dead centres

.....

4.2. Reference and/or setting ranges (2) .....

(1) Specify the tolerance.
(2) Delete where inapplicable.

5. **Exhaust device**

5.1. Description and diagrams .....

5.2. Mean back-pressure at maximum power: ..... mm water Pascal (Pa)

6. **Transmission**

6.1. Moment of inertia of engine flywheel .....

6.2. Additional moment of inertia with no gear engaged .....

.....

7. **Additional information on test conditions**

7.1. Lubricant used

7.1.1. Make(s) .....

7.1.2. Type(s) .....
(State percentage of oil in mixture if lubricant and fuel mixed)

8. **Engine performances**

8.1. Idling speed ..... rpm (1)

8.2. Engine speed at maximum power ..... rpm (1)

8.3. Power at the six points of measurement referred to in 2.1 of Annex III

8.3.1. Power of the engine measured on the test bench: indicate the standard followed (BSI-CUNA-DIN-GOST-IGM-ISO-SAE, etc.)

8.3.2. Power measured on the wheels of the vehicle

Engine speed (n) rpm	Measured power kW
1.	.....
2.	.....
3.	.....
4.	.....
5.	.....
6.	.....

(1) Specify the tolerance.

ANNEX III

TEST AT STEADY SPEEDS

1. INTRODUCTION

1.1. This Annex describes the method of determining emissions of pollutants at different steady speeds at 80% of the maximum load.

1.2. The test may be carried out either on an engine or on a tractor.

2. MEASUREMENT PRINCIPLE

2.1. The opacity of the exhaust gases produced by the engine shall be measured with the engine running under 80% of the maximum load and at steady speed. Six measurements shall be made at engine speeds spaced out uniformly between that corresponding to maximum power and the higher of the following two engine speeds:

— 55% of the engine speed corresponding to maximum power; and

— 1 000 rpm.

The extreme points of measurement shall be situated at the limits of the interval defined above.

2.2. In the case of diesel engines which are fitted with an air supercharger which can be engaged at will, and in which engines the entry into operation of the air supercharger automatically brings about an increase in the quantity of fuel injected; the measurements shall be made both with and without the supercharger working.

For each engine speed, the result of the measurement shall be the higher of the two figures obtained.

3. TEST CONDITIONS

3.1. **Tractor or engine**

3.1.1. The engine or the tractor shall be submitted in good mechanical condition. The engine shall have been run in.

3.1.2. The engine shall be tested with the equipment described in Annex II.

3.1.3. The settings of the engine shall be those described by the manufacturer and by Annex II.

3.1.4. The exhaust device shall not have any orifice through which the gases emitted by the engine might be diluted.

3.1.5. The engine shall be in the normal working condition prescribed by the manufacturer. In particular, the cooling water and the oil shall each be at the normal temperature indicated by the manufacturer.

3.2. **Fuel**

The fuel shall be the reference fuel whose specifications are given in Annex V.

3.3. **Test laboratory**

3.3.1. The absolute temperature T of the laboratory, expressed in Kelvin, and the atmospheric pressure H, expressed in torr, shall be measured, and the factor F shall be determined by the formula

$$F = \left(\frac{750}{H}\right)^{0{\cdot}65} \times \left(\frac{T}{298}\right)^{0{\cdot}5}$$

3.3.2. For a test to be recognized as valid, the factor F shall be such that $0{\cdot}98 \leq F \leq 1{\cdot}02$.

3.4. **Sampling and measuring apparatus**

The light-absorption coefficient of the exhaust gases shall be measured with an opacimeter satisfying the conditions laid down in Annex VII and installed in conformity with Annex VIII.

4. LIMIT VALUES

4.1. For each of the six engine speeds at which the absorption coefficient is measured pursuant to paragraph 2.1 above, the nominal gas flow G, expressed in litres per second, shall be calculated by means of the following formulae:

— for two-stroke engines $G = \frac{Vn}{60}$

— for four-stroke engines $G = \frac{Vn}{120}$

where:

V is the cylinder capacity of the engine expressed in litres; and n is the engine speed in revolutions per minute.

4.2. For each engine speed the absorption coefficient of the exhaust gases shall not exceed the limit value given in the table in Annex VI. Where the value of the nominal flow is not one of those given in that table, the limit value applicable shall be obtained by interpolation on the principle of proportional parts.

ANNEX IV

TEST UNDER FREE ACCELERATION

1. TEST CONDITIONS

1.1. The test shall be carried out on the tractor or engine which has undergone the test at steady speeds described in Annex III.

1.1.1. If the engine is tested on a bench the test shall be carried out as soon as possible after the test for measurement of opacity at steady speed. In particular, the cooling water and the oil shall be at the normal temperatures indicated by the manufacturer.

1.1.2. If the test is carried out on a stationary tractor, the engine shall first be brought to normal operating condition by a road run. The test shall be carried out as soon as possible after completion of the road run.

1.2. The combustion chamber shall not have been cooled or fouled by a prolonged period of idling preceding the test.

1.3. The test conditions described in 3.1, 3.2 and 3.3 of Annex III shall apply.

1.4. The conditions described in 3.4 of Annex III, with regard to the sampling and measuring apparatus, shall apply.

2. TEST METHODS

2.1. If the test is a bench test, the engine shall be disconnected from the brake, the latter being replaced either by the rotating parts driven when no gear is engaged or by an inertia substantially equivalent to that of the rotating parts.

2.2. If the test is carried out on a tractor, the gear-change control shall be set in the neutral position and the engine in gear.

2.3. With the engine idling, the accelerator control shall be operated quickly, but not violently, so as to obtain maximum delivery from the injection pump. This position shall be maintained until maximum engine speed is reached and the governor comes into action. As soon as this speed is reached the accelerator shall be released until the engine resumes its idling speed and the opacimeter reverts to the corresponding conditions.

2.4. The operation described in 2.3 above shall be repeated not less than six times in order to clear the exhaust system and to allow for any necessary adjustment of the apparatus. The maximum opacity values read at each successive acceleration shall be noted until stabilized values are obtained. No account shall be taken of the values read while the engine is idling after each acceleration. The values read shall be regarded as stabilized when four consecutive readings are situated within a band width of 0·25 m^{-1} and do not form a decreasing sequence. The absorption coefficient X_M to be recorded shall be the arithmetic mean of these four values.

2.5. Engines fitted with an air supercharger shall be subject, where appropriate, to the following special requirements:

2.5.1. In the case of engines with an air supercharger which is coupled with or driven mechanically by the engine and is capable of being disengaged, two complete measurement cycles with preliminary accelerations shall be carried out, the air supercharger being engaged in one case and disengaged in the other. The measurement result recorded shall be the higher of the two results obtained;

2.5.2. In the case of engines with an air supercharger which can be cut out by means of a driver-operated bypass, the test shall be carried out with and without the bypass. The measurement result recorded shall be the higher of the results obtained.

3. DETERMINATION OF THE CORRECTED VALUE OF THE ABSORPTION COEFFICIENT

3.1. Notation

X_M = value of the absorption coefficient under free acceleration measured as described in 2.4 of this Annex;

X_L = corrected value of the absorption coefficient under free acceleration;

S_M = value of the absorption coefficient measured at steady speed (2.1 of Annex III), which is closest to the prescribed limit value corresponding to the same nominal flow;

S_L = value of the absorption coefficient (4.2 of Annex III) for the nominal flow corresponding to the point of measurement which gave the value S_M ;

L = effective length of the light path in the opacimeter.

3.2. When the absorption coefficients are expressed in m^{-1} and the effective length of the light path in metres, the correcte value X_L is given by the smaller of the following two expressions:

$$X'_L = \frac{S_L}{S_M} \times X_M \text{ or } X''_L = X_M + 0{\cdot}5$$

ANNEX V

SPECIFICATIONS OF REFERENCE FUEL PRESCRIBED FOR APPROVAL TESTS AND TO VERIFY CONFORMITY OF PRODUCTION

	Limits and units	Method
Density 15/4 °C	0·830 ± 0·005	ASTM D 1298-67
Distillation		ASTM D 86-67
50 %	min. 245 °C	
90 %	330 ± 10 °C	
Final boiling point	max. 370 °C	
Cetane index	54 ± 3	ASTM D 976-66
Kinematic viscosity at 100 °F	3 ± 0·5 cSt	ASTM D 445-65
Sulphur content	0·4 ± 0·1 % by weight	ASTM D 129-64
Flash-point	min. 55 °C	ASTM D 93-71
Cloud point	max. — 7 °C	ASTM D 2500-66
Aniline point	69 ± 5 °C	ASTM D 611-64
Carbon residue on 10 % bottoms	max. 0·2 % by weight	ASTM D 524-64
Ash content	max. 0·01 % by weight	ASTM D 482-63
Water content	max. 0·05 % by weight	ASTM D 95-70
Copper — corrosion test at 100 °C	max. 1	ASTM D 130-68
Net calorific value	{ 10250 ± 100 kcal/kg 18450 ± 180 BTU/lb }	ASTM D 2-68 (Ap. VI)
Strong acid number	nil mg KOH/g	ASTM D 974-64

Note: The fuel must be based only on straight-run distillates, hydrodesulphurized or not, and must contain no additives.

ANNEX VI

LIMIT VALUES APPLICABLE IN THE TEST AT STEADY SPEEDS

Nominal flow G litres/second	*Absorptions coefficient k* m^{-1}
≦ 42	2·26
45	2·19
50	2·08
55	1·985
60	1·90
65	1·84
70	1·775
75	1·72
80	1·665
85	1·62
90	1·575
95	1·535
100	1·495
105	1·465
110	1·425
115	1·395
120	1·37
125	1·345
130	1·32
135	1·30
140	1·27
145	1·25
150	1·225
155	1·205
160	1·19
165	1·17
170	1·155
175	1·14
180	1·125
185	1·11
190	1·095
195	1·08
≧ 200	1·065

Note: Although the above values are rounded to the nearest 0·01 or 0·005, this does not mean that the measurements need to be made to this degree of accuracy.

ANNEX VII

CHARACTERISTICS OF OPACIMETERS

1. SCOPE

This Annex defines the conditions to be met by opacimeters used in the tests described in Annexes III and IV.

2. BASIC SPECIFICATION FOR OPACIMETERS

2.1. The gas to be measured shall be confined in an enclosure having a non-reflecting internal surface.

2.2. In determining the effective length of the light path through the gas, account shall be taken of the possible influence of devices protecting the light source and the photoelectric cell. This effective length shall be indicated on the instrument.

2.3. The indicating dial of the opacimeter shall have two measuring scales, one in absolute units of light absorption from 0 to ∞ (m^{-1}) and the other linear from 0 to 100; both scales shall range from 0 at total light flux to full scale at complete obscuration.

3. CONSTRUCTION SPECIFICATIONS

3.1. **General**

The design shall be such that under steady-speed operating conditions the smoke chamber is filled with smoke of uniform opacity.

3.2. **Smoke chamber and opacimeter casing**

3.2.1. The impingement on the photoelectric cell of stray light due to internal reflections or diffusion effects shall be reduced to a minimum (e.g. by finishing internal surfaces in matt black and by a suitable general layout).

3.2.2. The optical characteristics shall be such that the combined effect of diffusion and reflection does not exceed one unit on the linear scale when the smoke chamber is filled with smoke having an absorption coefficient near 1·7 m^{-1}.

3.3. **Light source**

The light source shall be an incandescent lamp with a colour temperature in the range 2 800 to 3 250 K.

3.4. **Receiver**

3.4.1. The receiver shall consist of a photoelectric cell with a spectral response curve similar to the photopic curve of the human eye (maximum response in the range 550/570 nm; less than 4% of that maximum response below 430 nm and above 680 nm).

3.4.2. The construction of the electrical circuit, including the indicating dial, shall be such that the current output from the photoelectric cell is a linear function of the intensity of the light received over the operating-temperature range of the photoelectric cell.

3.5. **Measuring scales**

3.5.1. The light-absorption coefficient k shall be calculated by the formula $\Phi = \Phi_o \cdot e^{-kL}$, where L is the effective length of the light path through the gas to be measured, Φ_o the incident flux and Φ the emergent flux.

When the effective length L of a type of opacimeter cannot be assessed directly from its geometry, the effective length L shall be determined

— either by the method described in 4 of this Annex; or

— through correlation with another type of opacimeter for which the effective length is known.

3.5.2. The relationship between the 0 to 100 linear scale and the light absorption coefficient k is given by the formula

$$k = -\frac{1}{L} \log_e \left(1 - \frac{N}{100}\right)$$

where N is a reading on the linear scale and k the corresponding value of the absorption coefficient.

3.5.3. The indicating dial of the opacimeter shall enable an absorption coefficient of 1·7 m^{-1} to be read with an accuracy of 0·025 m^{-1}.

3.6. **Setting and testing of the measuring apparatus**

3.6.1. The electrical circuit of the photoelectric cell and of the indicating dial shall be adjustable so that the pointer can be reset at zero when the light flux passes through the smoke chamber filled with clean air or through a chamber having identical characteristics.

3.6.2. With the lamp switched off and the electrical measuring circuit open or short-circuited, the reading on the absorption-coefficient scale shall be ∞, and it shall remain at ∞ with the measuring circuit reconnected.

3.6.3. An intermediate check shall be carried out by placing in the smoke chamber a screen representing a gas whose known light-absorption coefficient k, measured as described in 3.5.1, is between 1·6 m^{-1} and 1·8 m^{-1}. The value of k must be known to within 0·025 m^{-1}. The check consists in verifying that this value does not differ by more than 0·05 m^{-1} from that read on the opacimeter indicating dial when the screen is introduced between the source of light and the photoelectric cell.

3.7. **Opacimeter response**

3.7.1. The response time of the electrical measuring circuit, being the time necessary for the indicating dial to reach 90% of full-scale deflection on insertion of a screen fully obscuring the photoelectric cell, shall be 0·9 to 1·1 seconds.

3.7.2. The damping of the electrical measuring circuit shall be such that the initial overswing beyond the final steady reading after any momentary variation in input (e.g. the calibration screen) does not exceed 4% of that reading in linear scale units.

3.7.3. The response time of the opacimeter which is due to physical phenomena in the smoke chamber is the time between the beginning of the entry of the gas into the measuring apparatus and the complete filling of the smoke chamber; it shall not exceed 0·4 second.

3.7.4. These provisions shall apply solely to opacimeters used to measure opacity under free acceleration.

3.8. **Pressure of the gas to be measured and of scavenging air**

3.8.1. The pressure of the exhaust gas in the smoke chamber shall not differ by more than 735 Pa from the atmospheric pressure.

3.8.2. The variations in the pressure of the gas to be measured and of the scavenging air shall not cause the absorption coefficient to vary by more than 0·05 m^{-1} in the case of a gas having an absorption coefficient of 1·7 m^{-1}.

3.8.3. The opacimeter shall be equipped with appropriate devices for measuring the pressure in the smoke chamber.

3.8.4. The limits of pressure variation of gas and scavenging air in the smoke chamber shall be indicated by the manufacturer of the apparatus.

3.9. **Temperature of the gas to be measured**

3.9.1. At every point in the smoke chamber the gas temperature at the instant of measurement shall be between 70 °C and a maximum temperature, specified by the opacimeter manufacturer, such that the readings over this temperature range do not vary by more than 0·1 m^{-1} if the chamber is filled with a gas having an absorption coefficient of 1·7 m^{-1}.

3.9.2. The opacimeter shall be equipped with appropriate devices for measuring the temperature in the smoke chamber.

4. EFFECTIVE LENGTH 'L' OF THE OPACIMETER

4.1. General

4.1.1. In some types of opacimeter the gas between the light source and the photoelectric cell, or between transparent parts protecting the source and the photoelectric cell, is not of constant opacity. In such cases the effective length L shall be that of a column of gas of uniform opacity which gives the same absorption of light as that obtained when the gas is admitted in a normal way into the opacimeter.

4.1.2. The effective length of the light path is obtained by comparing the reading N of the opacimeter operating normally with the reading N_o obtained with the opacimeter modified so that the test gas fills a well defined length L_o.

4.1.3. It will be necessary to take comparative readings in quick succession to determine the correction to be made for shifts of zero.

4.2. Method of assessment of L

4.2.1. The test gas shall be exhaust gas of constant opacity or a light-absorptive gas of a gravimetric density similar to that of the exhaust gas.

4.2.2. A column of length L_o of the opacimeter, which can be filled uniformly with the test gases, and the ends of which are substantially at right angles to the light path, shall be accurately determined. This length L_o shall be close to the presumed effective length of the opacimeter.

4.2.3. The mean temperature of the test gas in the smoke chamber shall be measured.

4.2.4. If necessary, an expansion tank of compact design and of sufficient capacity to damp the pulsations may be incorporated in the sampling line as near to the probe as possible. A cooler may also be fitted. The addition of the expansion tank and of the cooler must not unduly disturb the composition of the exhaust gas.

4.2.5. The test for determining the effective length shall consist of passing a sample of test gas alternately through the opacimeter operating normally and through the same apparatus modified as indicated in 4.1.2.

4.2.5.1. The opacimeter readings shall be recorded continuously during the test with a recorder whose response time is equal to or shorter than that of the opacimeter.

4.2.5.2. With the opacimeter operating normally, the reading on the linear scale of opacity is N and that of the mean gas temperature expressed in Kelvin is T.

4.2.5.3. With the known length L_o filled with the same test gas, the reading on the linear scale of opacity is N_o and that of the mean gas temperature expressed in Kelvin is T_o.

4.2.6. The effective length will be

$$L = L_o \frac{T}{T_o} \frac{\log\left(1 - \frac{N}{100}\right)}{\log\left(1 - \frac{N_o}{100}\right)}$$

4.2.7. The test shall be repeated with at least four test gases giving readings evenly spaced between the 20 and 80 on the linear scale.

4.2.8. The effective length L of the opacimeter will be the arithmetic mean of the effective lengths obtained as stated in 4.2.6 with each of the gases.

ANNEX VIII

INSTALLATION AND USE OF THE OPACIMETER

1. SCOPE

This Annex specifies the installation and use of opacimeters for the tests described in Annexes III and IV.

2. SAMPLING OPACIMETER

2.1. **Installation for steady-speed tests**

2.1.1. The ratio of the cross-sectional area of the probe to that of the exhaust pipe shall not be less than 0·05. The back pressure measured in the exhaust pipe at the intake of the probe shall not exceed 735 Pa.

2.1.2. The probe shall be a tube with an open end facing forwards in the axis of the exhaust pipe, or of the extension pipe if one is required. It shall be situated in a section where the distribution of smoke is approximately uniform. To achieve this, the probe shall be placed as far downstream in the exhaust pipe as possible or, if necessary, in an extension pipe so that, if D is the diameter of the exhaust pipe at the outlet, the end of the probe is situated in a straight portion at least 6 D in length upstream of the sampling point and 3 D in length downstream. If an extension pipe is used, no air shall be allowed to enter the joint.

2.1.3. The pressure in the exhaust pipe and the characteristics of the pressure drop in the sampling line shall be such that the probe collects a sample substantially equivalent to that which would be obtained by isokinetic sampling.

2.1.4. If necessary, an expansion tank of compact design and of sufficient capacity to damp the pulsations may be incorporated in the sampling line as near to the probe as possible. A cooler may also be fitted. The addition of the expansion tank and cooler shall not unduly disturb the composition of the exhaust gas.

2.1.5. A butterfly valve or other means of increasing the sampling pressure may be placed in the exhaust pipe least three 3 D downstream from the sampling probe.

2.1.6. The connecting pipes between the probe, the cooling device, the expansion tank (if required) and the opacimeter shall be as short as possible while satisfying the pressure and temperature requirements described in 3.8 and 3.9 of Annex VII. The pipe shall be inclined upwards from the sampling point to the opacimeter, and sharp bends where soot might accumulate shall be avoided. If not embodied in the opacimeter, a bypass valve shall be provided upstream.

2.1.7. A check shall be carried out during the test to ensure that the requirements of 3.8 of Annex VII, concerning pressure and those of 3.9 of Annex VII, concerning the temperature in the measuring chamber, are observed.

2.2. **Installation for tests under free acceleration**

2.2.1. The ratio of the cross-sectional area of the probe to that of the exhaust pipe shall not be less than 0·05. The back pressure measured in the exhaust pipe at the intake of the probe shall not exceed 735 Pa.

2.2.2. The probe shall be a tube with an open end facing forwards in the axis of the exhaust pipe, or of the extension pipe if one is required. It shall be situated in a section where the distribution of smoke is approximately uniform. To achieve this, the probe shall be placed as far down-

stream in the exhaust pipe as possible or, if necessary, in an extension pipe so that, if D is the diameter of the exhaust pipe at the outlet, the end of the probe is situated in a straight portion at least 6 D in length upstream of the sampling point and 3 D in length downstream. If an extension pipe is used, no air shall be allowed to enter the joint.

2.2.3. The sampling system shall be such that at all engine speeds the pressure of the sample at the opacimeter is within the limits specified in 3.8.2 of Annex VII. This may be checked by noting the sample pressure at engine idling and maximum no-load speeds. Depending on the characteristics of the opacimeter, control of sample pressure can be achieved by a fixed restriction or a butterfly valve in the exhaust pipe or extension pipe. Whichever method is used, the back pressure measured in the exhaust pipe at the intake of the probe shall not exceed 735 Pa.

2.2.4. The pipes connecting with the opacimeter shall be as short as possible. The pipe shall be inclined upwards from the sampling point to the opacimeter, and sharp bends where soot might accumulate shall be avoided. A bypass valve may be provided upstream of the opacimeter to isolate it from the exhaust-gas flow when no measurement is being made.

3. FULL-FLOW OPACIMETER

The only general precautions to be observed in steady-speed and free-acceleration tests are the following:

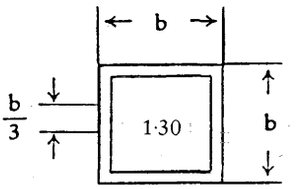
3.1. joints in the connecting pipes between the exhaust pipe and the opacimeter shall not allow air to enter from outside;

3.2. the pipes connecting with the opacimeter shall be as short as possible, as in the case of sampling opacimeters. The pipe system shall be inclined upwards from the exhaust pipe to the opacimeter, and sharp bends where soot might accumulate shall be avoided. A bypass valve may be provided upstream of the opacimeter to isolate it from the exhaust-gas flow when no measurement is being made;

3.3. a cooling system may also be required upstream of the opacimeter.

ANNEX IX

EXAMPLE OF THE SYMBOL OF THE CORRECTED ABSORPTION COEFFICIENT



Minimum dimensions b = 5·6 mm

The above symbol shows that the corrected absorption coefficient is 1·30 m^{-1}.

ANNEX X

Name of administration

ANNEX TO THE EEC TYPE-APPROVAL CERTIFICATE ON THE EMISSION OF GASEOUS POLLUTANTS BY DIESEL ENGINES

(Articles 4 (2) and 10 of Council Directive 74/150/EEC of 4 March 1974 on the approximation of the laws of the Member States relating to the type-approval of agricultural tractors and machinery)

EEC type-approval No (1) .....

Registered No (1) .....

1. Trade name or mark of the vehicle .....

2. Vehicle type .....

3. Manufacturer's name and address .....

.....

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

.....

5. Emission levels

5.1. At steady speeds

Engine speed (rpm)	Nominal flow G (litres/second)	Limit absorption values (m^{-1})	Measured absorption values (m^{-1})
1.	.....	.....	.....
2.	.....	.....	.....
3.	.....	.....	.....
4.	.....	.....	.....
5.	.....	.....	.....
6.	.....	.....	.....

5.2. Under free acceleration

5.2.1. Measured absorption value..... m^{-1}

(1) Delete where inapplicable.

5.2.2. Corrected absorption value..... m^{-1}

6. Make and type of the opacimeter .....

7. Engine submitted for approval tests on .....

8. Technical service conducting approval tests .....

.....

9. Date of test report issued by that service .....

10. Number of test report issued by that service .....

11. Approval granted/refused (1) .....

12. Site of approval mark on the vehicle .....

13. Place .....

14. Date .....

15. Signature .....

16. The following documents, bearing the approval number shown above, are annexed in communication:

one copy of Annex II duly completed together with the drawings and diagrams referred to

..... photograph(s) of the engine.

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1) Delete where inapplicable.

COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to rear fog lamps for motor vehicles and their trailers

(77/538/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 their rear fog lamps;

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 rules, 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 introduced in respect of each type of vehicle;

Whereas in Directive 76/756/EEC [4], the Council laid down the common requirements for the installation of lighting and light-signalling devices on motor vehicles and their trailers;

Whereas a harmonized component type-approval procedure for rear fog lamps makes it possible for each Member State to check compliance with the common construction 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 rear fog lamp; whereas the placing of an EEC component type-approval mark on all rear fog lamps manufactured in conformity with the approved type obviates any need for technical checks on these rear fog lamps in the other Member States;

Whereas it is desirable to draft the technical requirements so that they have the same aim as the work being carried out on the subject in the UN Economic Commission for Europe;

Whereas the approximation of national laws relating to motor vehicles entails reciprocal recognition by Member States of the tests 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 rear fog lamp which satisfies the construction and testing requirements laid down in Annexes 0, II and III.

2. The Member State which has granted EEC component type-approval shall take the measures required in order to verify that production models conform to the approved type, in so far as this is necessary and if need be in cooperation with the competent authorities in the other Member States. Such verification shall be limited to spot checks.

Article 2

Member States shall for each type of rear fog lamp which they approve pursuant to Article 1, issue to the manufacturer, or to his authorized representative, an EEC component type-approval mark conforming to the model shown in Annex II.

Member States shall take all appropriate measures to prevent the use of marks liable to create confusion be-

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[1] OJ No C 118, 16. 5. 1977, p. 29.
[2] OJ No C 114, 11. 5. 1977, p. 2.
[3] OJ No L 42, 23. 2. 1970, p. 1.
[4] OJ No L 262, 27. 9. 1976, p. 1.

tween rear fog lamps 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 rear fog lamps on grounds relating to their construction 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 rear fog lamps 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 the competent authorities of the other Member States a copy of the component type-approval certificates, an example of which is given in Annex I, completed for each type of rear fog lamp which they approve or refuse to approve.

Article 5

1. If the Member State which has granted EEC component type-approval finds that a number of rear fog lamps 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 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 Member States shall inform each other within one month of any withdrawal of EEC component type-approval, and of the reasons for such a measure.

Article 6

Any decision taken pursuant to the provisions adopted in implementation of this Directive, to refuse or withdraw EEC component type-approval for a rear fog lamp or prohibit its placing on the market or use shall set out in detail the reasons on which it is based. Such decision 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 of any vehicle on grounds relating to its rear fog lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

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 rear fog lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

Article 9

For the purposes of this Directive, 'vehicle' means any motor vehicle intended for use on the road, with or without bodywork, having at least four wheels and a maximum design speed exceeding 25 km/h, and its trailers, with the exception of vehicles which run on rails, agricultural or forestry tractors and machinery and public works vehicles.

Article 10

Any amendments necessary to adjust the requirements of 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 needed 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.

Done at Luxembourg, 28 June 1977.

For the Council
The President
W. RODGERS

LIST OF ANNEXES

ANNEX 0:	Definitions, general specifications, intensity of light emitted, test procedure, heat resistance test, colour of light emitted, conformity of production
ANNEX I:	Model EEC component type-approval certificate
ANNEX II:	EEC component type-approval and marking requirements
ANNEX III:	Photometric measurements

ANNEX 0

DEFINITIONS, GENERAL SPECIFICATIONS, INTENSITY OF LIGHT EMITTED, TEST PROCEDURE, HEAT RESISTANCE TEST, COLOUR OF LIGHT EMITTED, CONFORMITY OF PRODUCTION

1. DEFINITIONS

1.1. *'Rear fog lamp'* means the lamp used to render the vehicle more readily visible from the rear in dense fog.

1.2. *'Axis of reference'* means the characteristic axis of the light signal, determined by the manufacturer for use as the direction of reference (H = 0°, V = 0°) for photometric measurements and when fitting the lamp on the vehicle.

1.3. *'Centre of reference'* means the intersection of the axis of reference with the exterior light-emitting surface, specified by the manufacturer of the lamp.

1.4. *'Exterior light-emitting surface'*, for a defined direction of observation, means the orthogonal projection of the light-emitting surface on a plane perpendicular to the direction of observation.

1.5. *'Type of rear fog lamp'* means rear fog lamps which do not differ in such essential respects as:

1.5.1. the trade name or mark;

1.5.2. the characteristics of the optical system;

1.5.3. the inclusion of components capable of altering the optical effects by reflection, refraction or absorption;

1.5.4. the type of filament lamp.

2. GENERAL SPECIFICATIONS

2.1. Each sample referred to in 1.2.3 of Annex II shall conform to the specifications set forth in the sections below.

2.2. The rear fog lamps shall be so designed and constructed that under normal conditions of use, notwithstanding any vibration to which they may be subjected during such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Directive.

3. INTENSITY OF LIGHT EMITTED

3.1. The light emitted by each of the two samples referred to in 1.2.3 of Annex II, having met the requirements of 5 below, shall be of not less than the minimum intensity and of not more than the maximum intensity specified below and shall be measured in relation to the axis of reference in the directions shown below (expressed in degrees from the axis of reference).

3.2. The intensity along the H and V axes, between 10° to the left and 10° to the right and between 5° up and 5° down, shall not be less than 150 cd. The intensity between the axes shall not be less than 75 cd.

3.3. The intensity of the light emitted in all directions in which the light can be observed shall not exceed 300 cd.

3.4. The exterior light-emitting surface in the direction of the reference axis shall not exceed 140 cm^2.

3.5. Annex III gives particulars of the measurement methods to be used.

4. TEST PROCEDURE

All measurements shall be carried out with a colourless standard filament lamp of the type recommended for the rear fog lamp and so regulated as to produce the normal luminous flux prescribed for this type of lamp.

5. HEAT RESISTANCE TEST

5.1. The lamp shall be subjected to a one-hour test of continuous operation following a warm-up period of 20 minutes. The ambient temperature shall be 23 ± 5 °C. The filament lamp used shall be of the category recommended for the lamp, and shall be supplied with current at a voltage such that it gives the specified average power at the corresponding test voltage.

5.2. Where only the maximum power is specified, the test shall be carried out by regulating the voltage to obtain a power equal to 90% of the specified power. The average or maximum power specified above shall in all cases be chosen from the voltage range of 6, 12 or 24 V at which it reaches the highest value.

5.3. After the lamp has been stabilized at the ambient temperature, no distortion, deformation, cracking or colour modification shall be perceptible.

6. COLOUR OF LIGHT EMITTED

The device must emit a red light. The colour of the light emitted, measured by using a source of light at a colour temperature of 2 854 K, corresponding to illuminant A of the International Commission on Illumination (CIE), must be within the limits of the following trichromatic coordinates:

limit towards yellow: $y \leqq 0{\cdot}335$

limit towards purple: $z \leqq 0{\cdot}008$.

7. CONFORMITY OF PRODUCTION

Every rear fog lamp being an EEC component type-approval mark must conform to the type approved and comply with the photometric conditions specified in 3 and 6. Nevertheless, in the case of a rear fog lamp picked at random from series production, the requirements as to minimum intenstiy of the light emitted (measured with a standard filament lamp as referred to in 4) may be limited in each relevant direction to 80% of the minimum value specified in 3.

ANNEX I

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 for a type of rear fog lamp

EEC component type-approval No .....

1. Type of rear fog lamp .....
2. Type(s) of filament lamp(s) .....
3. Trade name or mark of the rear fog lamp .....
4. Name and address of manufacturer .....
5. If applicable, name and address of manufacturer's authorized representative .....
6. Submitted for EEC component type-approval on .....
7. Technical service conducting EEC component type-approval tests .....
8. Date of report issued by that service .....
9. Number of report issued by that service .....
10. Date of granting/refusal/withdrawal of EEC component type-approval (1) .....
11. Single EEC component type-approval granted on the basis of 3.3 of Annex II for a lighting and light-signalling device comprising several lamps, and in particular .....
12. Date of granting/refusal/withdrawal of single EEC component type-approval (1) .....
13. Place .....
14. Date .....
15. Signature .....
16. The attached drawing No ..... shows the geometrical position in which the rear fog lamp is to be mounted on the vehicle, and the axis of reference and centre of reference of the rear fog lamp.
17. Remarks .....

(1) Delete where inapplicable.

ANNEX II

EEC COMPONENT TYPE-APPROVAL AND MARKING REQUIREMENTS

1. APPLICATION FOR EEC COMPONENT TYPE-APPROVAL

1.1. The application for EEC component type-approval shall be submitted by the holder of the trade name or mark or by his authorized representative.

1.2. For each type of rear fog lamp, the application shall be accompanied by:

1.2.1. a brief technical description stating, in particular, the type(s) of filament lamp(s) recommended, which must comply with the specifications of the International Commission on Illumination (CIE);

1.2.2. drawings, (three copies), in sufficient detail to permit identification of the type of the rear fog lamp and showing, geometrically, the position in which the rear fog lamp is to be mounted on the vehicle, the axis of observation to be taken as the axis of reference in the tests (horizontal angle H = 0°, vertical angle V = 0°), and the point to be taken as the centre of reference in the said tests;

1.2.3. two samples; if the rear fog lamp is such that it can be mounted only on one side of the vehicle, the two samples submitted may be identical and be suitable for mounting only on the right or only on the left side of the vehicle;

1.2.4. an additional sample to be kept by the laboratory for any subsequent verification which may prove necessary.

2. MARKINGS

2.1. The samples of a type of rear fog lamp submitted for EEC component type-approval must bear:

2.1.1. the trade name or mark of the applicant, which must be clearly legible and indelible;

2.1.2. a clearly legible and indelible marking indicating the type(s) of filament lamp(s) recommended;

2.1.3. and incorporate a space large enough to contain the EEC component type-approval mark, including the additional symbols prescribed in 4; this space shall be shown in the drawings mentioned in 1.2.2.

3. EEC COMPONENT TYPE-APPROVAL

3.1. If the two samples submitted in accordance with 1.2.3 meet the requirements of Annexes 0, II and III, EEC component type-approval shall be granted and a component type-approval number assigned.

3.2. This number shall not be assigned to any other type of rear fog lamp.

3.3. Where EEC component type-approval is requested for a type of lighting and light-signalling device comprising a rear fog lamp and other lamps, a single EEC component type-approval mark may be issued provided that the rear fog lamp complies with the requirements of this Directive and that each of the other lamps forming part of the lighting and light-signalling device for which EEC component type-approval is requested, complies with the specific Directive applying to it.

4. MARKS

4.1. Every rear fog lamp conforming to a type approved under this Directive shall bear an EEC component type-approval mark.

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

1 for Germany,
2 for France,
3 for Italy,
4 for the Netherlands,
6 for Belgium,
11 for the United Kingdom,
13 for Luxembourg,
18 for Denmark,
IRL for Ireland.

It must also include the EEC component type-approval number which corresponds to the number of the EEC component type-approval certificate issued for the type of rear fog lamp in question.

4.3. The EEC component type-approval mark shall be supplemented by an additional symbol 'F'.

4.4. The EEC component type-approval number must be placed in any convenient position near the rectangle surrounding the letter 'e'.

4.5. The EEC component type-approval mark and the additional symbol must be affixed to the lens of the lamp, or one of the lenses, in such a way as to be indelible and clearly legible even when the rear fog lamp(s) is (are) fitted on the vehicle.

4.6. An example of the EEC component type-approval mark and the additional symbol are shown in Appendix 1.

4.7. Where a single EEC component type-approval number is issued, as under 3.3, for a type of lighting and light-signalling device comprising a rear fog lamp and other lamps, one EEC component type-approval mark only may be affixed, consisting of:

— a rectangle surrounding the letter 'e' followed by the distinguishing letter(s) or number of the Member State which has granted the EEC component type-approval,

— an EEC component type-approval number,

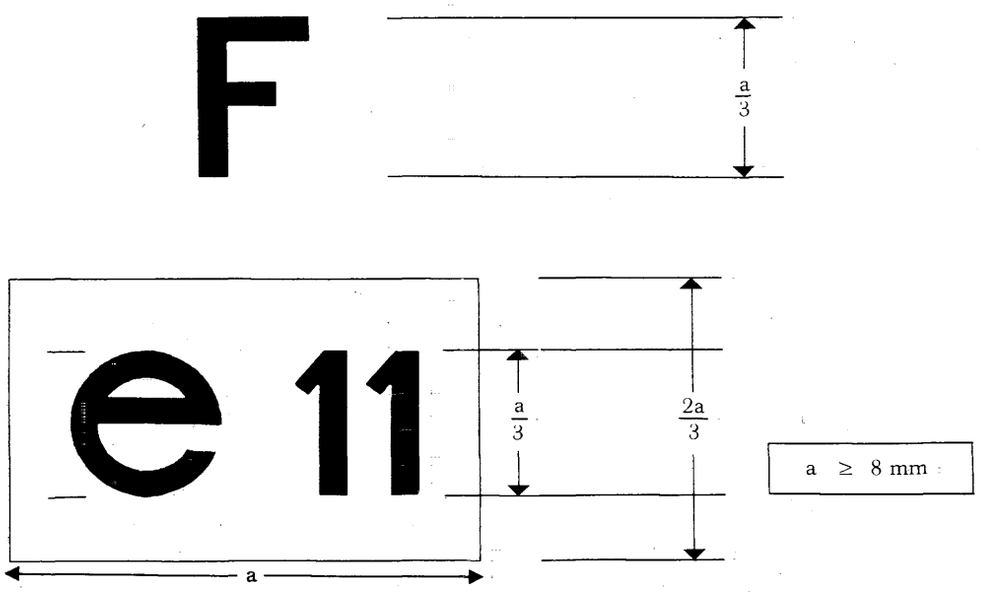
— the additional symbols required by the various Directives under which EEC component type-approval was granted.

4.8. The dimensions of the various components of this mark shall not be less than the largest of the minimum dimensions specified for individual markings by the Directives under which the EEC component type-approval was granted.

4.9. Examples of the component type-approval mark for a device comprising several lamps are given in Appendix 2.

Appendix 1

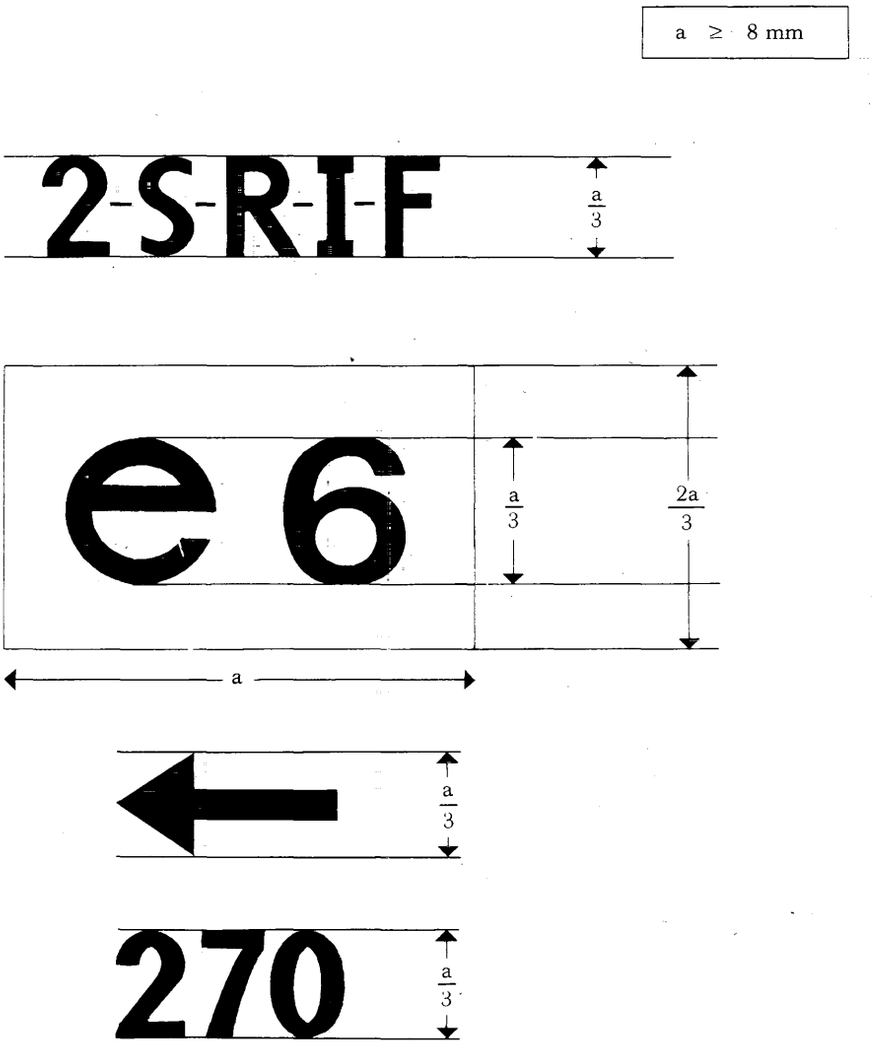
Example of an EEC component type-approval mark



The device bearing the EEC component type-approval mark shown above is a rear fog lamp EEC type-approved in the United Kingdom (e 11) under the number 1471.

Appendix 2

Example of EEC component type-approval marks



The device bearing the EEC component type-approval mark shown above is a device comprising a direction indicator lamp in category 2, a stop lamp, a rear position (side) lamp, a reflex reflector in class I, and a rear fog lamp, EEC type-approved in Belgium (e 6) under the number 270. The arrow shows in what position this device, which can be mounted only on one side of the vehicle, is to be mounted. The arrow points towards the front of the vehicle.

Examples of the markings on an EEC-type-approved device comprising several lamps (reciprocally incorporated)

1. *Separate markings*

Mark Type 2 e 6 270	Mark Type S e 6 270	Mark Type R e 6 270	Mark Type I e 6 270	Mark Type F e 6 270
Direction indicator lamp	Stop lamp	Position (side) lamp	Reflex reflector	Rear fog lamp

2. *Single markings*

Mark Type 2-S-R-I-F e 6 270				

ANNEX III

PHOTOMETRIC MEASUREMENTS

1. During photometric measurements, stray reflections shall be prevented by appropriate masking.

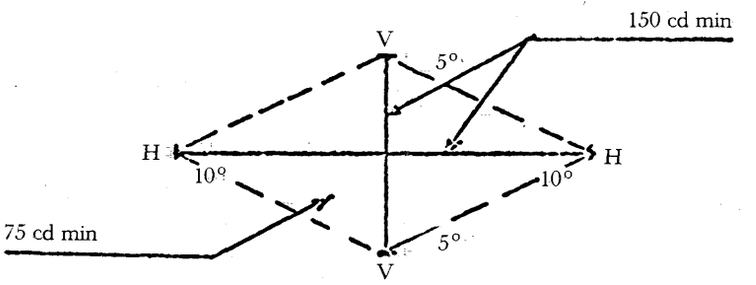
2. The measurements shall be carried out in such a way as to meet the following requirements:

2.1. the distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;

2.2. the measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the lamp is between 10' and 1°;

2.3. the intensity requirement for a particular direction of observation shall be satisfied if that requirement is met in a direction deviating by not more than 15' from the direction of observation.

3. The direction H = 0° and V = 0° corresponds to the axis of reference (which, when the lamp is mounted on the vehicle, must be horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility). It passes through the centre of reference.



3.1. Intensities outside the axes shall be measured within the rhombus described by the extreme directions of measurement (see diagram above).

COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to reversing lamps for motor vehicles and their trailers

(77/539/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 their reversing lamps;

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 rules, 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 introduced in respect of each type of vehicle;

Whereas in Directive 76/756/EEC (4), the Council laid down the common requirements for the installation of lighting and light-signalling devices on motor vehicles and their trailers;

Whereas a harmonized component type-approval procedure for reversing lamps makes it possible for each Member State to check compliance with the common construction 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 reversing lamp; whereas the placing of an EEC component type-approval mark on all reversing lamps manufactured in conformity with the approved type obviates any need for technical checks on these reversing lamps in the other Member States;

Whereas it is desirable to take into account the technical requirements adopted by the UN Economic Commission for Europe in its Regulation No 23 ('Uniform provisions concerning the approval of reversing lights for power-driven vehicles and their trailers') (5) which is annexed to the Agreement of 20 March 1958 concerning the adoption of uniform conditions for approval and reciprocal recognition of approval for motor vehicle equipment and parts;

Whereas the approximation of national laws relating to motor vehicles entails reciprocal recognition by Member States of the tests 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 reversing lamp which satisfies the construction and testing requirements laid down in Annexes 0, II, III and IV.

2. The Member State which has granted EEC component type-approval shall take the measures required in order to verify that production models conform to the approved type, in so far as this is necessary and if need be in cooperation with the competent authorities in the other Member States. Such verification shall be limited to spot checks.

(1) OJ No C 118, 16. 5. 1977, p. 29.
(2) OJ No C 114, 11. 5. 1977, p. 3.
(3) OJ No L 42, 23. 2. 1970, p. 1.
(4) OJ No L 262, 27. 9. 1976, p. 1.
(5) Economic Commission for Europe document E/ECE/324/E/ECE/TRANS/505/Rev. 1/Add 22, 20. 8. 1971.

Article 2

Member States shall for each type of reversing lamp which they approve pursuant to Article 1, issue to the manufacturer, or to his authorized representative, an EEC component type-approval mark conforming to the model shown in Annex II.

Member States shall take all appropriate measures to prevent the use of marks liable to create confusion between reversing lamps 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 reversing lamps on grounds relating to their construction 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 reversing lamps 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 the competent authorities of the other Member States a copy of the component type-approval certificates, an example of which is given in Annex I, completed for each type of reversing lamp which they approve or refuse to approve.

Article 5

1. If the Member State which has granted EEC component type-approval finds that a number of reversing lamps 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 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 Member States shall inform each other within one month of any withdrawal of EEC component type-approval, and of the reasons for such a measure.

Article 6

Any decision taken pursuant to the provisions adopted in implementation of this Directive, to refuse or withdraw EEC component type-approval for a reversing lamp or prohibit its 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 of any vehicle on grounds relating to its reversing lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

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 reversing lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

Article 9

For the purposes of this Directive, 'vehicle' means any motor vehicle intended for use on the road, with or without bodywork, having at least four wheels and a maximum design speed exceeding 25 km/h, and its trailers, with the exception of vehicles which run on rails, agricultural or forestry tractors and machinery and public works vehicles.

Article 10

Any amendments necessary to adjust the requirements of 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 needed 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.

Done at Luxembourg, 28 June 1977.

For the Council

The President

W. RODGERS

LIST OF ANNEXES

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(1) The technical requirements of this Annex are similar to those of Regulation No 23 of the Economic Commission for Europe. In particular, the breakdown into sections is the same. For this reason, where a section in Regulation No 23 has no counterpart in this Directive, its number is given in brackets for the record.

ANNEX 0

DEFINITIONS, GENERAL SPECIFICATIONS, INTENSITY OF LIGHT EMITTED, TEST PROCEDURE, COLOUR OF LIGHT EMITTED, CONFORMITY OF PRODUCTION

1. DEFINITIONS

1.1. *'Reversing lamp'* means the lamp used to illuminate the road to the rear of the vehicle and to warn other road-users that the vehicle is reversing or about to reverse.

1.2. *'Axis of reference'* means the characteristic axis of the light signal, determined by the manufacturer for use as the direction of reference (H = 0°, V = 0°) for photometric measurements and when fitting the lamp on the vehicle.

1.3. *'Centre of reference'* means the intersection of the axis of reference with the exterior light-emitting surface. It is specified by the manufacturer of the lamp.

1.4. *'Type of reversing lamp'* means reversing lamps which do not differ in such essential respects as:

1.4.1. the trade name or mark;

1.4.2. the characteristics of the optical system;

1.4.3. the inclusion of components capable of altering the optical effects by reflection, refraction or absorption;

1.4.4. the type of filament lamp.

(2.)

(3.)

(4.)

5. GENERAL SPECIFICATIONS

5.1. Each of the samples referred to in 1.2.3 of Annex II shall conform to the specifications set forth in the sections below.

5.2. The reversing lamps shall be so designed and constructed that under normal conditions of use, notwithstanding any vibration to which they may be subjected during such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Directive.

6. INTENSITY OF LIGHT EMITTED

6.1. The light emitted by each of the two samples referred to in, 1.2.3 of Annex II shall be of not less than the minimum intensity and of not more than the maximum intensity specified below and shall be measured in relation to the axis of reference in the directions shown below (expressed in degrees from the axis of reference).

6.2. The intensity along the axis of reference shall be not less than 80 cd.

6.3. The intensity of the light emitted in all directions in which the lamp can be observed shall not exceed:

— 300 cd in directions in or above the horizontal plane;

— 600 cd in directions below the horizontal plane.

6.4. In every other direction of measurement shown in Annex III, the luminous intensity shall be of not less than the minima specified in that Annex.

7. TEST PROCEDURE

All measurements shall be carried out with a colourless standard filament lamp of the type recommended for the reversing lamp and so regulated as to produce the normal luminous flux prescribed for this type of lamp.

8. COLOUR OF LIGHT EMITTED

The colour of the light emitted must be white. In case of doubt, the colour may be checked on the basis of the definition of the colour of white light given in Annex IV.

9. CONFORMITY OF PRODUCTION

Every reversing lamp bearing an EEC component type-approval mark must conform to the type approved and comply with the photometric conditions specified in 6 and 8. Nevertheless, in the case of a reversing lamp picked at random from series production, the requirements as to minimum intensity of the light emitted (measured with a standard filament lamp as referred to in 7) may be limited in each relevant direction 80% of the minimum value specified in 6.

(10.)

(11.)

ANNEX I

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 for a type of reversing lamp

EEC component type-approval No .....

1. Type of reversing lamp .....
2. Type(s) of filament lamp(s) .....
3. Trade name or mark of the reversing lamp .....
4. Name and address of manufacturer .....
5. If applicable, name and address of manufacturer's authorized representative .....
   .....
6. Submitted for EEC component type-approval on .....
7. Technical service conducting EEC component type-approval tests .....
   .....
8. Date of report issued by that service .....
9. Number of report issued by that service .....
10. Date of granting/refusal/withdrawal of EEC component type-approval (1) .....
11. Single EEC component type-approval granted on the basis of 3.3 of Annex II for a lighting and light-signalling device comprising several lamps, and in particular: .....
12. Date of granting/refusal/withdrawal of single EEC component type-approval (1) .....
13. Place .....
14. Date .....
15. Signature .....
16. The attached drawing No ..... shows the geometrical position in which the reversing lamp is to be mounted on the vehicle, and the axis of reference and centre of reference of the reversing lamp.
17. Remarks .....
    .....

(1) Delete where inapplicable.

ANNEX II

EEC COMPONENT TYPE-APPROVAL AND MARKING REQUIREMENTS

1. APPLICATION FOR EEC COMPONENT TYPE-APPROVAL

1.1. The application for EEC component type-approval shall be submitted by the holder of the trade name or mark or by his authorized representative.

1.2. For each type of reversing lamp, the application shall be accompanied by:

1.2.1. a brief technical description stating, in particular, the type(s) of filament lamp(s) recommended, which must comply with the specifications of the International Commission on Illumination (CIE)

1.2.2. drawings (three copies), in sufficient detail to permit identification of the type of the reversing lamp and showing geometrically the position in which the reversing lamp is to be mounted on the vehicle, the axis of observation to be taken as the axis of reference in the tests (horizontal angle H = 0°, vertical angle V = 0°), and the point to be taken as the centre of reference in the said tests;

1.2.3. two samples.

2. MARKINGS

2.1. The samples of a type of reversing lamp submitted for EEC component type-approval must bear:

2.1.1. the trade name or mark of the applicant, which must be clearly legible and indelible;

2.1.2. a clearly legible and indelible marking indicating the type(s) of filament lamp(s) recommended;

2.1.3. if necessary, in order to prevent any mistake in mounting the reversing lamp on the vehicle, the word 'TOP' marked horizontally on the uppermost part of the lens;

2.1.4. and incorporate a space large enough to contain the EEC component type-approval mark, including the additional symbols prescribed in 4; this space shall be shown in the drawings mentioned in 1.2.2.

3. EEC COMPONENT TYPE-APPROVAL

3.1. If the two samples submitted in accordance with 1 meet the requirements of Annexes 0, II, III and IV, EEC component type-approval shall be granted and a component type-approval number assigned.

3.2. This number shall not be assigned to any other type of reversing lamp.

3.3. Where EEC component type-approval is requested for a type of lighting and light-signalling device comprising a reversing lamp and other lamps, a single EEC component type-approval mark may be issued provided that the reversing lamp complies with the requirements of this Directive and that each of the other lamps forming part of the lighting and light-signalling device for which EEC component type-approval is requested, complies with the specific Directive applying to it.

4. MARKS

4.1. Every reversing lamp conforming to a type approved under this Directive shall bear an EEC component type-approval mark.

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

1 for Germany,
2 for France,
3 for Italy,
4 for the Netherlands,
6 for Belgium,
11 for the United Kingdom,
13 for Luxembourg,
18 for Denmark,
IRL for Ireland.

It must also include the EEC omponent type-approval number, which corresponds to the number of the EEC component type-approval certificate issued for the type of reversing lamp in question.

4.3. The EEC component type-approval mark shall be supplemented by an additional symbol 'AR'.

4.4. The EEC component type-approval number must be placed in any convenient position near the rectangle surrounding the letter 'e'.

4.5. The EEC component type-approval mark and the additional symbol must be affixed to the lens of the lamp, or one of the lenses, in such a way as to be indelible and clearly legible even when the reversing lamp is fitted on the vehicle.

4.6. An example of the EEC component type-approval mark and the above additional symbol combining the letters A and R, is shown in the Appendix.

4.7. Where a single EEC component type-approval number is issued, as under 3.3, for a type of lighting and light-signalling device comprising a reversing lamp and other lamps, one EEC component type-approval mark only may be affixed, consisting of:

— a rectangle surrounding the letter 'e', followed by the distinguishing number or letter(s) of the Member State which has granted the EEC component type-approval,

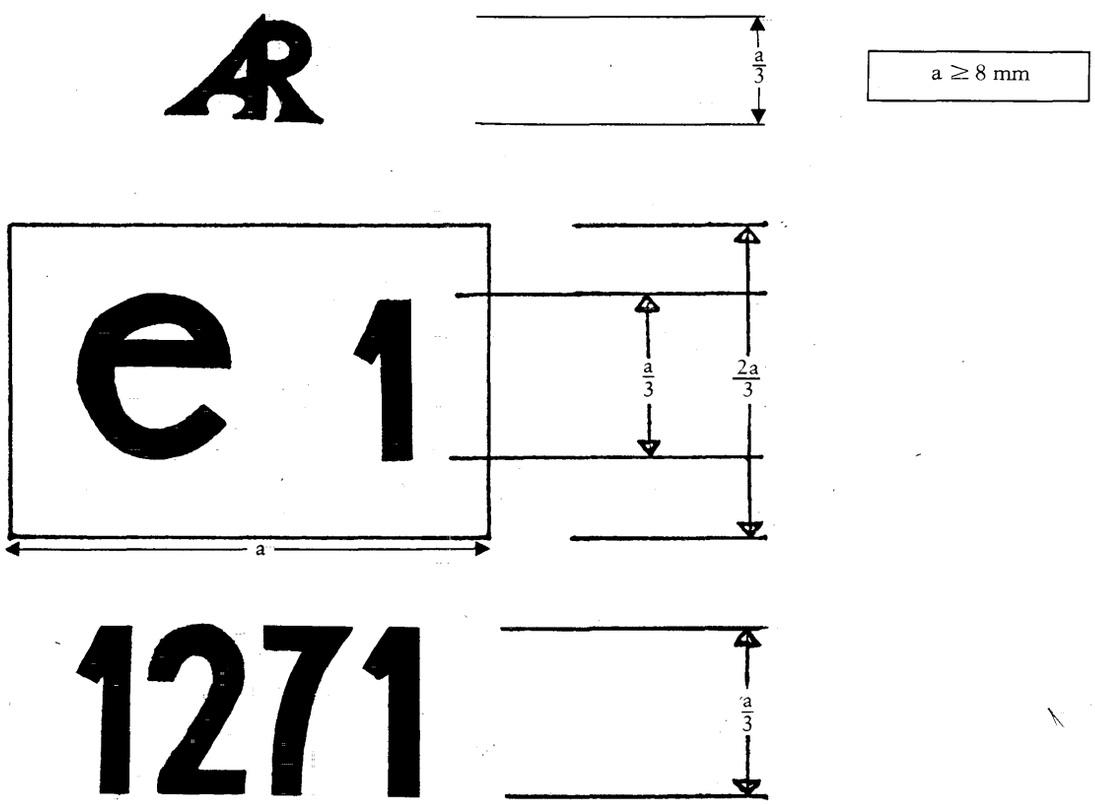
— an EEC component type-approval number,

— the additional symbols required by the various Directives under which EEC component type-approval was granted.

4.8. The dimensions of the various components of this mark shall not be less than the largest of the minimum dimensions specified for individual markings by the Directives under which the EEC component type-approval was granted.

Appendix

Example of an EEC component type-approval mark



The device bearing the EEC component type-approval mark shown above is a reversing lamp EEC type-approved in Germany (e 1) under the number 1271.

ANNEX III

PHOTOMETRIC MEASUREMENTS

1. MEASUREMENT METHODS

1.1. During photometric measurements, stray reflections shall be prevented by appropriate masking.

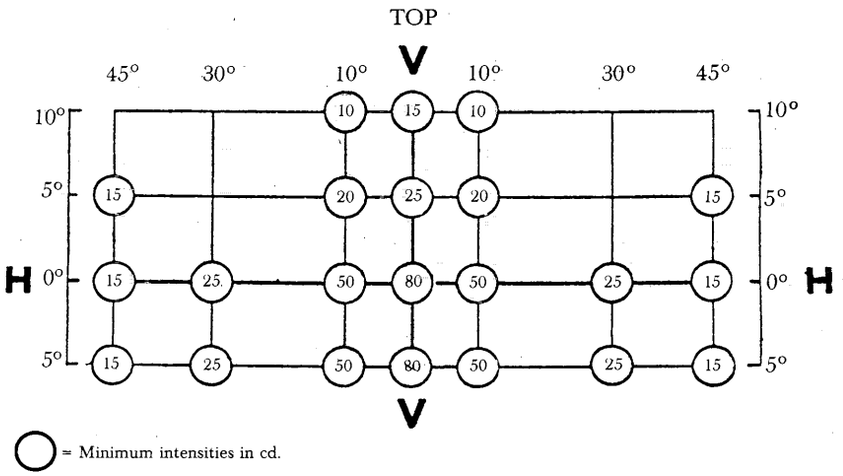
1.2. Should the results of measurements be challenged, measurements shall be carried out in such a way as to meet the following requirements:

1.2.1. the distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;

1.2.2. the measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the lamp is between 10' and1°;

1.2.3. the intensity requirement for a particular direction of observation shall be satisfied if that requirement is met in a direction deviating by not more than 15' from the direction of observation.

2. MEASURING POINTS EXPRESSED IN DEGREES OF ANGLE WITH THE AXIS OF REFERENCE AND VALUES OF THE MINIMUM INTENSITIES OF THE LIGHT EMITTED



2.1. The direction H = 0° and V = 0° corresponds to the axis of reference (which, when the lamp is mounted on the vehicle, must be horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility). It passes through the centre of reference. The values shown in the table give, for the various directions of measurement, the minimum intensities in cd.

2.2. If visual examination of a lamp appears to reveal substantial local variations of intensity, a check shall be made to ensure that no intensity measured between two of the directions of measurement referred to above is below 50% of the lower minimum intensity of the two prescribed for these directions of measurement.

ANNEX IV

COLOUR OF LIGHT EMITTED

TRICHROMATIC COORDINATES

WHITE:

limit towards blue:	$x \geqq 0{\cdot}310$
limit towards yellow:	$x \leqq 0{\cdot}500$
limit towards green:	$y \leqq 0{\cdot}150 + 0{\cdot}640\ x$
limit towards green:	$y \leqq 0{\cdot}440$
limit towards purple:	$y \geqq 0{\cdot}050 + 0{\cdot}750\ x$
limit towards red:	$y \geqq 0{\cdot}382$

For checking these colorimetric characteristics, a source of light at a colour temperature of 2 854 K corresponding to illuminant A of the International Commission on Illumination (CIE) shall be used.

COUNCIL DIRECTIVE

of 28 June 1977

on the approximation of the laws of the Member States relating to parking lamps for motor vehicles

(77/540/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 their parking lamps;

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 rules, 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 introduced in respect of each type of vehicle;

Whereas in Directive 76/756/EEC (4), the Council laid down the common requirements for the installation of lighting and light-signalling devices on motor vehicles and trailers;

Whereas a harmonized component type-approval procedure for parking lamps makes it possible for each Member State to check compliance with the common construction 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 parking lamp; whereas the placing of an EEC component type-approval mark on all parking lamps manufactured in conformity with the approved type obviates any need for technical checks on these parking lamps in the other Member States;

Whereas the approximation of national laws relating to motor vehicles entails reciprocal recognition by Member States of the tests 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 parking lamp which satisfies the construction and testing requirements laid down in Annexes I, II, IV, V and VI.

2. The Member State which has granted EEC component type-approval shall take the measures required in order to verify that production models conform to the approved type, in so far as this is necessary and if need be in cooperation with the competent authorities in the other Member States. Such verification shall be limited to spot checks.

Article 2

Member States shall for each type of parking lamp which they approve pursuant to Article 1 issue to the manufacturer, or to his authorized representative, an EEC component type-approval mark conforming to the model shown in Annex IV.

Member States shall take all appropriate measures to prevent the use of marks liable to create confusion between parking lamps 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 parking lamps on grounds relating to their construction or method of functioning if they bear the EEC component type-approval mark.

(1) OJ No C 118, 16. 5. 1977, p. 29.
(2) OJ No C 114, 11. 5. 1977, p. 4.
(3) OJ No L 42, 23. 2. 1970, p. 1.
(4) OJ No L 262, 27. 9. 1976, p. 1.

2. Nevertheless, a Member State may prohibit the placing on the market of parking lamps bearing theEEC 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 the competent authorities of the other Member States a copy of the component type-approval certificates, an example of which is given in Annex III, completed for each type of parking lamp which they approve or refuse to approve.

Article 5

1. If the Member State which has granted EEC component type-approval finds that a number of parking lamps 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 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 Member States shall inform each other within one month of any withdrawal of EEC component type-approval, and of the reasons for such a measure.

Article 6

Any decision taken pursuant to the provisions adopted in implementation of this Directive, to refuse or withdraw EEC component type-approval for a parking lamp or prohibit its 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 of a vehicle on grounds relating to its parking lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

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 parking lamps if these bear the EEC component type-approval mark and are fitted in accordance with the requirements laid down in Directive 76/756/EEC.

Article 9

For the purposes of this Directive, 'vehicle' means any motor vehicle intended for use on the road, with or without bodywork, having at least four wheels and a maximum design speed exceeding 25 km/h, with the exception of vehicles which run on rails, agricultural or forestry tractors and machinery and public works vehicles.

Article 10

Any amendments necessary to adjust the requirements of 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 needed 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.

Done at Luxembourg, 28 June 1977.

For the Council

The President

W. RODGERS

LIST OF ANNEXES

ANNEX I

DEFINITIONS, GENERAL SPECIFICATIONS, INTENSITY OF LIGHT EMITTED, TEST PROCEDURE, COLOUR OF LIGHT EMITTED, CONFORMITY OF PRODUCTION, NOTE CONCERNING COLOUR

1. DEFINITIONS

1.1. *'Parking lamp'* means the lamp used to draw attention to the presence of a stationary vehicle in a built-up area.

1.2. *'Axis of reference'* (or reference axis) means the characteristic axis of the light signal, determined by the manufacturer for use as the direction of reference (H = 0°, V = 0°) for photometric measurements and when fitting the lamp on the vehicle.

1.3. *'Centre of reference'* means the intersection of the axis of reference with the exterior light-emitting surface specified by the manufacturer of the lamp.

1.4. *'Type of parking lamp'* means parking lamps which do not differ in such essential respects as:

1.4.1. the trade name or mark;

1.4.2. the characteristics of the optical system;

1.4.3. the type of filament lamp.

2. GENERAL SPECIFICATIONS

2.1. Each sample referred to in 1.2.3 of Annex IV shall conform to the specifications set forth in 3 and 5.

2.2. The parking lamps shall be so designed and constructed that under normal conditions of use, notwithstanding any vibration to which they may be subjected during such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Directive.

3. INTENSITY OF LIGHT EMITTED

3.1. In the reference axis, the light emitted by each of the two samples referred to in 1.2.3 of Annex II shall be of not less than the minimum intensity and of not more than the maximum intensity specified below:

		Minimum (cd)	*Maximum (cd)*
3.1.1.	Forward-facing parking lamps	2	60
3.1.2.	Rearward-facing parking lamps	2	30

3.2. Outside the reference axis and within the angular fields defined in the diagrams in Annex II, the intensity of the light emitted by each of the two samples must:

3.2.1. in each direction corresponding to the points in the luminous intensity distribution table reproduced in Annex V be not less than the value shown, in the said table for the direction in question, expressed as a percentage of the minimum specified in 3.1;

3.2.2. in any direction within the space from which the lamp in question is visible, not exceed the maximum specified in 3.1;

3.2.3. however, a luminous intensity of 60 cd shall be permitted for parking lamps incorporated with stop lamps (see 3.1.2) below a plane forming an angle of 5° with and downward from the horizontal plane;

3.2.4. moreover,

3.2.4.1. throughout the fields defined in Annex II, the intensity of the light emitted must be not less than 0·05 cd;

3.2.4.2. the requirements of 2.2 of Annex V on local variations of intensity must be observed.

3.3. The intensities must be measured with the filament lamp(s) continuously alight and, in the case of devices emitting red or amber light, in coloured light.

3.4. Annex V, to which reference is made in 3.2.1 , gives particulars of the methods of measurement to be used.

4. TEST PROCEDURE

All measurements shall be carried out with colourless standard filament lamps of the types recommended for the parking lamp, and so regulated as to produce the normal luminous flux prescribed for those types of lamp.

5. COLOUR OF LIGHT EMITTED

The colour of the light emitted, measured by using a source of light with a colour temperature of 2 854 K, corresponding to illuminant A of the International Commission on Illumination (CIE), must be within the limits of the coordinates prescribed for the colour in question in Annex VI.

6. CONFORMITY OF PRODUCTION

Every parking lamp bearing an EEC component type-approval mark must conform to the type approved and comply with the photometric conditions specified in 3 and 5. Nevertheless, in the case of a parking lamp picked at random from series production, the requirements as to minimum intensity of the light emitted (measured with a standard filament lamp as referred to in 4) shall be limited in each relevant direction to 80% of the minimum values specified in 3.1 and 3.2.

7. NOTE CONCERNING COLOUR

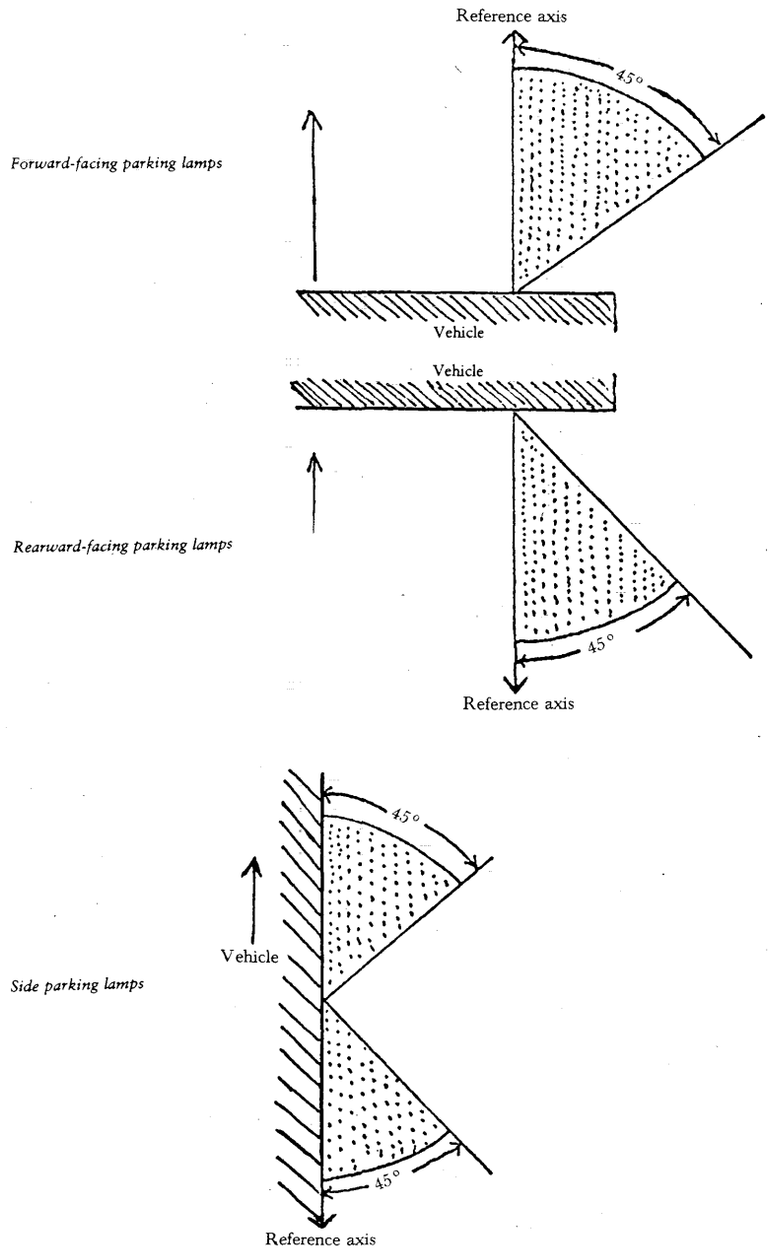
EEC component type-approval shall be granted if the colour emitted by the parking lamp is that laid down in 3.13 of Annex I to Directive 76/756/EEC.

ANNEX II

MINIMUM ANGLES REQUIRED FOR THE LIGHT DISTRIBUTION IN SPACE (1)

In all cases, the minimum vertical angles of light distribution in space are 15° above and 15° below the horizontal.

Minimum horizontal angles of light distribution in space



(1) The angles shown in these diagrams are correct for devices to be mounted on the right side of the vehicle. The arrows point to the front of the vehicles.

ANNEX III

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 for a type of parking lamp

EEC component type-approval No .....

1. Type of parking lamp .....
2. Type(s) of filament lamp(s) .....
3. Colour of light emitted .....
4. Trade name or mark of the parking lamp .....
5. Name and address of manufacturer .....
   .....
6. If applicable, name and address of manufacturer's authorized representative .....
   .....
7. Submitted for EEC component type-approval on .....
8. Technical service conducting EEC component type-approval tests .....
9. Date of report issued by that service .....
10. Number of report issued by that service .....
11. Date of granting/refusal/withdrawal of EEC component type-approval (1) .....
12. Single EEC component type-approval granted on the basis of 3.3 of Annex IV for a lighting and light-signalling device comprising several lamps, and in particular: .....
    .....
13. Date of granting/refusal/withdrawal of single EEC component type-approval (1) .....
14. Place .....
15. Date .....
16. Signature .....
17. The attached drawing No..... shows the geometrical position in which the device is to be mounted on the vehicle and the axis of reference and centre of reference of the parking lamp
18. Remarks .....
    .....

(1) Delete where inapplicable.

ANNEX IV

EEC COMPONENT TYPE-APPROVAL AND MARKING REQUIREMENTS

1. APPLICATION FOR EEC COMPONENT TYPE-APPROVAL

1.1. The application for EEC component type-approval shall be submitted by the holder of the trade name or mark or by his authorized representative.

1.2. For each type of parking lamp the application shall be accompanied by:

1.2.1. a brief technical description stating, in particular, the type(s) of filament lamp(s) recommended, which must comply with the specifications of the International Commission on Illumination (CIE)

1.2.2. drawings (three copies), in sufficient detail to permit identification of the type of the parking lamp and showing geometrically the position in which the lamp is to be mounted on the vehicle, the axis of observation to be taken as the axis of reference in the tests (horizontal angle H = 0°, vertical angle V = 0°), and the point to be taken as the centre of reference in the said tests;

1.2.3. two samples; if the parking lamps are such that they can be mounted only on one side of the vehicle, the two samples submitted may be identical and be suitable for mounting only on the right or only on the left side of the vehicle.

2. MARKINGS

2.1. The samples of a type of parking lamp submitted for EEC component type-approval must bear:

2.1.1. the trade name or mark of the applicant, which must be clearly legible and indelible;

2.1.2. a clearly legible and indelible marking indicating the type(s) of filament lamp(s) recommended;

2.1.3. and incorporate a space large enough to contain the EEC component type-approval mark, including the additional symbols prescribed in 4; this space shall be shown in the drawings mentioned in 1.2.2.

3. EEC COMPONENT TYPE-APPROVAL

3.1. If the two samples submitted in accordance with 1 meet the requirements of Annexes I, II, IV, V and VI, EEC component type-approval shall be granted and a component type-approval number assigned.

3.2. This number shall not be assigned to any other type of parking lamp.

3.3. Where EEC component type-approval is requested for a type of lighting and light-signalling device comprising a parking lamp and other lamps, a single EEC component type-approval mark may be issued provided that the lamp in question complies with the requirements of this Directive and that each of the other lamps forming part of the lighting and light-signalling device for which EEC component type-approval is requested, complies with the specific Directive applying to it.

4. MARKS

4.1. Every parking lamp conforming to a type approved under this Directive shall bear an EEC component type-approval mark.

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

1 for Germany,
2 for France,
3 for Italy,
4 for the Netherlands,
6 for Belgium,
11 for the United Kingdom,
13 for Luxembourg,
18 for Denmark,
IRL for Ireland.

It must also include the EEC component type-approval number which corresponds to the number of the EEC component type-approval certificate issued for the type of parking lamp in question.

4.3. In the following cases the EEC component type-approval mark shall be supplemented by an additional symbol 'P'.

4.4. The EEC component type-approval number must be placed in any convenient position near the rectangle surrounding the letter 'e'.

4.5. The EEC component type-approval mark and the additional symbols must be affixed to the lens of the lamp or one of the lenses in such a way as to be indelible and clearly legible even when the parking lamps are fitted on the vehicle.

4.6. An example of the EEC component type-approval mark and additional symbol is given in the Appendix.

4.7. Where a single EEC component type-approval number is issued, as under 3.3, for a type of lighting and light-signalling device comprising a parking lamp and other lamps, one EEC component type-approval mark only may be affixed, consisting of:

— a rectangle surrounding the letter 'e' followed by the distinguishing number or letter(s) of the Member State which has granted the EEC component type-approval,

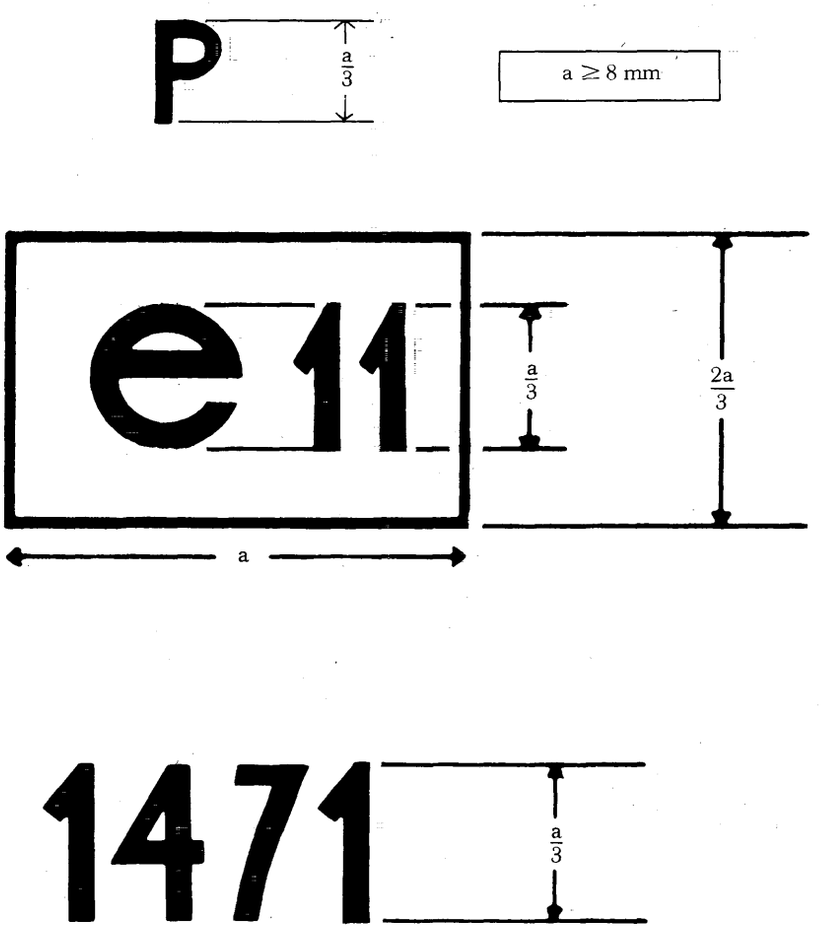
— the EEC component type-approval number,

— the additional symbols required by the various Directives under which EEC component type-approval was granted.

4.8. The dimensions of the various components of this mark shall not be less than the largest of the minimum dimensions specified for individual markings by the Directives under which the EEC component type-approval was granted.

Appendix

Example of an EEC component type-approval mark



The device bearing the EEC component type-approval mark shown above is a parking lamp, EEC type-approved in the United Kingdom (e 11) under the number 1471.

ANNEX V

PHOTOMETRIC MEASUREMENTS

1. MEASUREMENT METHODS

1.1. During photometric measurements, stray reflections shall be prevented by appropriate masking.

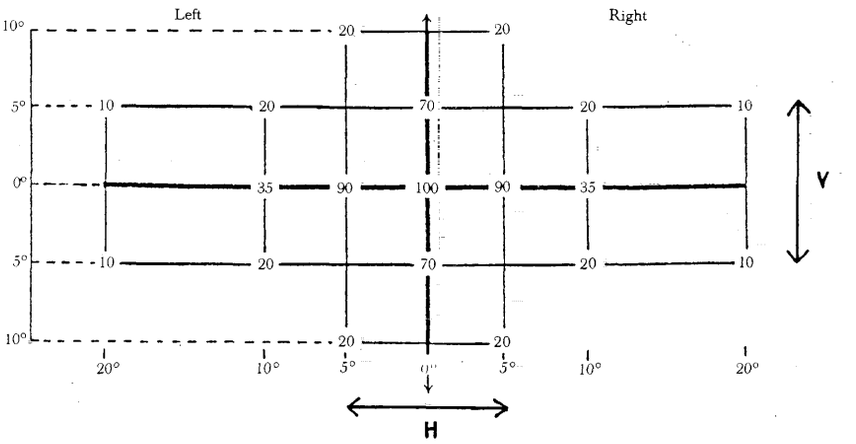
1.2. Should the results of measurements be challenged, measurements shall be carried out in such a way as to meet the following requirements:

1.2.1. the distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;

1.2.2. the measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the lamp is between 10′ and 1°.

1.2.3. the intensity requirement for a particular direction of observation shall be deemed to be satisfied if that requirement is met in a direction deviating by not more than 15′ from the direction of observation.

2. STANDARD LUMINOUS INTENSITY DISTRIBUTION TABLE



2.1. The direction H = 0° and V = 0° corresponds to the reference axis (which, when the lamp is mounted on the vehicle, must be horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility). It passes through the centre of reference. The values shown in the table give, for the various directions of measurement, the minimum intensities as a percentage of the minimum required in the axis for each lamp (in the direction H = 0° and V = 0°).

2.2. If visual examination of a lamp appears to reveal substantial local variations of intensity, a check shall be made to ensure that no intensity measured between two of the directions of measurement referred to in 2.1 is:

2.2.1. for a minimum specification, below 50% of the lower of the two minimum intensities prescribed for these directions of measurement;

2.2.2. for a maximum specification, above the lower of the two maximum intensities prescribed for these directions of measurement, increased by a fraction, expressed as a linear function, of the difference between the intensities prescribed for the said directions of measurement.

ANNEX VI

COLOUR OF LIGHT EMITTED

TRICHROMATIC COORDINATES

RED:	limit towards yellow:	$y \leqq 0{\cdot}335$
	limit towards purple:	$z \leqq 0{\cdot}008$
WHITE:	limit towards blue:	$x \geqq 0{\cdot}310$
	limit towards yellow:	$x \leqq 0{\cdot}500$
	limit towards green:	$y \leqq 0{\cdot}150 + 0{\cdot}640\ x$
	limit towards green:	$y \leqq 0{\cdot}440$
	limit towards purple:	$y \geqq 0{\cdot}050 + 0{\cdot}750\ x$
	limit towards red:	$y \geqq 0{\cdot}382$
AMBER:	limit towards yellow:	$y \leqq 0{\cdot}429$
	limit towards red:	$y \geqq 0{\cdot}398$
	limit towards white:	$z \leqq 0{\cdot}007$

For checking those colorimetric characteristics, a source of light at a colour temperature of 2 854 K corresponding to illuminant A of the International Commission on Illumination (CIE) shall be used.

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;

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

(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.

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 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.

Article 9

For the purposes of this Directive, 'vehicle' means any motor vehicle of category M_1 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.

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.

Done at Luxembourg, 28 June 1977.

For the Council

The President

W. RODGERS

ANNEX I

SCOPE, DEFINITIONS, EEC COMPONENT TYPE-APPROVAL, INSTALLATION REQUIREMENTS

0. SCOPE

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

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;

1.1.3. *'three-point belt'* means any belt assembly which is anchored at three points and is a combination of a lap belt and a diagonal belt;

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. The adjusting device may be either part of the buckle or a retractor;

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;

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);

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,

1.17.3. 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.

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. a technical description in triplicate of the belt type, specifying the straps and rigid parts used and accompanied by appropriate drawings and installation instructions in the case of retractors. 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;

2.1.2.2. five samples of a belt type without a retractor;

2.1.2.3. six samples of a belt type with a retractor;

2.1.2.4. a 10-metre length of each type of strap used in the type of belt.

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.

2.4. **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 plastic parts 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 plastic parts 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. The surface to which this pressure is applied shall have, in the position of actual unlocking:

— 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.

2.4.2.3. The buckle shall be capable of withstanding repeated operation and, before the dynamic test referred to in 2.7.8, shall undergo 500 opening and closing cycles. The springs of closing buckles shall, in addition, be actuated 4 500 times in conditions of normal use.

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.

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:

2.4.5.2.1.1. it shall have locked when the vehicle deceleration reaches a value of 0·45 g;

2.4.5.2.1.2. it shall not lock at strap accelerations, measured in the direction of the extraction, of less than 0·8 g;

2.4.5.2.1.3. it shall not lock when it is tilted to angles of 12° or less in any direction from the installation position specified by its manufacturer;

2.4.5.2.1.4. it shall lock when it is tilted to angles of 27° or more in any direction from the installation position specified by its manufacturer;

2.4.5.2.2. when tested in accordance with 2.7.7.2, an emergency locking retractor with multiple sensitivity, one of which is strap sensitivity, shall, in addition to meeting the above requirements, lock when the strap acceleration is at least 1·5 g, measured in the direction of the extraction;

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.

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 belt assemblies to be tested shall have met the requirements of 2.4.2.3. In the case of safety belts with retractors, the retractor shall have been subjected to the test for durability of the mechanism given in 2.7.7.1, the corrosion test given in 2.7.2 and the test for dust resistance given in 2.7.7.3. During the test, the following requirements shall be met:

2.6.1.2.1. 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;

2.6.1.2.2. the forward displacement of the manikin shall be between 80 and 200 mm at pelvic level in the case of lap belts. In the case of other types of belts, the forward displacement shall be between 80 and 200 mm at pelvic level and between 100 and 300 mm at chest level. These displacements are the displacements in relation to the measurement points shown in Annex VIII, fig. 6.

2.6.1.3. In the case of a restraint system:

2.6.1.3.1. 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;

2.6.1.3.2. in the case of a two-door vehicle, the displacement and locking systems enabling the occupants of the rear seats to leave the vehicle must still be operable by hand after the dynamic test.

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.

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	x	x
Parts sewn to the strap	—	—	x

2.7. Tests

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

2.7.1.1. Two belt assemblies are required for the assembled-belt test, for the buckle-opening test and for the cold impact test.

2.7.1.2. One belt assembly shall be used as a source of samples of belt components for the corrosion and buckle-strength tests.

2.7.1.3. Two belt assemblies are required for the abrasion procedure and the micro-slip test.

2.7.1.4. The additional belt assembly mentioned in 2.1.2.3 shall be used for the corrosion test.

2.7.1.5. 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.

2.7.1.6. The technical service responsible for approval testing shall be entitled to ask for a number of samples in addition to those referred to in 2.1.2.2, 2.1.2.3 and 2.1.2.4.

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 °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 ± 5 °C and a relative humidity of 65 ± 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. The provisions of Recommendation ISO/R 105—1959, 'Test for colour fastness of textiles', as amended by Addendum I (ISO/R 105—1959/A1 — 1963) and Addendum II (ISO/R 105/II — 1963) 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.

2.7.3.2.2. After exposure, 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%. The breaking load shall be determined within five minutes of the sample's removal from the conditioning installation.

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 $1^1/_2$ 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).

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

The angles of both sections of the strap shall be as shown in Annex XII, fig. 2.

The 0·5 daN load shall be permanently applied.

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*

2.7.6.1. The buckle and the adjusting device shall be connected to the tensile-testing apparatus by the parts of the belt assembly to which they are normally attached, and the load shall then build up to 980 daN. However, if the buckle or the adjusting device is part of the attachment, the buckle or adjusting device shall be tested with the attachment, in accordance with 2.7.6.2, except in the case of retractors with a return pulley or guide at the upright. Where a retractor is tested as an adjusting device, the length of strap remaining wound on the reel shall be the length resulting from locking with the strap unwound as close as possible to full length less 450 mm.

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.

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

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 plastic parts 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 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 10 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 $5{\cdot}5 \times 10^5 \pm 0{\cdot}5 \times 10^5$ 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 μm aperture, 104 μm wire diameter: 99 to 100%;

(b) passing through a 105 μm aperture, 64 μm wire diameter: 76 to 86%;

(c) passing through a 75 μm aperture, 52 μm wire diameter: 60 to 70%.

2.7.7.4. Withdrawal and retracting forces

2.7.7.4.1. The withdrawal and retracting forces shall 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, while the strap is being withdrawn or retracted at an approximate speed of 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 date supplied by the manufacturer of the vehicle.

2.7.8.1.1. In the case of belt assemblies forming part of a restraint system, the latter shall be mounted on the part of the vehicle structure to which it is normally fitted, and that part shall be attached to the test trolley in the manner prescribed below.

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 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. The positions of the seats shall be stated in the report. If the seat has a back which is adjustable for inclination, the back shall be locked as specified by the manufacturer or, in the absence of any specification, it shall be locked in such a manner as to form an effective angle as near as possible to 25°.

2.7.8.1.5. For the purpose of assessing the requirements of 2.6.1.3.1, 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.

2.7.8.2. The belt assembly shall be attached to the manikin specified in Annex VIII as follows. A board 25 mm thick shall be placed between the back of the manikin and the seat back. The belt shall be firmly adjusted to the manikin. The board shall then be removed and the manikin so positioned that the whole length of its back is in contact with the seat back. If the buckle is of the eccentric type, it shall lock only through the action of its spring; it shall not be forced or snapped into the locked position. If a metal-to-metal buckle is used, a check shall be made to ensure that the method of coupling the two parts is not capable of reducing the reliability of locking or the strength of the buckle.

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 2.6.1.3.1.

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.

2.7.9.2. The belt assembly shall be detached from the test trolley without the buckle being opened. A straight traction load of 30 daN shall be applied to the buckle. Where the buckle is connected to a rigid part, the force shall be applied while respecting the angle formed by the buckle and the rigid section during the dynamic test. At a speed of 400 mm/min ± 20 mm/min a normal load shall be applied to the geometric centre of the buckle opening button. This load shall be applied along a constant axis. During application of the buckle opening force, the buckle shall be held in place by a rigid support. The normal load referred to above shall not exceed the limit specified in 2.4.2.5. The point of contact of the test equipment shall be shperical in form with a radius of 2·5 mm ± 0·1 mm. It shall have a polished metal surface.

2.7.9.3. The buckle-opening force shall be applied by a spring-balance or another measuring device in the manner and direction which are normal for opening the buckle.

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

2.7.9.5. 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 2.6.1.3.1 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 belt assemblies 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 belt assemblies 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.

2.8.1.4.1. All assemblies incorporating emergency-locking retractors must be checked for compliance with the requirements of 2.4.5.2.1.1, in accordance with the specific instructions contained in 2.4.5.2.3.

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.

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.

3. INSTALLATION REQUIREMENTS

3.1. **Vehicle equipment**

Any vehicle covered by Article 9 shall be equipped with safety belts or restraint systems incorporating the following belt arrangements (with which neither non-locking retractors (1.8.1) nor manually unlocking retractors (1.8.2) can be used):

3.1.1. for front outboard seating positions, three-point safety belts with emergency locking retractors having multiple sensitivity (1.8.4); however, for the passenger seat automatically locking retractors (1.8.3) shall be permitted;

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 windscreen 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;

3.1.3. at rear seating positions, lap-belts or three-point belts, whether or not fitted with retractors;

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

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;

3.2.2.2. when worn correctly, the risk of the strap slipping from the shoulder is reduced to a minimum;

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.

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.

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.

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:

1 for Germany,
2 for France,
3 for Italy,
4 for the Netherlands,
6 for Belgium,
11 for the United Kingdom,
13 for Luxembourg,
18 for Denmark,
IRL for Ireland;

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;

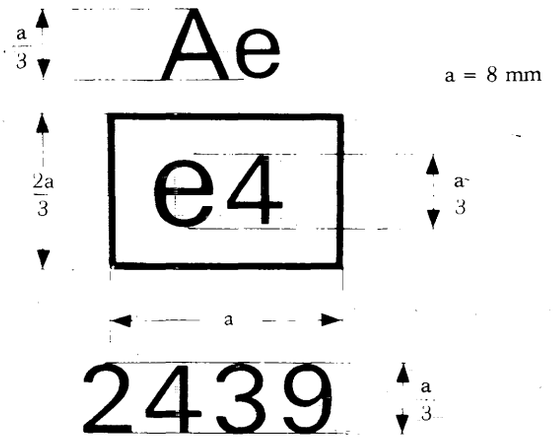
1.1.3.2.2. the letter 'r' in the case of a safety belt fitted with a retractor, followed by the number of the type of retractor used, in accordance with 1.8 of Annex I, and the letter 'm' if the retractor used is an emergency locking retractor with multiple sensitivity.

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.

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.

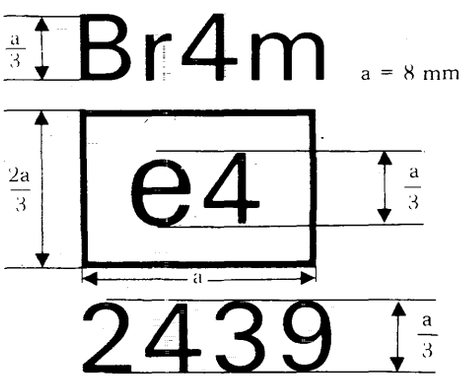
2. DIAGRAMS OF EEC COMPONENT TYPE-APPROVAL MARKS

2.1.



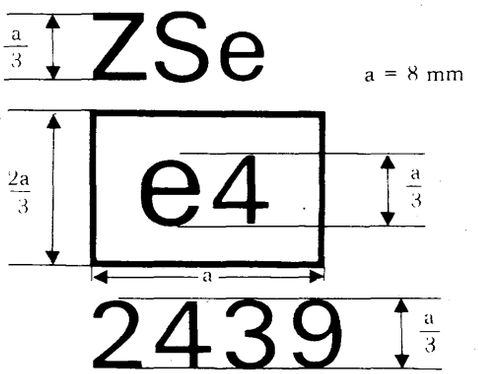
The belt bearing the above EEC component type-approval mark is a three-point belt ('A') fitted with an energy absorber (e) and approved in the Netherlands (e 4) under the number 2439.

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.

2.3.



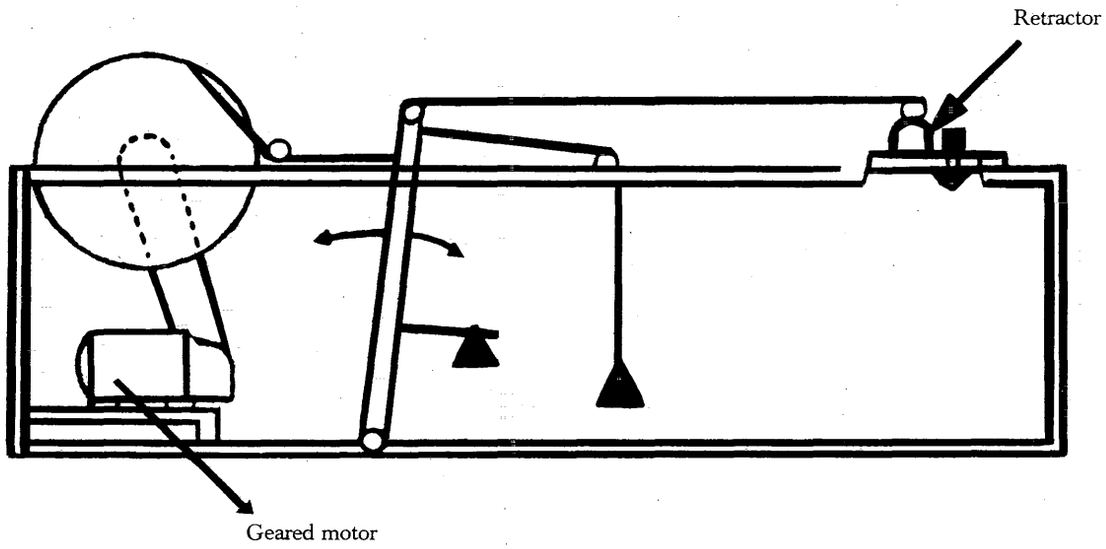
The belt bearing the above EEC component type-approval mark is a special type of belt ('S'), fitted with an energy absorber (e), forming part of a restraint system ('Z') and approved in the Nethelands (e 4) under the number 2439.

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.

ANNEX IV

EXAMPLE OF AN APPARATUS TO TEST DURABILITY OF RETRACTOR MECHANISM



ANNEX V

EXAMPLE OF AN APPARATUS TO TEST LOCKING OF EMERGENCY LOCKING RETRACTORS

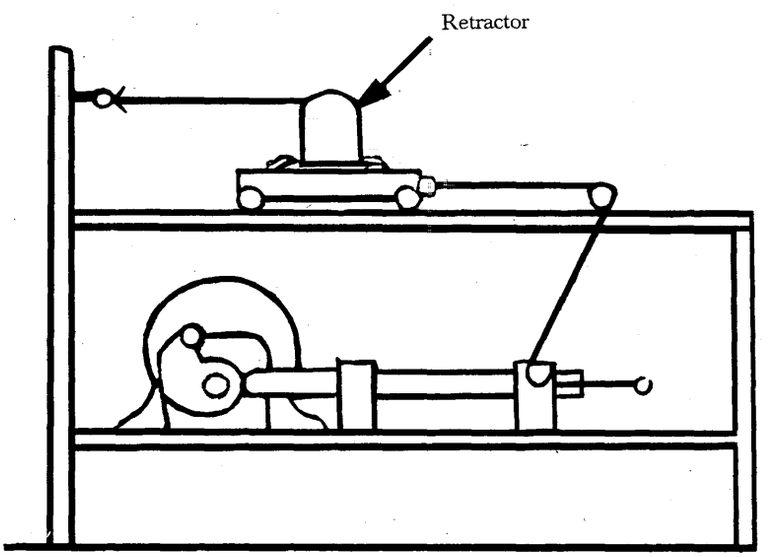
A suitable apparatus is illustrated in the figure and consists of a motor-driven cam, the follower of which is attached by wires to a small trolley mounted on a track. The cam follower incorporates a 'lost motion' device which absorbs any movement should the reel lock before the full stroke of the follower 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.

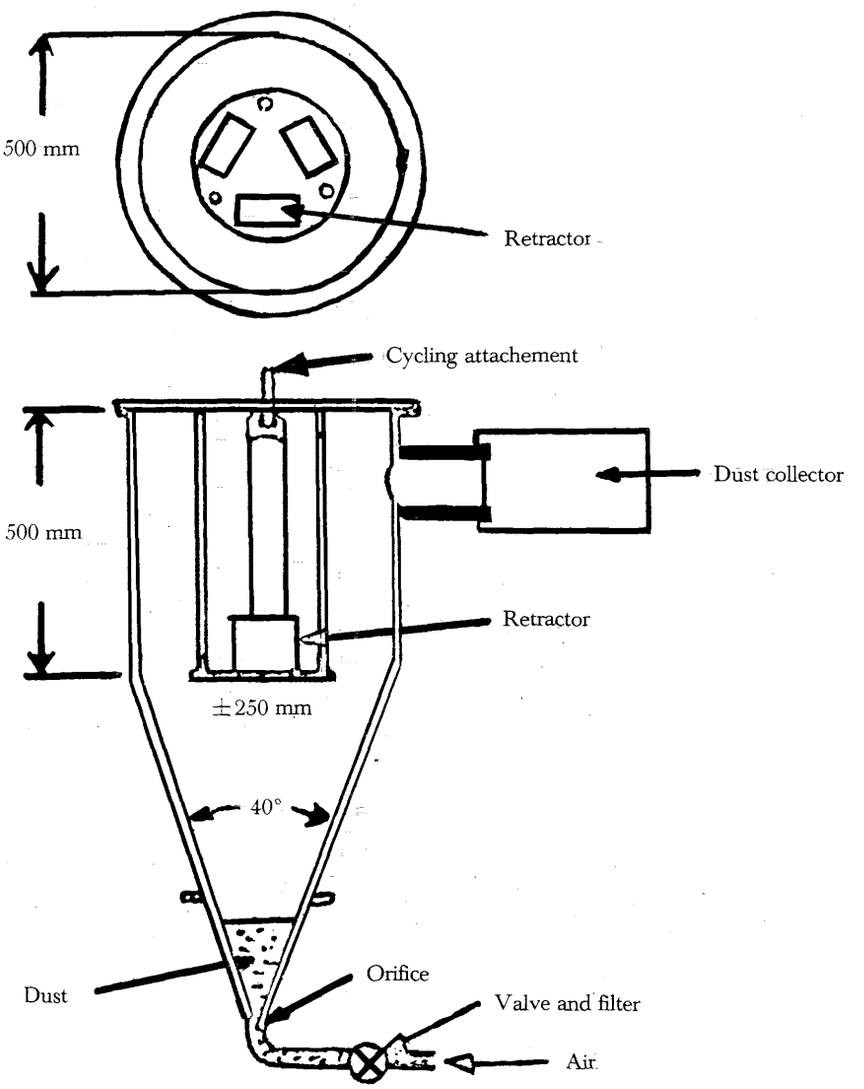
When carrying out the above tests any brackets, etc. supplied by the manufacturer or by his representative shall be incorporated in the test installation to simulate as closely as possible the intended installation in a vehicle.

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.



ANNEX VI

EXAMPLE OF AN APPARATUS FOR DUST RESISTANCE TESTS



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

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.

3. ANCHORAGES

The anchorages shall be positioned as shown in fig. 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 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.

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.

The dimensions of the various parts of this absorber are shown in the diagrams reproduced in figs. 2, 3 and 4. The characteristics of the absorbing material are given in the table below. Immediately before each test the tubes shall be maintained for a minimum of 12 hours at a temperature of between 15 and 30 °C without being used.

The requirements which the stopping device must meet are given in Annex IX. Any other device giving equivalent results can be accepted.

CHARACTERISTICS OF THE ABSORBING MATERIAL

(ASTM method D 735 unless otherwise stated)

Shore hardness A: 95 ± 2

Breaking strength: $R_o \geqq 343$ 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: 1·95 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):

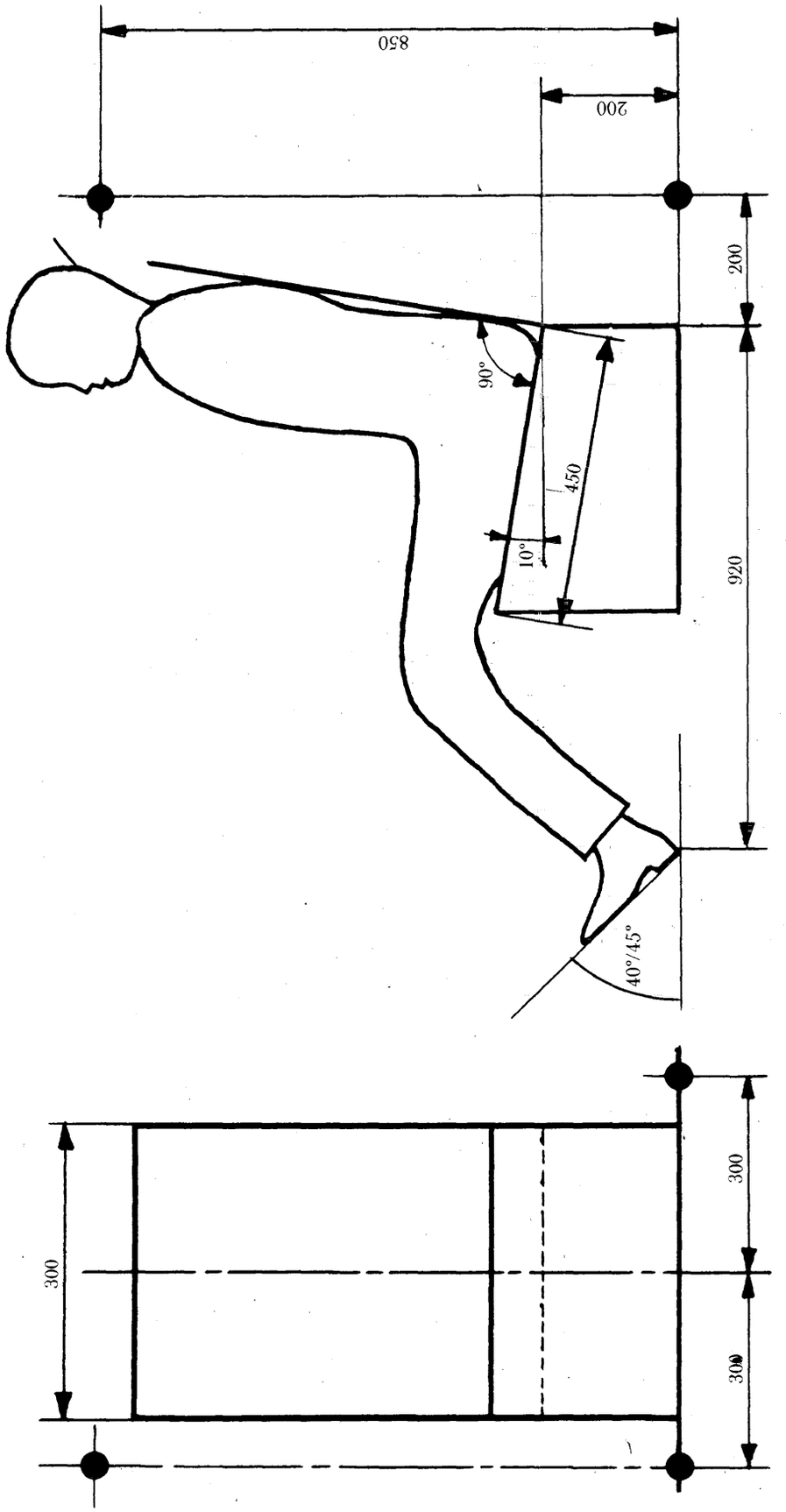
— 70 hours at 100 °C
- shore hardness A: max. variation ± 4
- breaking strength: decrease < 15 % of R_o
- elongation: decrease < 10 % of A_o
- volume: swelling < 5 %

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, tolerance ± 5 mm

Fig. 1

Trolley, seat, anchorages

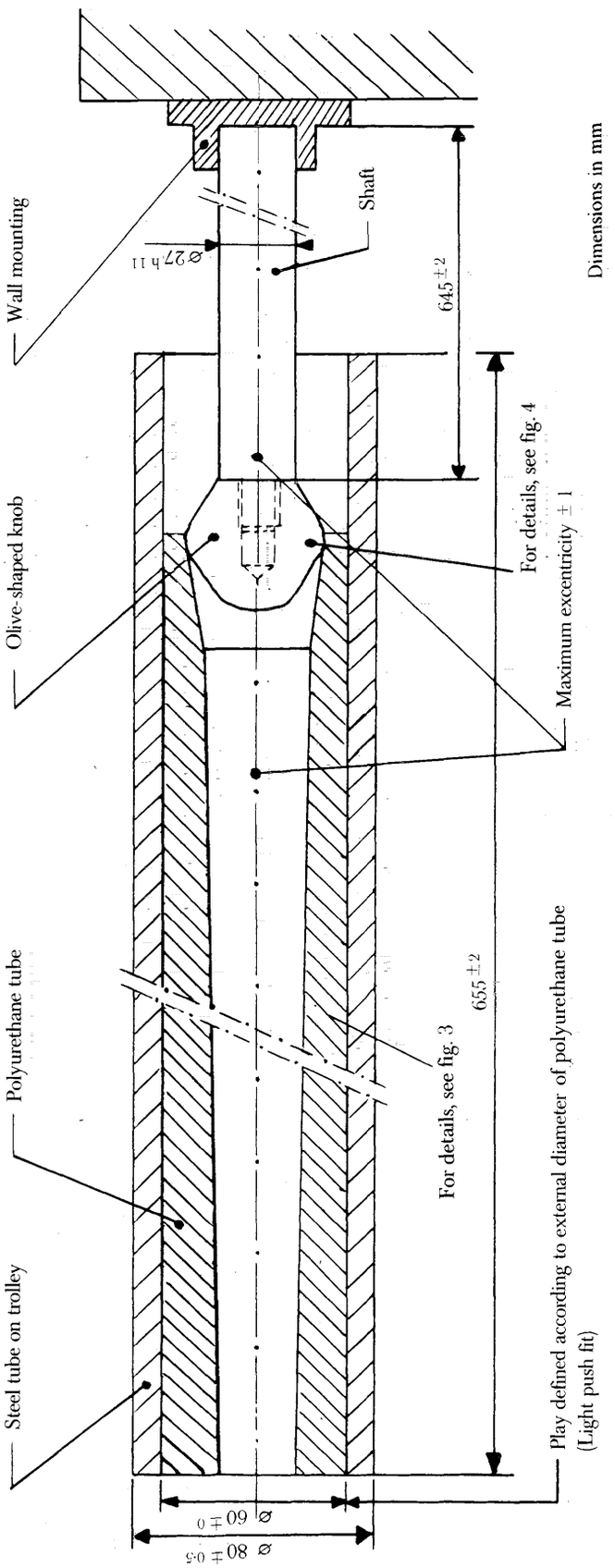


Fig. 2

Stopping device

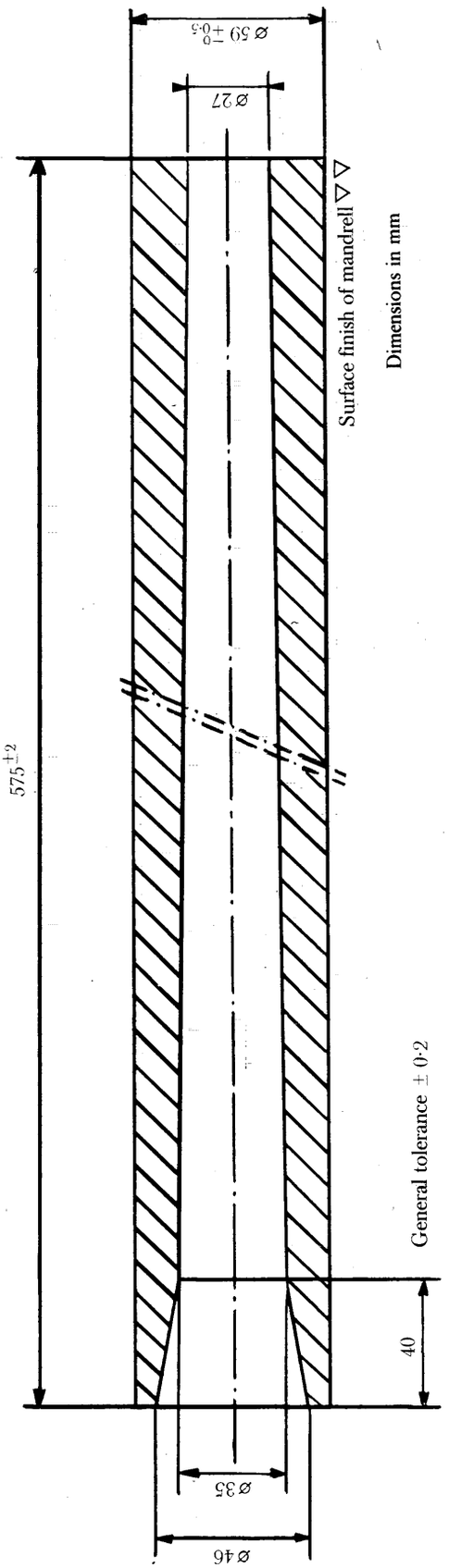
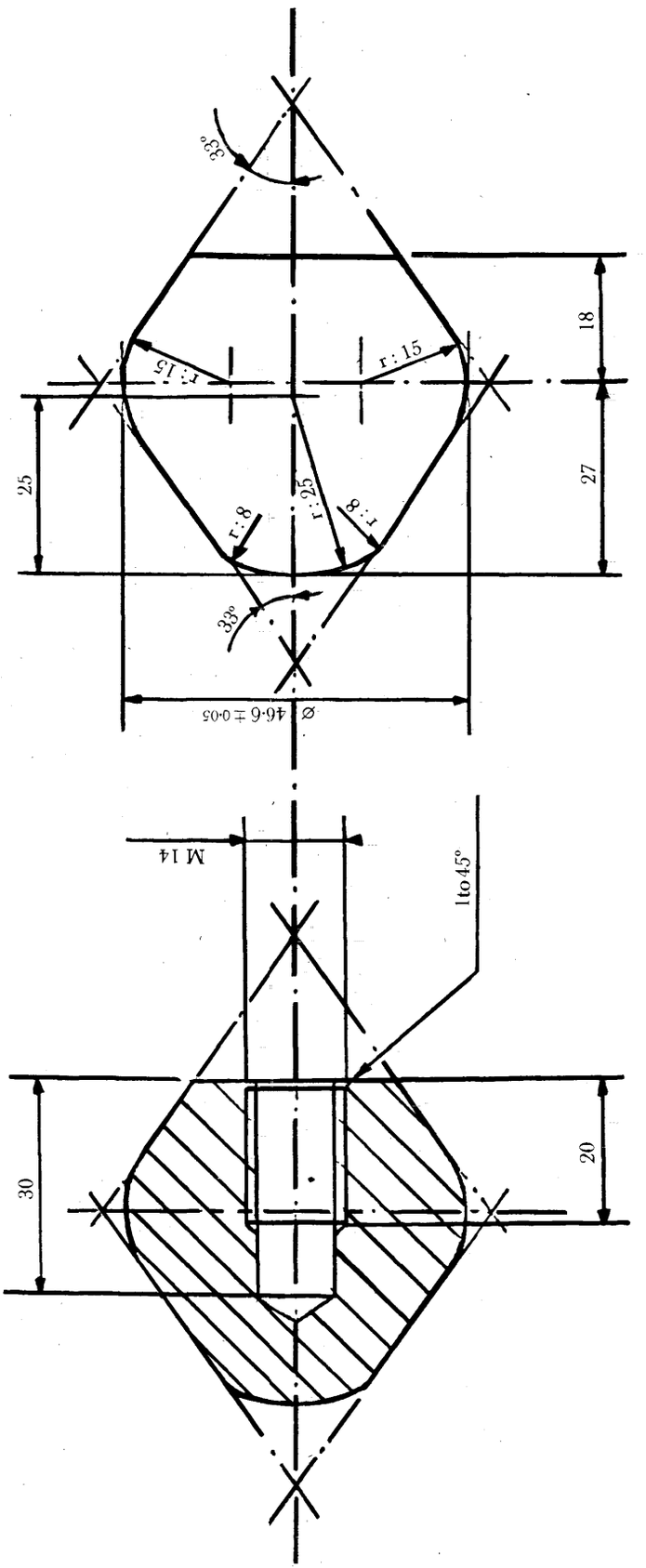


Fig. 3

Stopping device
(polyurethane tube)



Dimensions in mm

All surfaces finished ▽ ▽ ▽
General interference tolerance ± 0·1

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).

1.2.6. *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);

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	⌀ 90×20 mm ⌀ 80×20 mm ⌀ 75×20 mm ⌀ 70×20 mm ⌀ 65×20 mm ⌀ 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	⌀ 12×130 mm (M 12)
15	Head	polyurethane	—
16	Tubular spacer	steel	⌀ 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

Reference No	Name	Material	Dimensions
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	⌀ 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

TABLE 2

Components of manikin	Mass in kilograms
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

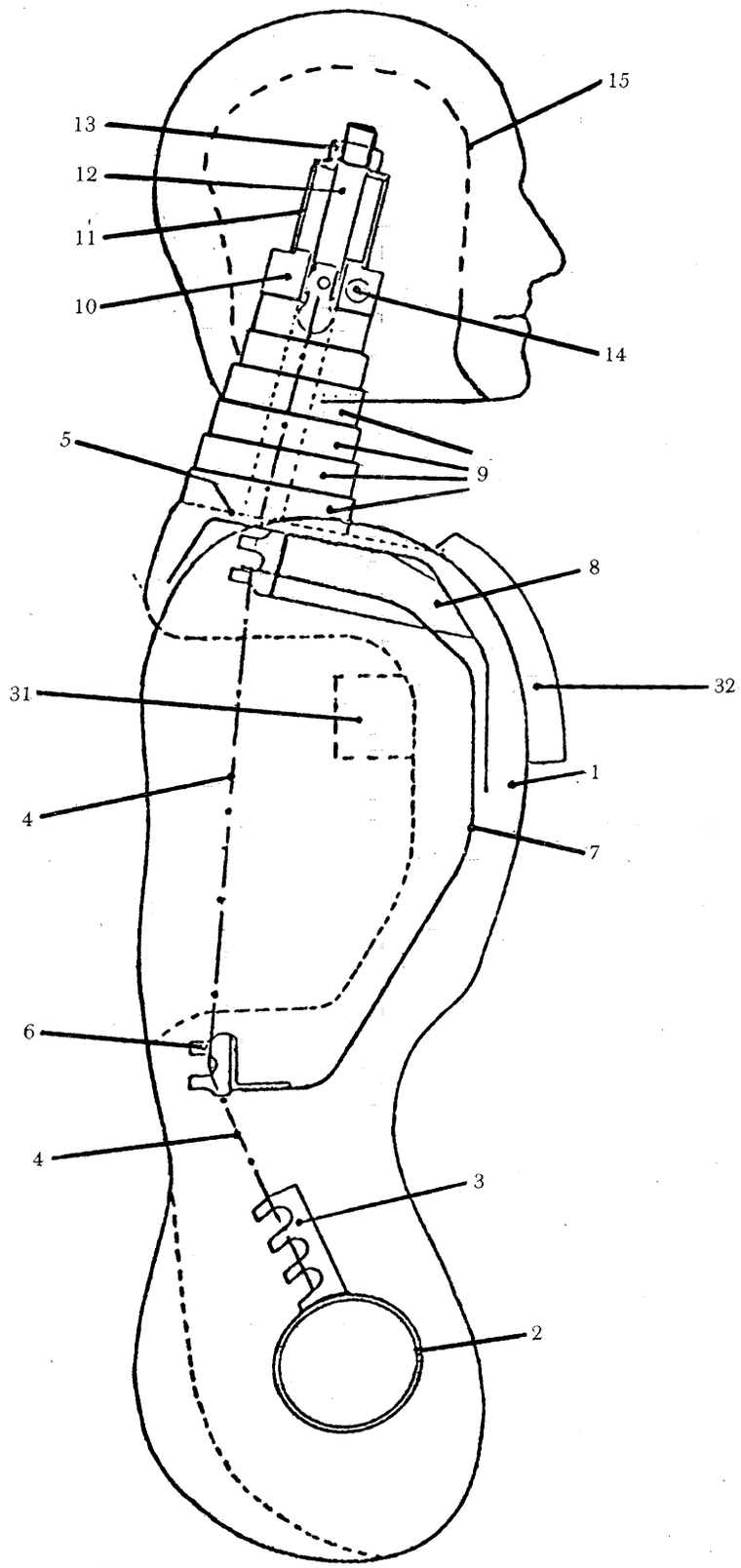


Fig. 1

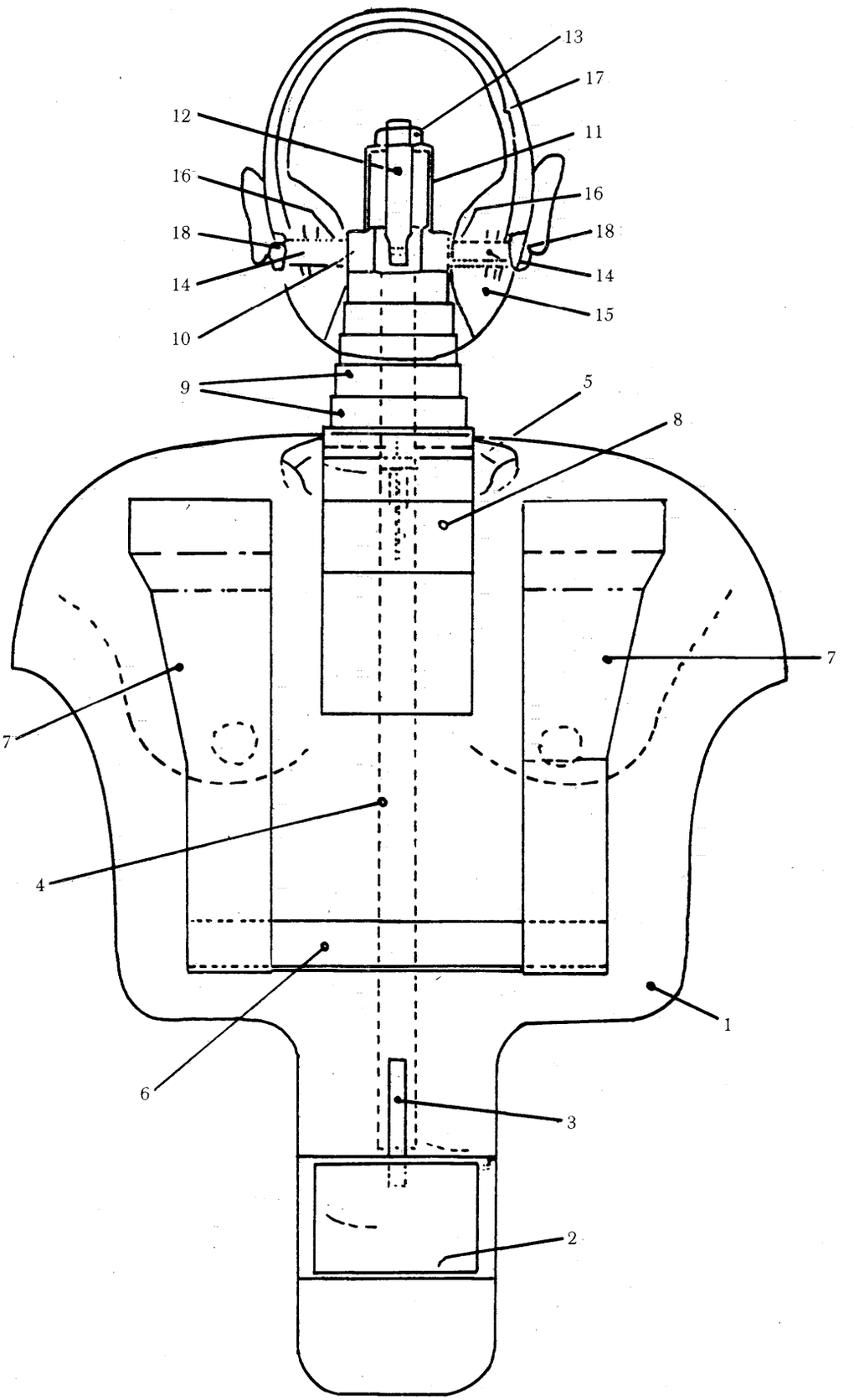


Fig. 2

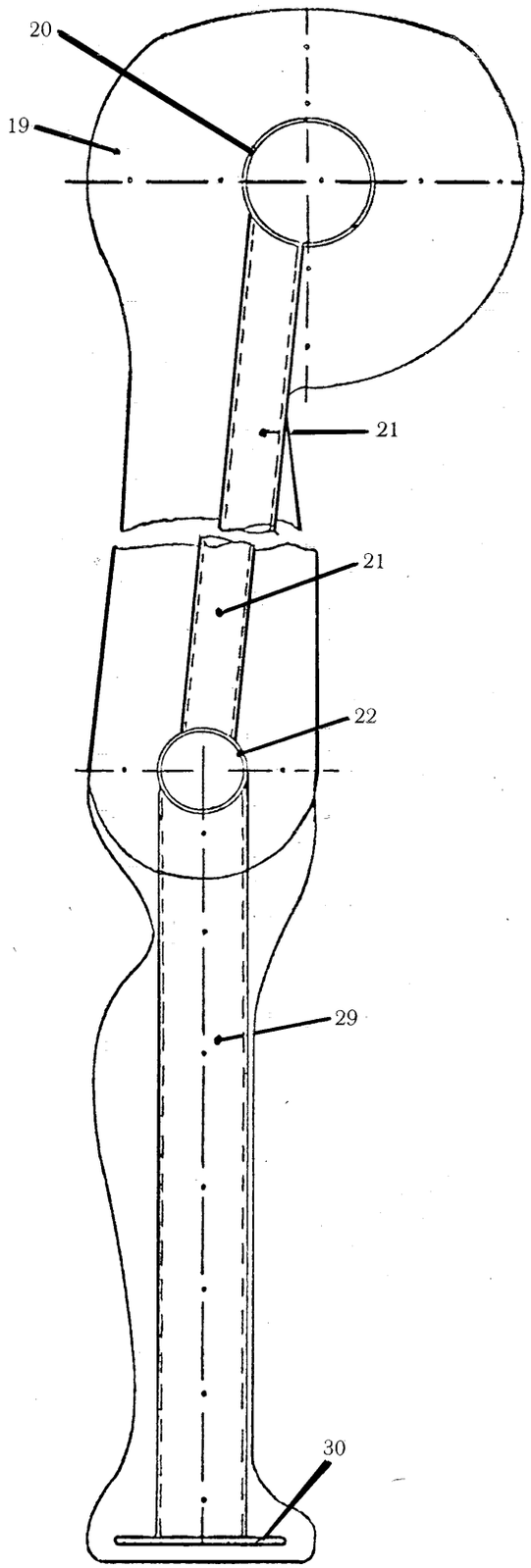


Fig. 3

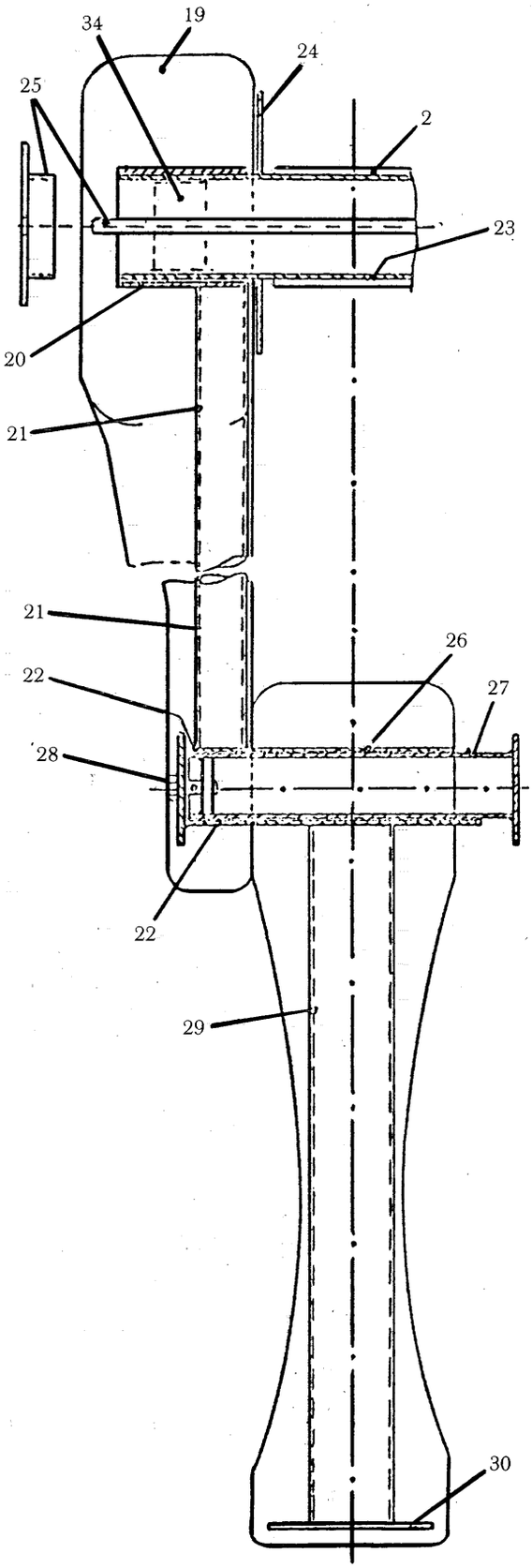


Fig. 4

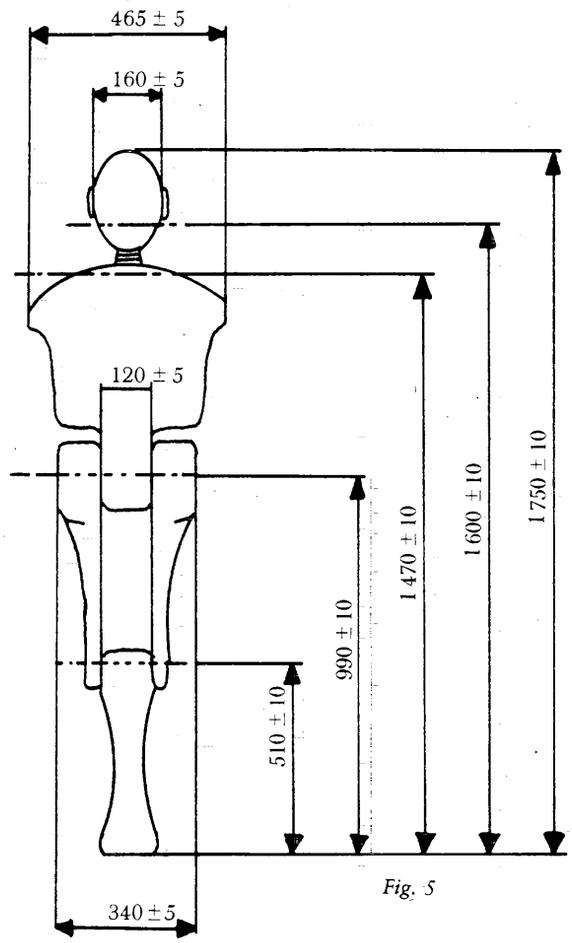


Fig. 5

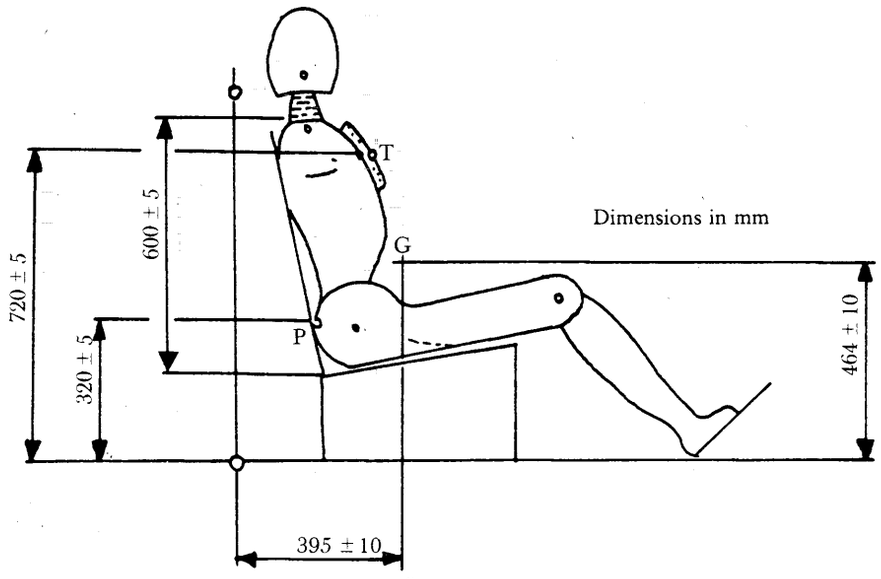


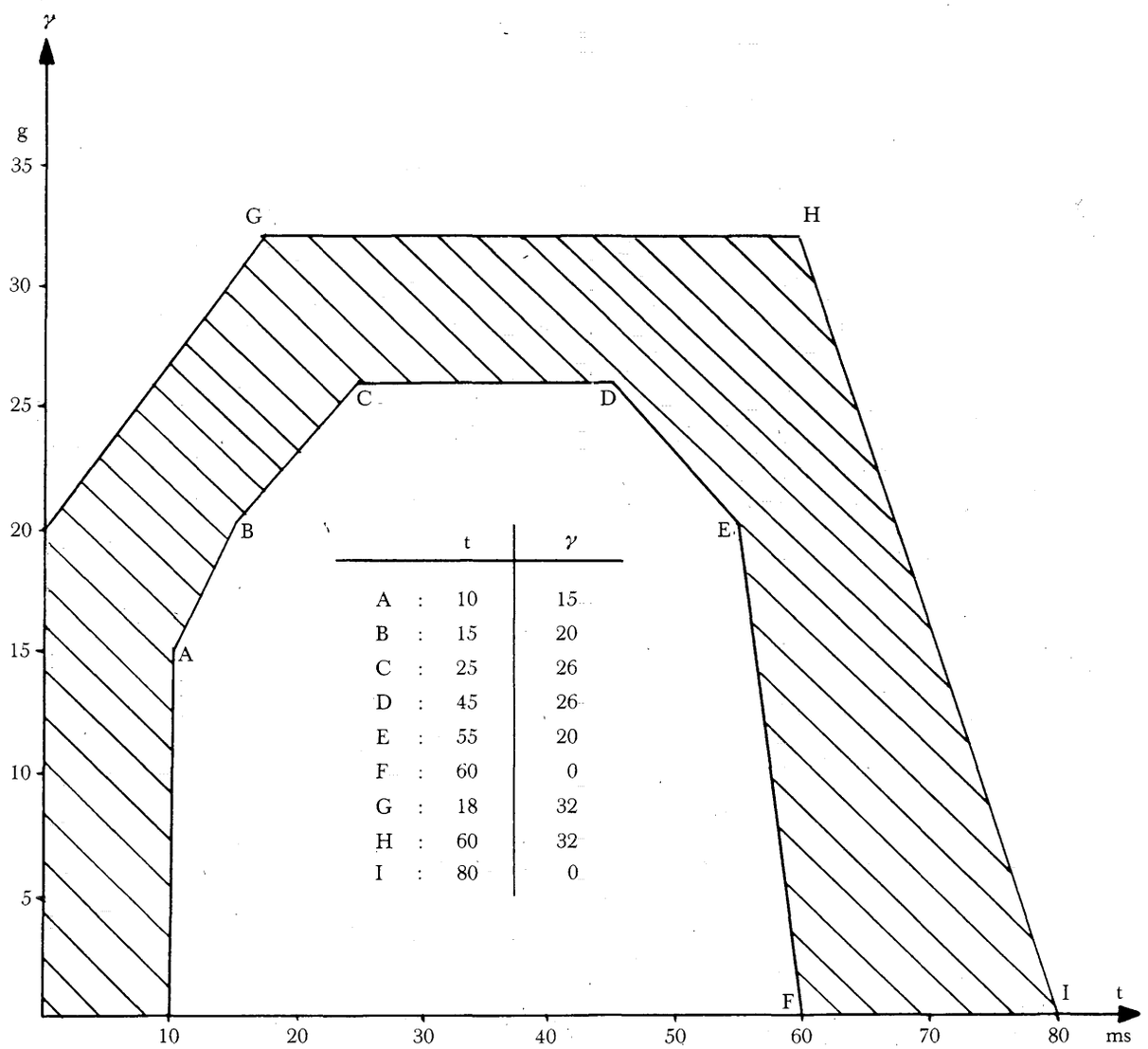
Fig. 6

Manikin seated in position shown in Annex VII, fig. 1.
G = Centre of gravity
T = Torso measurement point (located at the front on the centre line of the manikin)
P = Pelvis measurement point (located at the back on the centre line of the manikin)

ANNEX IX

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

(Curve for testing stopping devices)



	t	γ
A	10	15
B	15	20
C	25	26
D	45	26
E	55	20
F	60	0
G	18	32
H	60	32
I	80	0

The deceleration curve of the trolley weighted with inert masses to produce a total of 455 kg ± 20 kg for safety belt tests and 910 kg ± 40 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 ± 40 kg. The stopping distance during calibration of the trolley shall be 400 ± 20 mm.

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 (1).

(1) These requirements are in accordance with SAE recommended practice J 211a and will later be replaced by a reference to an ISO standard at present in preparation.

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;

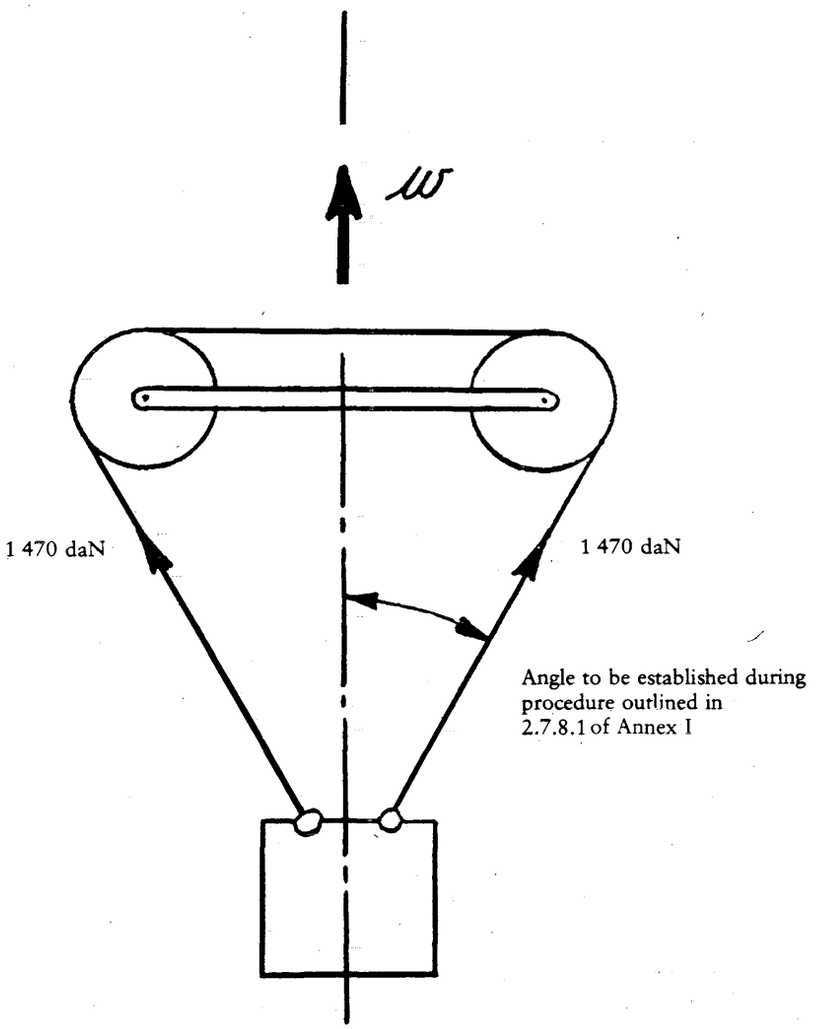
   (i) the fact that the belt is intended for use by occupants of adult build;

   (j) stowage of the belt when not in use.

ANNEX XI

DUAL BUCKLE TEST

(outlined in 2.7.6.5 of Annex I)

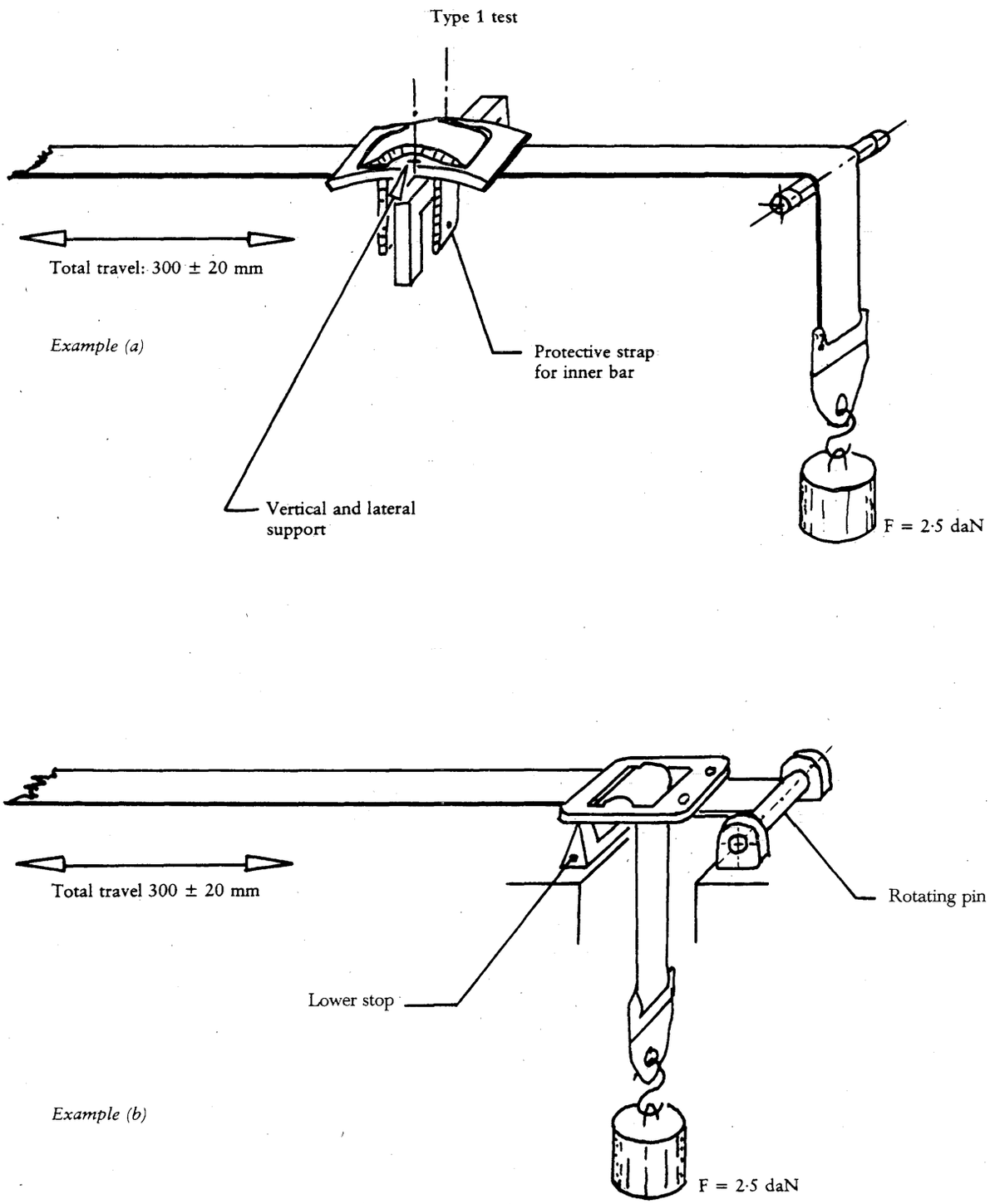


W = Applied load

ANNEX XII

ABRASION AND MICROSLIP TESTS

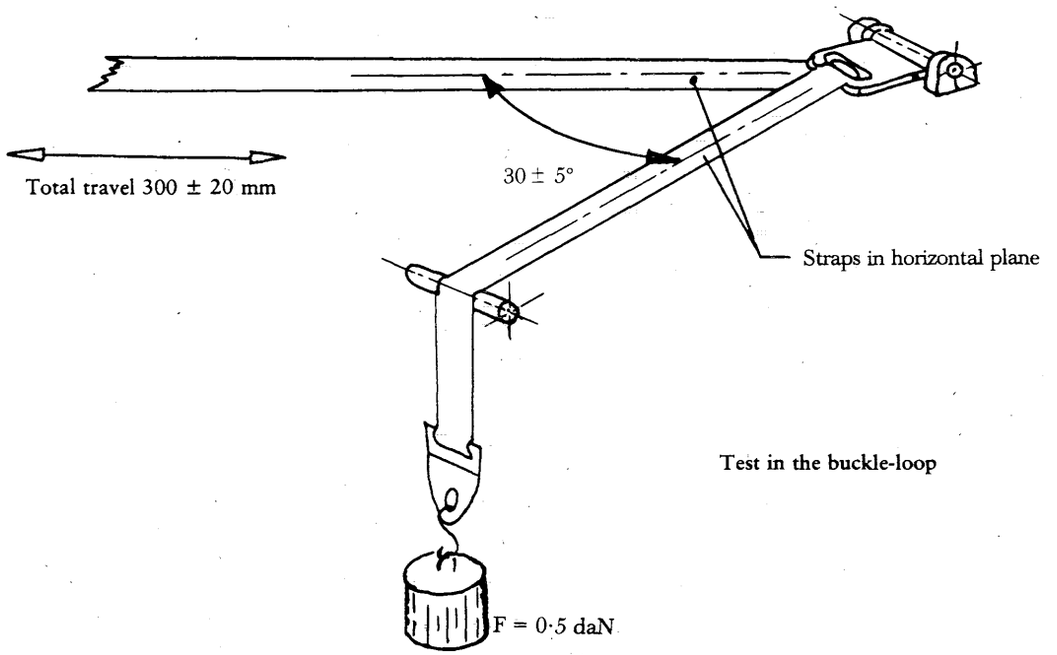
Fig. 1



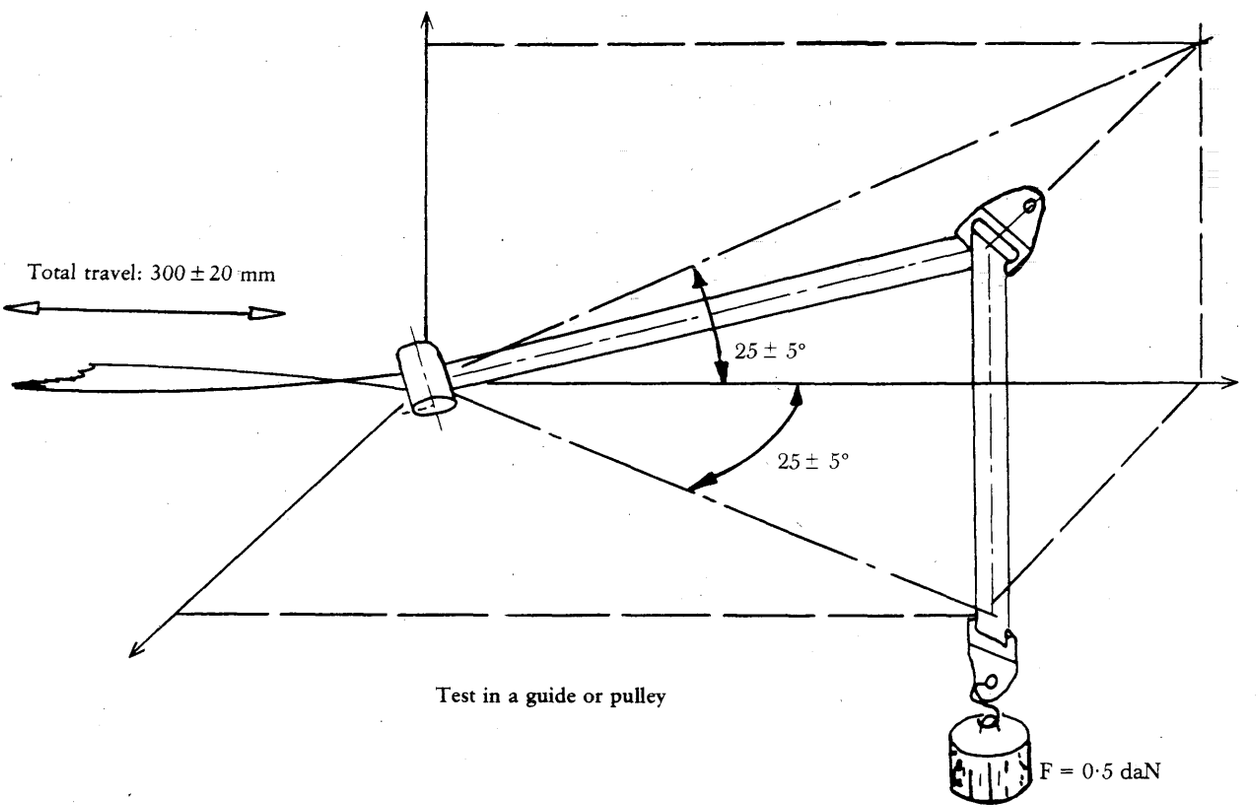
Examples of test arrangements corresponding to the type of adjusting device

Fig. 2

Type 2 test



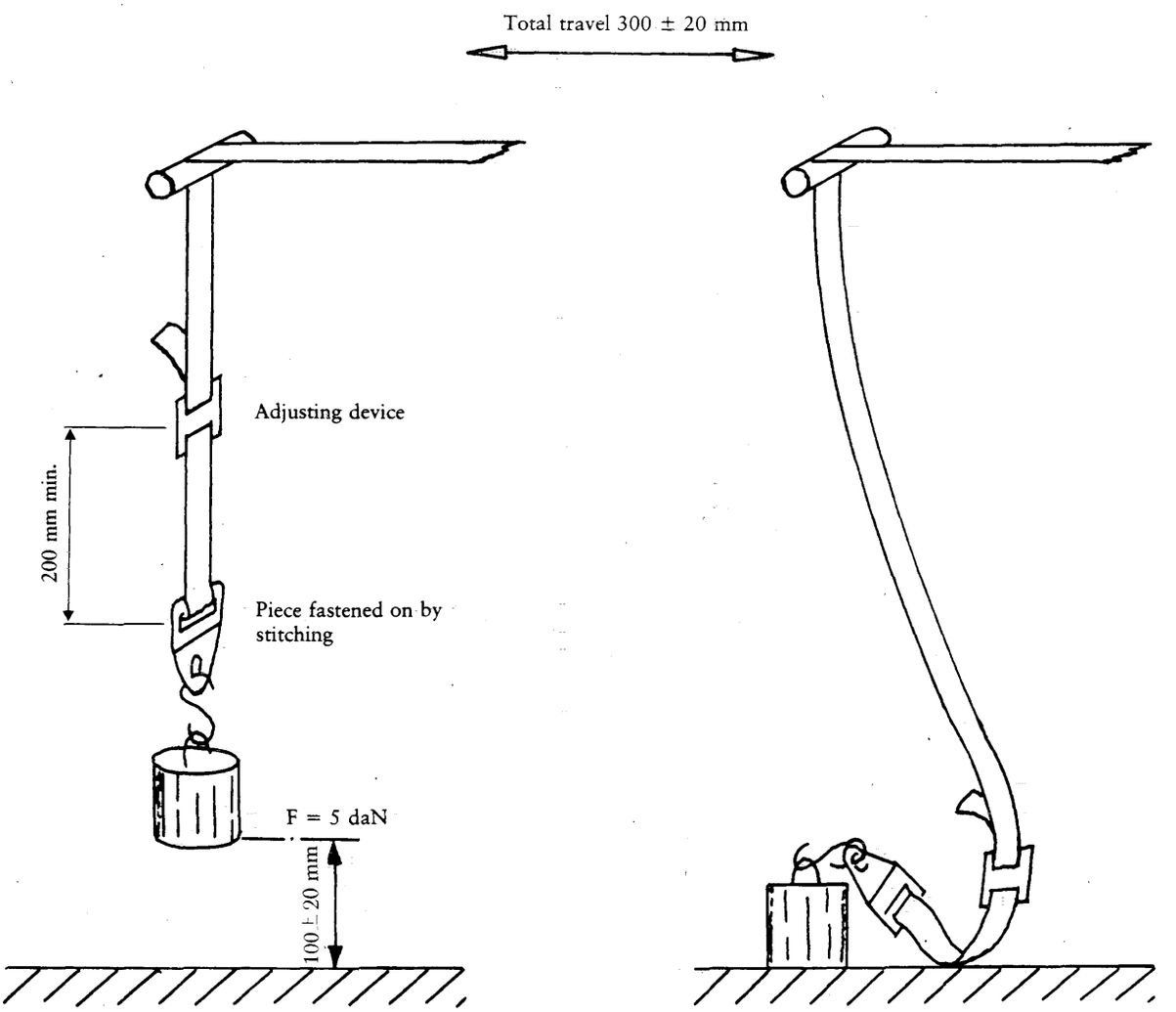
Test in the buckle-loop



Test in a guide or pulley

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 cm^2 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.

ANNEX XIV

CHRONOLOGICAL ORDER OF TESTS

Relevant Provisions Items	Test	Samples													
		Belt No						Strap sample No							
		1	2	3	4	5	6	1	2	3	4	5	6	7	8	9	10
2.2, 2.3.2, 2.4.1.1, 2.4.2.1, 2.5.1.1	Inspection of belt assembly	×															
2.4.2.2	Inspection of buckle	×	×	×	×	×	×										
2.4.1.2, 2.7.2	Corrosion tests on all rigid parts			×													
2.4.3.2, 2.7.5.1	Strength of adjusting device			×													
2.4.3.1, 2.4.3.3, 2.7.5.6	Ease of adjustment			×													
2.4.4, 2.7.5.2	Strength of attachments			×													
2.4.2.3	Durability of buckle	×	×														
2.4.2.4, 2.7.5.3	Low temperature operation of buckle	×	×														
2.4.2.6, 2.7.5.1, 2.7.5.5	Strength of buckle			×													
2.4.1.4, 2.7.5.4	Low temperature impact on all rigid parts	×	×														
2.4.5, 2.7.6.1, 2.7.2, 2.7.6.3, 2.7.6.2, 2.7.6.4	Operation of retractor						×										
2.5.1.2, 2.7.5	Check on strap width							×									
2.5.2, 2.7.3.1, 2.7.4	Strength of strap after room-conditioning								×								
2.5.3, 2.7.4	Strength of strap after special conditioning:																
2.7.3.2	— light-conditioning									×	×						
2.7.3.3	— cold-conditioning											×	×				
2.7.3.4	— heat-conditioning													×	×		
2.7.3.5	— exposure to water															×	×
2.6.2, 2.7.3.6	Abrasion				×	×											
2.4.3, 2.7.3.7	Micro-slip				×	×											
2.4.2.7, 2.6.1, 2.4.2.6, 2.7.2, 2.7.6.3, 2.7.7	Dynamic test on belt assembly	×	×														
2.4.2.5, 2.4.2.7, 2.7.8	Buckle-opening test	×	×														

Note: In addition, one belt sample is required for reference purposes.