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Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

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



## II

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

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:  
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>

**Regulation No 69 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of rear marking plates for slow-moving vehicles (by construction) and their trailers**

Incorporating all valid text up to:

Supplement 5 to the 01 series of amendments — Date of entry into force: 24 October 2009

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1. SCOPE

This Regulation applies to rear marking plates for vehicles of category M, N, O and T and for mobile machinery, which, by construction, cannot move faster than 40 km/h <sup>(1)</sup>.

2. DEFINITIONS <sup>(2)</sup>

2.1. For the purpose of these provisions, the following definitions shall apply:

2.1.1. 'SMV rear marking plate', a triangular plate with truncated corners with a characteristic pattern faced with retro-reflective and fluorescent material or devices (class 1); or with retro-reflective materials or devices only (class 2).

2.1.2. 'Sample unit', a complete, finished SMV plate ready to be mounted on a vehicle and representative of current production.

2.2. Retro-reflection

Reflection in which radiation is returned in directions close to the direction from which it came, this property being maintained even over wide variations of the direction of the incident radiation:

2.2.1. 'Retro-reflective material', a surface or device from which, when directionally irradiated, a relatively large portion of the incident radiation is retroreflected.

2.2.2. 'Retro-reflective device', an assembly ready for use and comprising one or more retro-reflective optical units.

2.3. Geometric definitions (see Annex 1, figure 1).

2.3.1. 'Reference centre', a point on or near a retro-reflective area which is designated to be the centre of the device for the purpose of specifying its performance.

2.3.2. 'Illumination axis', a line segment from the reference centre to the light source.

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

<sup>(2)</sup> The definitions of technical terms are those adopted by the International Commission on Illumination (CIE) — see Technical Report on Retro-reflection, CIE Publication No 54.

- 2.3.3. 'Observation axis', a line segment from the reference centre to the photometer head.
- 2.3.4. 'Observation angle (symbol  $\alpha$ )', the angle between the illumination axis and the observation axis. The observation angle is always positive and, in the case of retro-reflection, is restricted to small angles. Maximum range:  $0^\circ \leq \alpha \leq 180^\circ$ .
- 2.3.5. 'Observation half-plane', the half-plane which originates on the illumination axis and which contains the observation axis.
- 2.3.6. 'Reference axis', a designated line segment originating on the reference centre which is used to describe the angular position of the retro-reflective device.
- 2.3.7. 'Entrance angle (symbol  $\beta$ )', the angle from the illumination axis to the reference axis. The entrance angle is usually not larger than  $90^\circ$  but, for completeness, its full range is defined as  $0^\circ \leq \beta \leq 180^\circ$ . In order to specify the orientation in full, this angle is characterised by two components,  $\beta_1$  and  $\beta_2$ .
- 2.3.8. 'First axis', an axis through the reference centre and perpendicular to the observation half-plane.
- 2.3.9. 'First component of the entrance angle (symbol  $\beta_1$ )', the angle from the illumination axis to the plane containing the reference axis and the first axis. Range:  $-180^\circ < \beta_1 \leq 180^\circ$ .
- 2.3.10. 'Second component of the entrance angle (symbol  $\beta_2$ )', the angle from the plane containing the observation half-plane to the reference axis. Range:  $-90^\circ \leq \beta_2 \leq 90^\circ$ .
- 2.3.11. 'Second axis', an axis through the reference centre and perpendicular to both the first axis and the reference axis. The positive direction of the second axis lies in the observation half-plane when  $-90^\circ < \beta_1 < 90^\circ$  as shown in Annex 1, figure 1.

2.3.12. Angle of rotation  $\varepsilon$

Angle through which the sample is turned about its vertical axis from any arbitrarily established position counterclockwise (+  $\varepsilon$ ) or clockwise (−  $\varepsilon$ ) viewed in the direction of illumination. If retro-reflective materials or devices have a marking (e.g. TOP), this marking governs the starting position. The angle of rotation  $\varepsilon$  lies in the range  $-180^\circ < \varepsilon \leq 180^\circ$ .

2.4. Definition of photometric terms

2.4.1. Coefficient of retro-reflection  $R'$

Coefficient ( $R'$ ) obtained from the luminous intensity ( $I$ ) of the retro-reflective area in the direction of observation and the illuminance ( $E_i$ ) on the retro-reflective plane at right angles to the direction of the incident light and the illuminated plane sample surface  $A$ .

$$R' = \frac{I}{E_i A}$$

The coefficient of retro-reflection  $R'$  is expressed in candela per square metre per lux ( $\text{cd. m}^{-2} \cdot \text{lx}^{-1}$ ).

- 2.4.2. 'Angular diameter of the retro-reflective sample (symbol  $\eta$ )', the angle subtended by the greatest dimension of the retro-reflective sample, either at the centre of the source of illumination or at the centre of the receiver.
- 2.4.3. 'Luminance factor', the ratio of the luminance of the body considered to the luminance of a perfect diffuser under identical conditions of illumination and observation.
- 2.4.4. 'Colour of the reflected light of the device.' The definitions of the colour of the reflected light are given in paragraphs 2.30 and 2.31 of Regulation No 48.

2.5. Fluorescence

- 2.5.1. When certain substances are brought near to a source of ultraviolet or blue radiations, they emit radiations which are nearly always of longer wavelength than those producing the effect. This phenomenon is called fluorescence. By day and in twilight, fluorescent colours are brighter than normal colours because they reflect part of the light falling upon them and in addition they emit light. At night, they are not brighter than ordinary colours

2.5.2. 'Colour of the fluorescent light of the device.' The definitions of the colour of the fluorescent light are given in paragraph 2.32 of Regulation No 48.

2.6. Description of goniometer

A goniometer which can be used in making retro-reflection measurements in the CIE geometry is illustrated in Annex 1, figure 2. In this illustration, the photometer head is arbitrarily shown to be vertically above the source. The first axis is shown to be fixed and horizontal and is situated perpendicular to the observation half-plane. Any arrangement of the components which is equivalent to the one shown can be used.

2.7. Definition of 'type'

SMV rear marking plates of different types means SMV marking plates which differ in such essential respects as:

2.7.1. The trade name or mark.

2.7.2. The characteristics of the retro-reflective material or devices.

2.7.3. The characteristics of the fluorescent material.

2.7.4. The parts affecting the properties of the retro-reflective material or devices.

3. APPLICATION FOR APPROVAL

3.1. The application for approval of a type of SMV rear marking plate shall be submitted by the holder of the trade name or mark, or if necessary by his duly accredited representative and shall be accompanied by:

3.1.1. Drawings, in triplicate, sufficiently detailed to permit identification of the type. The drawings shall show geometrically the position in which the SMV rear marking plate is to be fitted to the rear end of the vehicles. They shall also show the position intended for the approval number and the identification symbol in relation to the circle of the approval mark.

3.1.2. A brief description giving the technical specifications of the materials of which the retro-reflective areas are made.

3.1.3. A brief description giving the technical specifications of the materials of which the fluorescent area is made.

3.1.4. Samples of the retro-reflective and fluorescent (class 1) or retro-reflective only (class 2).

3.2. The Competent Authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

4. MARKINGS

4.1. Every SMV rear marking plate submitted for approval shall bear:

4.1.1. The trade name or mark of the applicant.

4.1.2. On the plates whose retro-reflective system is not for all angles of rotation  $\epsilon$ , the 'TOP' inscribed horizontally on the part of the plates which is intended to be the highest part of the plate when mounted on the vehicle.

- 4.2. The markings shall be applied on either the retro-reflective or the fluorescent area of the plate, or on the edge, and shall be visible from the outside when the marking plate is fitted on the vehicle.
- 4.3. The markings shall be clearly legible and shall be indelible.
5. APPROVAL
- 5.1. If the SMV rear marking plates submitted for approval in accordance with paragraph 4 above meet the requirements of this Regulation, approval for this type of SMV rear marking plate shall be granted.
- 5.2. An approval number shall be assigned to each type approved. Its first two digits (at present 01) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The symbol above the circle indicates the class of SMV rear marking plate, 'RF' in the case of class 1 (recto-reflective and fluorescent materials) and 'RR' in the case of class 2 (recto-reflective only materials). The same Contracting Party may not assign the same number to another type of SMV rear marking plate.
- 5.3. Notice of approval or refusal or extension of approval of a type of SMV rear marking plate under this Regulation shall be communicated to the Parties to the Agreement applying this Regulation by means of a form conforming to the model in Annex 2 to this Regulation and of a drawing annexed thereto supplied by the applicant for approval, in a format not exceeding A4 (210 × 297 mm) or folded to that format and if possible on a scale of 1:1.
- 5.4. Every SMV rear marking plate conforming to a type approved under this Regulation shall bear, in addition to the markings prescribed in paragraph 4.1.
- 5.4.1. An international approval mark consisting of:
- 5.4.1.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval <sup>(1)</sup>.
- 5.4.1.2. An approval number.
- 5.5. The approval mark shall be clearly legible and shall be indelible.
- 5.6. Annex 3 to this Regulation gives an example of the arrangement of the approval mark.
6. GENERAL SPECIFICATIONS
- 6.1. SMV rear marking plates shall be so constructed that they function satisfactorily and will continue to do so in normal use. In addition, they shall not have any defect in design or manufacture that is detrimental to their efficient operation or to their maintenance in good condition.
- 6.2. The components of retro-reflective/fluorescent SMV rear marking plates (class 1) or retro-reflective only SMV rear marking plates (class 2) shall not be capable of being easily dismantled.

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

- 6.3. The means of attachment of the SMV rear marking plate shall be such that they allow a stable and durable connection between the plate and the rear end of vehicles, for instance by screws or rivets.
- 6.4. The outer surface of the retro-reflective/fluorescent SMV rear marking plate (class 1) or retro-reflective only SMV rear marking plate (class 2) shall be easy to clean. The surface shall therefore not be rough and any protuberances it may exhibit shall not prevent easy cleaning.
7. SPECIAL SPECIFICATION (TESTS)
- 7.1. SMV rear marking plates shall also satisfy the conditions as to dimensions, shape, pattern and the colorimetric, photometric, physical and mechanical requirements set forth in Annexes 5 to 12 to this Regulation.
8. MODIFICATIONS AND EXTENSION OF APPROVAL OF REAR MARKING PLATES FOR SLOW-MOVING VEHICLES (BY CONSTRUCTION) AND THEIR TRAILERS
- 8.1. Every modification of the rear marking plate type shall be notified to the Administrative Department which granted the type approval. The department may then either:
- 8.1.1. Consider that the modifications made are unlikely to have appreciable adverse effects and that in any case the type of device still complies with the requirements; or
- 8.1.2. Require a further test report from the Technical Service responsible for conducting the tests.
- 8.2. Confirmation or refusal of approval, specifying the alterations, shall be notified by the procedure specified in paragraph 5.3 above to the Parties to the Agreement applying this Regulation.
- 8.3. The Competent Authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.
9. CONFORMITY OF PRODUCTION
- The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:
- 9.1. Rear marking plates approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 6 and 7.
- 9.2. The minimum requirements for conformity of production control procedures set forth in Annex 13 to this Regulation shall be complied with.
- 9.3. The minimum requirements for sampling by an inspector set forth in Annex 14 to this Regulation shall be complied with.
- 9.4. The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be once every two years.
10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 10.1. The approval granted in respect of a type of SMV rear marking plate pursuant to this Regulation may be withdrawn if the requirements set forth above are not met or if a marking plate bearing the approval mark does not conform to the type approved.
- 10.2. If a Party to the Agreement applying the Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.



11. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases the manufacture of an SMV rear marking plate approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

12. TRANSITIONAL PROVISIONS

12.1. As from the official date of entry into force of Supplement 2 to the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant approvals under this Regulation as amended by Supplement 2 to the 01 series of amendments.

12.2. As from 24 months after the date of entry into force of Supplement 2 to the 01 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the type of rear marking plates to be approved meets the requirements of this Regulation as amended by Supplement 2 to the 01 series of amendments.

12.3. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to a preceding version of this Regulation, up to Supplement 1 to the 01 series of amendments.

12.4. Approvals granted under this Regulation earlier than 24 months after the date of entry into force of Supplement 2 to the 01 series of amendments and all extensions of approvals, including those to the preceding series of amendments granted subsequently, shall remain valid indefinitely. When the type of rear marking plates approved to a preceding version of the Regulation up to Supplement 1 to the 01 series of amendments meets the requirements of this Regulation as amended by Supplement 2 to the 01 series of amendments, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.

12.5. No Contracting Party applying this Regulation shall refuse a type of rear marking plates approved under this Regulation as amended by Supplement 2 to the 01 series of amendments.

12.6. As from the official date of entry into force of Supplement 2 to the 01 series of amendments, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of rear marking plates approved under this Regulation as amended by Supplement 2 to the 01 series of amendments.

12.7. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of rear marking plates approved under preceding version of the Regulation up to Supplement 1 to the 01 series of amendments during the 48 months period which follows the date of entry into force of Supplement 2 to the 01 series of amendments.

12.8. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 2 to the 01 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of rear marking plates which do not meet the requirements of this Regulation as amended by Supplement 2 to the 01 series of amendments on a new vehicle for which national type or individual approval was granted more than 24 months after the entry into force of Supplement 2 to the 01 series of amendments to this Regulation.

13. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

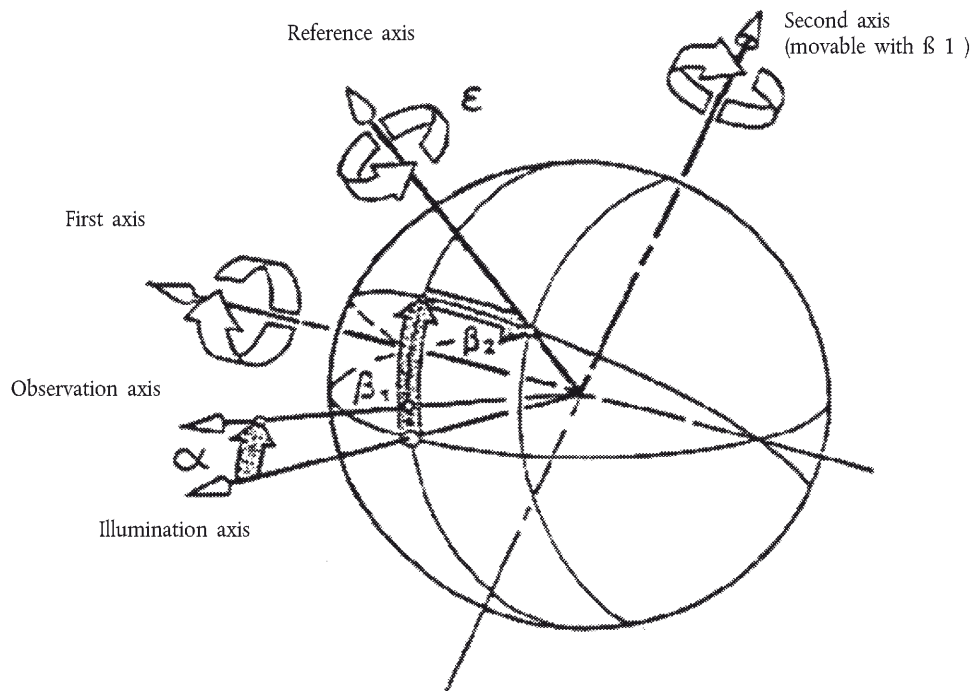
The Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Administrative Departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

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## ANNEX 1

## THE CIE CO-ORDINATE SYSTEM

Figure 1



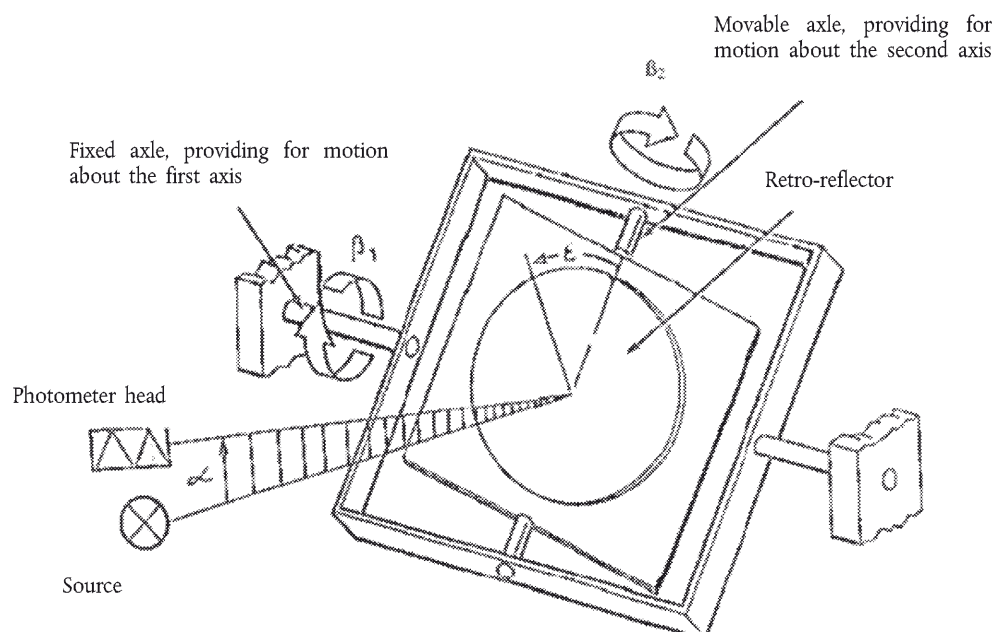
The CIE angular system for specifying and measuring retro-reflectors. The first axis is perpendicular to the plane containing the observation axis and the illumination axis. The second axis is perpendicular both to the first axis and to the reference axis. All axes, angles and directions of rotation are shown positive.

Notes: (a) the principal fixed axis is the illumination axis;

(b) the first axis is fixed perpendicular to the plane containing the observation and illumination axis;

(c) the reference axis is fixed in retro-reflector and movable with  $\beta_1$  and  $\beta_2$ .

Figure 2



Representation of a goniometer mechanism embodying the CIE angular system for specifying and measuring retro-reflectors. All angles and directions of rotation are shown positive.

## ANNEX 2

## COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning <sup>(2)</sup>: APPROVAL GRANTED  
 APPROVAL EXTENDED  
 APPROVAL REFUSED  
 APPROVAL WITHDRAWN  
 PRODUCTION DEFINITELY DISCONTINUED

of a type of SMV rear marking plate, pursuant to Regulation No 69

Approval No: .....

Extension No: .....

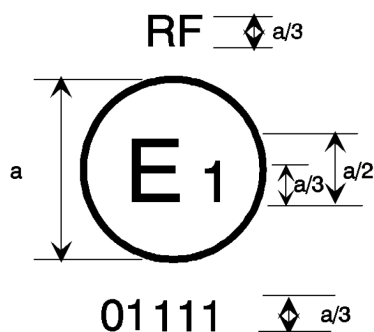
1. Trade name or mark of the SMV rear marking plate: .....
2. SMV rear marking plate type: .....
- 2.1. SMV rear marking plate class: Class 1/class 2 <sup>(2)</sup> .....
3. Manufacturer's name and address: .....
4. If applicable, name and address of manufacturer's representative: .....
5. Submitted for approval on: .....
6. Technical Service responsible for conducting approval tests: .....
7. Date of test report: .....
8. Number of test report: .....
9. Remarks: .....
10. Vehicles to which the device is intended to be fitted (if applicable): .....
11. Position and nature of the marking: .....
12. Approval granted/refused/extended/withdrawn <sup>(2)</sup> .....
13. Reason(s) for extension (if applicable): .....
14. Place: .....
15. Date: .....
16. Signature: .....
17. The list of documents deposited at the Administrative Service which has granted approval is annexed to this communication. ....

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

<sup>(2)</sup> Strike out what does not apply.

## ANNEX 3

## ARRANGEMENT OF THE APPROVAL MARK



$a = 5 \text{ mm min.}$

The SMV rear marking plate bearing the above approval mark has been approved in Germany (E1) under approval number 01111. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of this Regulation as amended by the 01 series of amendments. The symbol 'RF' indicates class 1 SMV rear marking plate (retro-reflective/fluorescent materials). Class 2 (retro-reflective only materials) SMV rear marking plates shall be marked by the symbol 'RR'.

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

## ANNEX 4

**TEST PROCEDURE**

## TEST SAMPLES

1. Five SMV rear marking plates shall be supplied to the testing laboratory for the various tests to be conducted.
  2. The test samples shall be representative of current production, fabricated in accordance with the recommendations of the manufacturer(s) of the retro-reflective and fluorescent (class 1) or retro-reflective only (class 2).
  3. After verification of the general specifications (paragraph 6 of the Regulation) and the specifications of shape and dimensions (Annex 5) four samples shall be subjected to the heat resistance test described in Annex 9 to this Regulation, prior to the tests described in Annexes 6, 7 and 8. The fifth sample shall be kept for reference purposes during the test procedures.
  4. The photometric and colorimetric measurements may be made on the same sample.
  5. For the other tests, samples which have not undergone any testing should be used.
-

## ANNEX 5

**SPECIFICATIONS OF SHAPE AND DIMENSIONS****SHAPE AND DIMENSIONS OF RETRO-REFLECTIVE/FLUORESCENT (CLASS 1) OR RETRO-REFLECTIVE ONLY (CLASS 2) SMV REAR MARKING PLATES****1. Shape**

The plates shall be in the shape of an equilateral triangle with truncated corners, for mounting with one apex upwards at the rear of slow-moving vehicles.

**2. Pattern**

The SMV rear marking plates shall have a red fluorescent centre and red retro-reflective borders made of either retro-reflective sheeting or coating or of plastic corner-cube reflectors (class 1). The SMV rear marking plates of class 2 shall have a retro-reflective centre.

**3. Dimensions**

The length of the base of the enclosed fluorescent triangle (class 1) or retro-reflective triangle (class 2) shall be: minimum 350 mm and maximum 365 mm. The minimum width of the light-emitting surface of the red retro-reflective border shall be 45 mm, the maximum width 48 mm. These features are illustrated in the example of Annex 12.

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## ANNEX 6

## COLORIMETRIC SPECIFICATIONS

1. SMV rear marking plates for slow-moving vehicles and their trailers shall be composed either of red retro-reflective and red fluorescent materials or devices (class 1) or red retro-reflective only materials or devices (class 2).
2. Red retro-reflective material or devices
- 2.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No 15 (1971) and illuminated with the CIE Standard illuminant  $D_{65}$  at an angle of  $45^\circ$  to the normal and viewed along the normal (45/0 geometry), the colour of the material in new condition shall be within the limits according to paragraph 2.31 of Regulation No 48.

Table 1

Colour	1	2	3	4	Luminance factor
Red x	0,690	0,595	0,560	0,650	$\geq 0,03$
y	0,310	0,315	0,350	0,350	

- 2.1.1. Luminance factor for red colour shall be  $\geq 0,03$ .

- 2.2. When illuminated by the CIE Standard Illuminant A at an entrance angle  $\beta_1 = \beta_2 = 0^\circ$  or, if this produces a colourless surface reflection, an angle  $\beta_1 = \pm 5^\circ$ ,  $\beta_2 = 0^\circ$ , and measured at an observation angle of  $20^\circ$ , the colour of the material in new condition shall be within the limits according to paragraph 2.30 of the Regulation No 48.

Table 2

Colour	1	2	3	4
Red x	0,720	0,735	0,665	0,643
y	0,258	0,265	0,335	0,335

Note: The question of the night-time colours of retro-reflective materials is at present being studied by CIE TC 1.6; the above limits are therefore only provisional and will be revised later after CIE TC 1.6 has completed its work.

3. Red fluorescent material
- 3.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No 15 (1971) and illuminated polychromatically with the CIE Standard Illuminant  $D_{65}$  at an angle  $45^\circ$  to the normal and viewed along the normal (geometry 45/0), the colour of the material in new condition shall be within the limits according to paragraph 2.32 of the Regulation No 48.

Table 3

Colour	1	2	3	4	Luminance factor
Red x	0,690	0,595	0,569	0,655	$\geq 0,30$
y	0,310	0,315	0,341	0,345	

- 3.1.1. Luminance factor shall be  $\geq 0,30$ .

4. Compliance with the colorimetric specifications shall be verified by a visual comparison test.

If any doubt remains after this test, conformity with the colorimetric specification shall be verified by determining the trichromatic coordinates of the most doubtful sample.



## ANNEX 7

## PHOTOMETRIC SPECIFICATIONS

## PHOTOMETRIC PROPERTIES

1. When illuminated with a CIE Standard Illuminant A and measured as recommended by CIE TC 2.3 (CIE Publication No 54, 1982), the coefficient of retro-reflection  $R'$  in candelas per square metre per lux ( $\text{cd.m}^{-2}.\text{lx}^{-1}$ ) of the entire red retro-reflective area in new condition shall be at least as indicated in table 1.

Table 1

Coefficient of retro-reflection  $R'$  [ $\text{cd.m}^{-2}.\text{lx}^{-1}$ ]

Observation angle $\alpha$ [°]	Entrance angle $\beta$ [°]	
20°	$\beta_1$	0° 0° 0° 0°
	$\beta_2$	5° 20° 30° 40°
$R'$ of the outer border (class 1, 2) [ $\text{cd.m}^{-2}.\text{lx}^{-1}$ ]		120 60 30 10
$R'$ of the enclosed triangle (class 2) [ $\text{cd.m}^{-2}.\text{lx}^{-1}$ ]		10 7 4 -

2. The subtended angle at the sample shall not be larger than 80°.

## ANNEX 8

## RESISTANCE TO EXTERNAL AGENTS

## 1. RESISTANCE TO WEATHERING

- 1.1. Procedure — For each test, two specimens of a sample unit (see paragraph 2.1.2 of this Regulation) are taken. One specimen shall be stored in a dark and dry container for subsequent use as 'reference unexposed specimen'.

The second specimen shall be subjected to a source of illumination in accordance with ISO Standard 105-B02-1978, Section 4.3.1; the retro-reflective material shall be exposed until blue standard No 7 has faded to No 4 on the grey scale and the fluorescent material until blue standard No 5 has faded to No 4 on the grey scale.

After the test, the specimen shall be washed in a dilute neutral detergent solution, dried and examined for conformity with the requirements specified in paragraphs 1.2 to 1.4.

- 1.2. Visual appearance — No area of the exposed specimen shall show any evidence of cracking, sealing, pitting, blistering, delamination, distortion, chalking, staining or corrosion.

There shall be no shrinkage in excess of 0,5 per cent in any linear direction and no evidence of adhesion failure such as edge lifting from the substrate.

- 1.3. Colour fastness — The colours of the exposed specimen shall still meet the requirements specified in Annex 6.

- 1.4. Effect on the coefficient of luminous intensity of the retro-reflective material.

- 1.4.1. For this check, measurement shall be made only at an observation angle of 20' and an entrance angle of 5° by the method given in Annex 7.

- 1.4.2. The coefficient of luminous intensity of the exposed specimen when dry shall be not less than 80 per cent of the value in Annex 7, table 1.

- 1.4.3. The specimen shall then be subjected to simulated rainfall and its coefficient of luminous intensity under this condition shall be not less than 90 per cent of the value obtained when measured in dry condition, as explained in paragraph 1.4.2 above.

## 2. RESISTANCE TO CORROSION (ISO Standard 3768)

- 2.1. A specimen of the sample unit shall be subjected to the action of a saline mist for 48 hours comprising two periods of exposure of 24 hours each, separated by an interval of 2 hours during which the specimen is allowed to dry.

The saline mist shall be produced by atomising at a temperature of  $35 \pm 2$  °C of a saline solution obtained by dissolving five parts by weight of sodium chloride in 95 parts of distilled water containing not more than 0,02 per cent of impurities.

- 2.2. Immediately after completion of the test, the sample shall show no sign of corrosion liable to impair the efficiency of the device.

- 2.2.1. The coefficient of luminous intensity R of the retro-reflective area, when measured after a recovery period of 48 hours as specified in Annex 7, paragraph 1, at an entrance angle of 5° and an observation angle of 20', shall be not less than the value in Annex 7, table 1. Before measuring, the surface shall be cleaned to remove salt deposits from the saline mist.

## 3. RESISTANCE TO FUELS

A section of a sample unit not less than 300 mm long shall be immersed in a mixture of n-heptane and toluene, 70 per cent and 30 per cent by volume, for one minute.

After removal, the surface shall be wiped dry with a soft cloth and shall not show any visible change which would reduce its effective performance.

4. BONDING STRENGTH (in the case of adhesive materials)

- 4.1. The adhesion of retro-reflective materials shall be determined after 24 hours curing time by utilising a 90-degree peel on a tensile strength testing machine.
- 4.2. The adhesion of laminated or coated retro-reflective and fluorescent materials shall be determined.
- 4.3. The coated materials, of whatever kind, shall not be removable without tools or without damaging the material.
- 4.4. The laminated materials (adhesive films) shall need a force of at least 10 N per 25 mm width at a speed of 300 mm per minute, to be removed from the substrate.

5. RESISTANCE TO WATER

A section of a sample unit not less than 300 mm long shall be immersed in distilled water at a temperature of  $23 \pm 5$  °C for a period of 18 hours; it shall then be left to dry for 24 hours under normal laboratory conditions.

After completion of the test, the section shall be examined. No part inside 10 mm from the cut edge shall show evidence of deterioration which would reduce the effectiveness of the plate.

6. RESISTANCE TO IMPACT (except for plastics corner-cube reflectors)

When a 25 mm diameter solid steel ball is dropped from a height of 2 m on to the retro-reflective and on the fluorescent surfaces of a supported plate, at an ambient temperature of  $23 \pm 2$  °C, the materials shall show no cracking or separation from the substrate at a distance of more than 5 mm from the impacted area.

7. RESISTANCE TO CLEANING

7.1. Manual cleaning

- 7.1.1. A test sample smeared with a mixture of detergent lubricating oil and graphite shall be easily cleaned without damage to the retro-reflective surface or fluorescent surface when wiped with a mild aliphatic solvent such as n-heptane, followed by washing with a neutral detergent.

7.2. Power washing

- 7.2.1. When subjected to a continuous spraying action for 60 seconds on the test component in its normal mounting conditions, a test sample shall show no damage to the retro-reflective surface or delamination from the substrate or separation from the sample mounting surface under the following set-up parameters:

- (a) water/wash solution pressure  $8 \pm 0,2$  MPa;
- (b) water/wash solution temperature  $60^\circ - 5^\circ$  °C;
- (c) water/wash solution flow rate  $7 \pm 1$  l/min;
- (d) the tip of the cleaning wand to be positioned at distance of  $600 \pm 20$  mm away from the retro-reflective surface;
- (e) cleaning wand to be held at no greater angle than 45 degrees from perpendicular to the retro-reflective surface;
- (f) 40 degree nozzle creating wide fan pattern.
-

## ANNEX 9

**RESISTANCE TO HEAT**

1. The four samples shall be kept for 48 hours in a dry atmosphere at a temperature of  $65 \pm 2$  °C, after which the samples shall be allowed to cool for 1 hour at  $23 \pm 2$  °C. They shall then be kept for 12 hours at a temperature of  $-20 \pm 2$  °C.
  - 1.1. The sample shall be examined after a recovery time of 4 hours under normal laboratory conditions.
  2. After this test, no cracking or appreciable distortion of the surfaces, particularly of the optical units, shall be evident.
-

## ANNEX 10

**RIGIDITY OF THE PLATES**

The triangular plate shall be strongly held on one of its long sides, with the clamps of the holding device not encroaching over more than 20 mm. A force of 10 N perpendicular to the plane shall be applied to the opposite apex.

The apex shall then not move in the direction of the force by more than 40 mm.

After removal of the force, the plate shall visibly return to its initial position. The residual deflection shall not be more than 5 mm.

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## ANNEX 11

**Stability in time of the optical properties <sup>(1)</sup> of rear marking plates**

1. The authority which granted approval shall have the right to check the stability in time of the optical properties of a type of rear marking plate in service.
2. The Competent Authorities of countries other than the country in which approval was granted may carry out similar checks in their territory. If a type of rear marking plate in use exhibits a systematic defect, the said authorities shall transmit to the authority which granted approval, with a request for its opinion, any components removed for examination.
3. In the absence of other criteria, the concept of 'systematic defect' of a type of rear marking plate in use shall be interpreted in conformity with the intention of paragraph 6.1 of this Regulation.

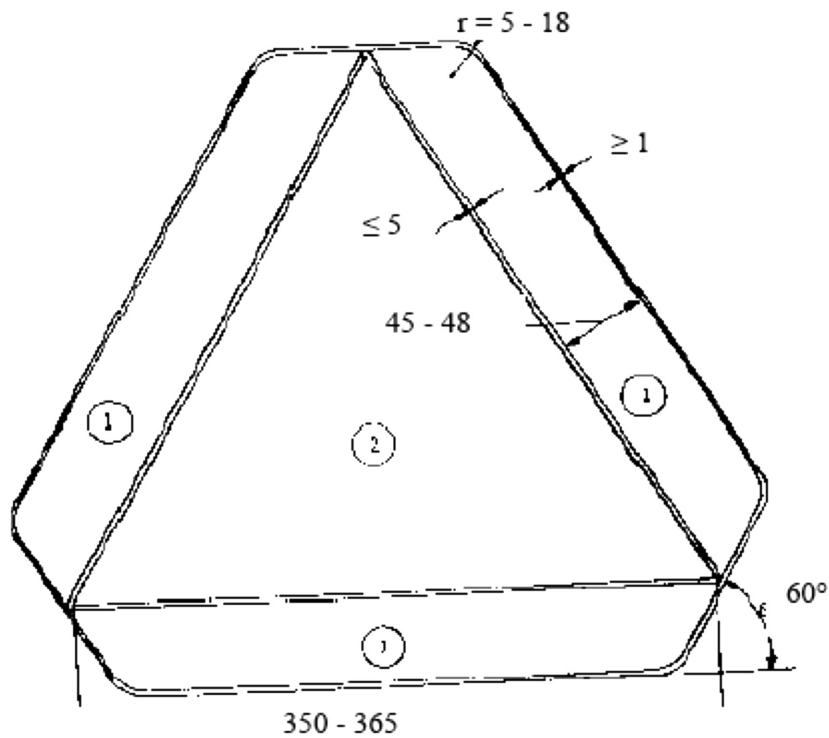
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<sup>(1)</sup> Despite the importance of tests to check the stability in time of the optical properties of rear marking plates, it is in the present state of the art not yet possible to assess this stability by laboratory tests of limited duration.

## ANNEX 12

**Rear marking plates for slow-moving vehicles and their trailers***Example*

All dimensions in mm



(1) Red retro-reflecting material or corner-cube retro-reflector (class 1 or class 2)

(2) Red fluorescent material (class 1) or red retro-reflecting material (class 2)

## ANNEX 13

**Minimum requirements for conformity of production control procedures**

## 1. GENERAL

- 1.1. The conformity requirements shall be considered satisfied from a mechanical and geometric standpoint, if the differences do not exceed inevitable manufacturing deviations within the requirements of this Regulation.
- 1.2. With respect to photometric performances, the conformity of mass-produced rear marking plates shall not be contested if, when testing photometric performances of any rear marking plate chosen at random, no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.
- 1.3. The chromaticity coordinates shall be complied with.

## 2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of rear marking plate the holder of the approval mark shall carry out at least the following tests, at appropriate intervals. The tests shall be carried out in accordance with the provisions of this Regulation.

If any sampling shows non-conformity with regard to the type of test concerned, further samples shall be taken and tested. The manufacturer shall take steps to ensure the conformity of the production concerned.

## 2.1. Nature of tests

Tests of conformity in this Regulation shall cover the photometric and colorimetric characteristics and the test of weather resistance of these characteristics.

## 2.2. Methods used in tests

- 2.2.1. Tests shall generally be carried out in accordance with the methods set out in this Regulation.

- 2.2.2. In any test of conformity carried out by the manufacturer, equivalent methods may be used with the consent of the competent authority responsible for approval tests. The manufacturer is responsible for proving that the applied methods are equivalent to those laid down in this Regulation.

- 2.2.3. The application of paragraphs 2.2.1 and 2.2.2 requires regular calibration of test apparatus and its correlation with measurements made by a competent authority.

- 2.2.4. In all cases the reference methods shall be those of this Regulation, particularly for the purpose of administrative verification and sampling.

## 2.3. Nature of sampling

Samples of rear marking plates shall be selected at random from the production of a uniform batch. A uniform batch means a set of rear marking plates of the same type, defined according to the production methods of the manufacturer.

The assessment shall in general cover series production from individual factories. However, a manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

## 2.4. Measured and recorded photometric characteristics

The sampled rear marking plate shall be subjected to photometric measurements for minimum values at the points and chromaticity coordinates provided for in the Regulation.

## 2.5. Criteria governing acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the Competent Authority, criteria governing the acceptability of his products in order to meet the specifications laid down for verification of conformity of products in paragraph 9.1 of this Regulation.

The criteria governing the acceptability shall be such that, with a confidence level of 95 per cent, the minimum probability of passing a spot check in accordance with Annex 14 (first sampling) would be 0,95.

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## ANNEX 14

**MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR****1. GENERAL**

- 1.1. The conformity requirements shall be considered satisfied from a mechanical and a geometric standpoint, in accordance with the requirements of this Regulation, if any, if the differences do not exceed inevitable manufacturing deviations.
- 1.2. With respect to photometric performance, the conformity of mass-produced rear marking plates shall not be contested if, when testing photometric performances of any rear marking plate chosen at random:
- 1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.
- 1.2.2. Rear marking plates with apparent defects are disregarded.
- 1.3. The chromaticity coordinates shall be complied with.

**2. FIRST SAMPLING**

In the first sampling four rear marking plates are selected at random. The first sample of two is marked A, the second sample of two is marked B.

**2.1. The conformity is not contested**

- 2.1.1. Following the sampling procedure shown in Figure 1 of this Annex the conformity of mass-produced rear marking plates shall not be contested if the deviations of the measured values of the rear marking plates in the unfavourable directions are:

**2.1.1.1. sample A**

A1: one rear marking plate	0 per cent
one rear marking plate not more than	20 per cent
A2: both rear marking plates more than	0 per cent
but not more than	20 per cent
go to sample B	

**2.1.1.2. sample B**

B1: both rear marking plates	0 per cent
------------------------------	------------

**2.2. The conformity is contested**

- 2.2.1. Following the sampling procedure shown in Figure 1 of this Annex the conformity of mass-produced rear marking plates shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the rear marking plates are:

**2.2.1.1. sample A**

A3: one rear marking plate not more than	20 per cent
one rear marking plate more than	20 per cent
but not more than	30 per cent

**2.2.1.2. sample B**

B2: in the case of A2	
one rear marking plate more than	0 per cent
but not more than	20 per cent
one rear marking plate not more than	20 per cent

- |     |  |  |
|-----|--|--|
| B3: | in the case of A2<br>one rear marking plate<br>one rear marking plate more than<br>but not more than | 0 per cent<br>20 per cent<br>30 per cent |
|-----|--|--|
- 2.3. Approval withdrawn
- Conformity shall be contested and paragraph 10 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the rear marking plates are:
- 2.3.1. sample A
- |     |  |                            |
|-----|--|----------------------------|
| A4: | one rear marking plate not more than<br>one rear marking plate more than | 20 per cent<br>30 per cent |
| A5: | both rear marking plates more than                                       | 20 per cent                |
- 2.3.2. sample B
- |     |  |  |
|-----|--|--|
| B4: | in the case of A2<br>one rear marking plate more than<br>but not more than<br>one rear marking plate more than | 0 per cent<br>20 per cent<br>20 per cent |
| B5: | in the case of A2<br>both rear marking plates more than  | 20 per cent                              |
| B6: | in the case of A2<br>one rear marking plate<br>one rear marking plate more than                                | 0 per cent<br>30 per cent                |
3. REPEATED SAMPLING
- In the cases of A3, B2, B3 a repeated sampling, third sample C of two rear marking plates and fourth sample D of two rear marking plates, selected from stock manufactured after alignment, is necessary within two months time after the notification.
- 3.1. The conformity is not contested
- 3.1.1. Following the sampling procedure shown in Figure 1 of this Annex the conformity of mass-produced rear marking plates shall not be contested if the deviations of the measured values of the rear marking plates are:
- 3.1.1.1. sample C
- |     |   |                           |
|-----|---|---------------------------|
| C1: | one rear marking plate<br>one rear marking plate not more than            | 0 per cent<br>20 per cent |
| C2: | both rear marking plates more than<br>but not more than<br>go to sample D | 0 per cent<br>20 per cent |
- 3.1.1.2. sample D
- |     |   |            |
|-----|---|------------|
| D1: | in the case of C2<br>both rear marking plates | 0 per cent |
|-----|---|------------|
- 3.2. The conformity is contested
- 3.2.1. Following the sampling procedure shown in Figure 1 of this Annex the conformity of mass-produced rear marking plates shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the rear marking plates are:
- 3.2.1.1. sample D
- |     |  |  |
|-----|--|--|
| D2: | in the case of C2<br>one rear marking plate more than<br>but not more than<br>one rear marking plate not more than | 0 per cent<br>20 per cent<br>20 per cent |
|-----|--|--|

### 3.3. Approval withdrawn

Conformity shall be contested and paragraph 10 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the rear marking plates are:

#### 3.3.1. sample C

C3: one rear marking plate not more than	20 per cent
one rear marking plate more than	20 per cent

C4: both rear marking plates more than	20 per cent
--	-------------

#### 3.3.2. sample D

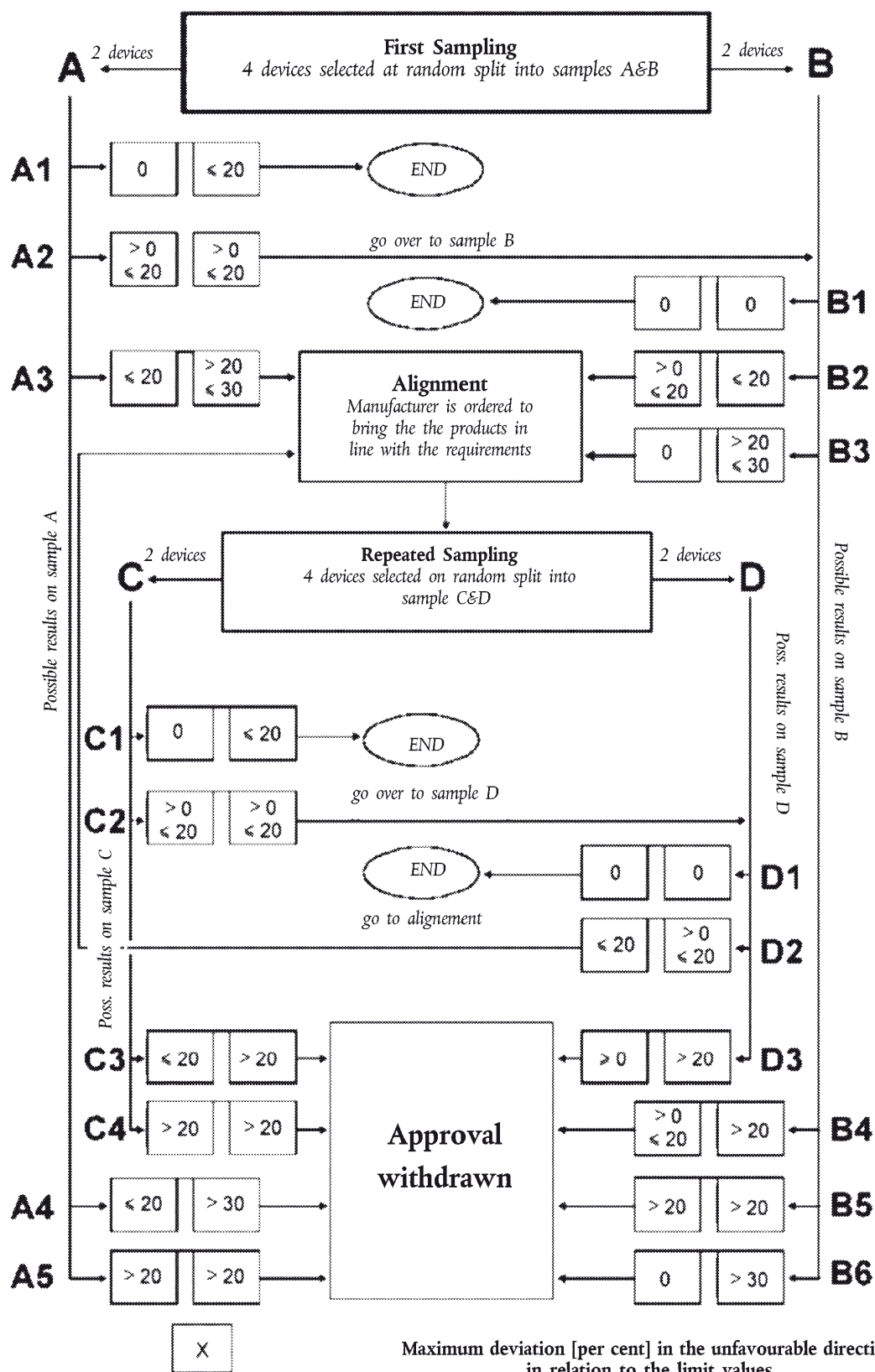
D3: in the case of C2	
one rear marking plate 0 or more than	0 per cent
one rear marking plate more than	20 per cent

### 4. RESISTANCE TESTS

Specimens of one of the rear marking plates of sample A, after sampling procedure in Figure 1 of this Annex, shall be tested according to the procedures described in Annexes 8 and 9 to this Regulation.

The rear marking plate shall be considered acceptable if the tests were passed. However, if the tests on specimens of sample A did not pass the tests, the two rear marking plates of sample B shall be subjected to the same procedure and both shall pass the test.

Figure 1



## ANNEX 15

**Guidelines for installation of rear marking plates on slow-moving vehicles (by construction) and their trailers**

1. It is recommended to the Governments to require on slow-moving vehicles which, by construction, cannot travel faster than 30 km/h, 'Rear marking plates for slow-moving vehicles and their trailers' conforming to this Regulation and the specific requirements relating to its scope in accordance with the guidelines given in this Annex.

2. Scope

The main purpose of these guidelines is to establish requirements for installation, arrangement, position and geometric visibility of rear marking plates on slow-moving vehicles and their trailers which, by construction, cannot travel faster than 30 km/h. It increases the visibility and permits an easy identification of these vehicles.

3. Number

At least one.

4. Arrangement

The rear marking plate(s) shall be type approved and meet the requirements of this Regulation.

The apex of a rear marking plate shall be directed upwards.

Every part of a rear marking plate shall lie within 5° of a transverse vertical plane at right angles to the longitudinal axis of the vehicle and shall face to the rear.

5. Position

In width: If there is only one rear marking plate, it must be on the opposite side of the median longitudinal plane of the vehicle to the direction of traffic prescribed in the country of registration.

In height: Above the ground, not less than 250 mm (lower edge), not more than 1 500 mm (upper edge).

In length: At the rear of the vehicle.

6. Geometric visibility

Horizontal angle: 30° inwards and outwards, covering by indispensable constructional parts of the vehicle up to 10 per cent of the rear marking plate surface is permitted;

Vertical angle: 15° above and below the horizontal;

Orientation: rearwards.

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Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:  
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>

**Regulation No 71 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of agricultural tractors with regard to the driver's field of vision**

Date of entry into force: 1 August 1987

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8. Penalties for non-conformity of production
9. Production definitely discontinued
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ANNEXES

- Annex 1 — Communication concerning the approval or refusal or extension or withdrawal of approval or production definitely discontinued of a tractor type with regard to the driver's field of vision, pursuant to Regulation No 71.
- Annex 2 — Arrangements of approval marks.

1. SCOPE
  - 1.1. This Regulation applies to the 180° forward field of vision of the drivers of agricultural tractors.
2. DEFINITIONS
  - 2.1. For the purposes of this Regulation 'agricultural tractor' means any power-driven vehicle, either wheeled or tracklaying, which has at least two axles, whose function depends essentially on its tractive power, and which is specially designed to pull, push, carry or actuate certain implements, machines or trailers intended for use in agriculture or forestry. Such a tractor may be arranged to carry a load and attendants.
  - 2.2. 'Approval of a tractor' means the approval of a tractor type with regard to the field of vision defined in paragraph 2.4.
  - 2.3. 'Tractor type' means a category of tractors which do not differ in such essential respects as:
    - 2.3.1. such external and internal shapes and arrangements within the area specified in paragraph 1.1 as may affect visibility;
    - 2.3.2. the form and size of the windscreen and of the side windows situated in the area specified in paragraph 1.1.
  - 2.4. 'Field of vision' means the aggregate of forward and side directions in which the tractor driver can see.

- 2.5. 'Reference point' means the point which is situated in the plane parallel to the median longitudinal plane of the tractor passing through the middle of the seat, at a position 700 mm along the vertical above the line of intersection of that plane with the surface of the seat and 270 mm – in the direction of the pelvis support – from the vertical plane tangential to the front edge of the seat surface and perpendicular to the median longitudinal plane of the tractor (see figure 1); the reference point as thus determined applies to an empty seat adjusted in the average position prescribed by the tractor manufacturer.
- 2.6. 'Semi-circle of vision' means the semi-circle described by a radius of 12 m around the point situated in the horizontal plane of the road at the vertical below the reference point so that the arc – seen from the direction in which the vehicle travels – is situated in front of the tractor and that the diameter delimiting the semi-circle forms a right angle with the longitudinal axis of the tractor (see figure 2).
- 2.7. 'Masking effect' means the chords of the sectors of the semi-circle of vision which cannot be seen because of structural components – for instance, the roof pillars, air intakes, exhaust stacks, windscreen frames, protective frame.
- 2.8. 'Area of vision' means that part of the field of vision which is delimited:
- 2.8.1. in an upward direction by a horizontal plane passing through the reference point;
- 2.8.2. on the plane of the road by the area, situated outside the semi-circle of vision, which extends the area of the semi-circle of vision, whose chord, 9,5 m in length, is perpendicular to and bisected by the plane parallel to the median longitudinal plane of the tractor passing through the middle of the driver's seat.
- 2.9. 'Operating area of the windscreen wipers' means the external surface of the windscreen which is swept by the windscreen wipers.
3. APPLICATION FOR APPROVAL
- 3.1. The application for approval of a tractor with regard to the driver's field of vision shall be submitted by the manufacturer of the tractor or by his duly accredited representative.
- 3.2. It shall be accompanied by the under-mentioned documents in triplicate, and by the following particulars:
- 3.2.1. a description of the tractor with regard to the points mentioned in paragraph 2.3 above, together with dimensioned drawings and tyre sizes designated by the manufacturer and either a photograph or an exploded view of the passenger compartment; the numbers and/or symbols identifying the tractor type shall be specified;
- 3.2.2. particulars of the position of the reference point in relation to any obstacles to the driver's vision, the particulars being sufficiently detailed for, inter alia, calculation of the masking effects according to the formula given in paragraph 5.2.2.2.
- 3.3. A tractor representative of the tractor type to be approved shall be submitted to the technical service responsible for conducting approval tests.
4. APPROVAL
- 4.1. If the tractor type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5 below, approval of that tractor type shall be granted.
- 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another tractor type as defined in paragraph 2.3 above.

- 4.3. Notice of approval or of refusal or of extension or withdrawal of approval or production definitely discontinued of a tractor type pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in annex 1 to this Regulation.
- 4.4. To every tractor conforming to a type approved pursuant to this Regulation there shall be affixed, conspicuously and in a readily accessible place specified on the approval form, an international approval mark consisting of:
- 4.4.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval <sup>(1)</sup>;
- 4.4.2. the number of this Regulation, followed by the letter 'R', a dash and the approval number to the right of the circle described in paragraph 4.4.1.
- 4.5. If the tractor conforms to a tractor type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 need not be repeated; in such a case the Regulation and approval numbers and the additional symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the tractor data plate affixed by the manufacturer.
- 4.8. Annex 2 to this Regulation gives examples of arrangements of approval marks.
5. SPECIFICATION
- 5.1. General
- 5.1.1. The tractor shall be so constructed and equipped that, in road traffic and when used in agriculture or forestry, the driver has an adequate field of vision in all normal conditions of road traffic and of field and forest work. The field of vision shall be deemed to be adequate when the driver can, wherever possible, see part of each front wheel and when the following requirements are met:
- 5.2. Verification of field of vision
- 5.2.1. Procedure for determining masking effects.
- 5.2.1.1. The tractor shall be placed on a horizontal surface as shown in figure 2. On a horizontal support level with the reference point, there shall be mounted two point sources of light, e.g. 2 × 150 W, 12 V, 65 mm apart and symmetrically located with respect to the reference point. The support shall be rotatable at its centre point about a vertical axis passing through the reference point. For the purpose of measuring the masking effects, the support shall be so aligned that the line joining the two light sources is perpendicular to the line joining the masking component and

<sup>(1)</sup> One for the Federal Republic of Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for Czechoslovakia, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 for the German Democratic Republic, 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal and 22 for the Union of Soviet Socialist Republics. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify or accede to the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.



the reference point. The most adverse arrangement of tyre equipment shall be fitted. The silhouette (deepest shadow) overlaps projected onto the semi-circle of vision by the masking component when the light sources are switched on simultaneously or alternately shall be measured in accordance with paragraph 2.7 (figure 3).

- 5.2.1.2. Each masking effect shall not exceed 700 mm.
- 5.2.1.3. Masking effects due to adjacent structural components over 80 mm in width shall be so disposed that there is an interval of at least 2 200 mm – measured as a chord of the semi-circle of vision - between the centres of two masking effects.
- 5.2.1.4. There shall not be more than six masking effects in the semi-circle of vision as a whole, nor more than two within the area of vision referred to in paragraph 2.8.
- 5.2.1.5. Masking effects exceeding 700 mm but not exceeding 1 500 mm are, however, permissible if the components causing them cannot be redesigned or relocated. Outside the sector of vision, there may be on each side a total of either:
  - 5.2.1.5.1. two such masking effects, one not exceeding 700 mm and the other not exceeding 1 500 mm; or
  - 5.2.1.5.2. two such masking effects, neither exceeding 1 200 mm.
- 5.2.1.6. Any obstruction of vision caused by the presence of rear-view mirrors of an authorized model shall not be taken into consideration if such mirrors cannot be positioned differently.
- 5.2.2. Mathematical determination of binocular-vision masking effects.
  - 5.2.2.1. The admissibility of various masking effects may be verified mathematically rather than through the verification procedure referred to in paragraph 5.2.1. The extent, distribution and number of masking effects shall be governed by paragraphs 5.2.1.3 to 5.2.1.6.
  - 5.2.2.2. On the basis of a binocular vision and a distance between the eyes of 65 mm, the masking effect expressed in mm can be calculated by the formula

$$X = \frac{b - 65}{a} \times 12000 + 65$$

where

a = the distance in mm between the component obscuring vision and the reference point, measured along the line of vision joining the reference point, the centre of the component and the perimeter of the semi-circle of vision;

b = the width in mm of the component obscuring vision, measured horizontally and perpendicularly to the line of vision.

- 5.3. The verification procedures referred to in paragraph 5.2 may be replaced by other procedures, provided that the latter can be shown to be equally valid.
- 5.4. Masking effect of the windscreen frame
 

In determining the masking effects in the sector of vision, the masking effect caused by the windscreen frame and the masking effect caused by another obstruction may, for the purposes of paragraph 5.2.1.4 be considered as a single masking effect, provided the distance between the outermost points of such masking effects does not exceed 700 mm.

- 5.5. Windscreen wiper
- 5.5.1. If the tractor is equipped with a windscreen, it shall also be equipped with one or more power-driven windscreen wipers. Their operating area shall be such as to ensure a clear forward view corresponding to one chord of the semi-circle measuring not less than 8 m, within the area of vision.
- 5.5.2. Windscreen wipers shall operate with not less than 20 wiping cycles per minute.
6. MODIFICATIONS OF THE TRACTOR TYPE AND EXTENSION OF APPROVAL
- 6.1. Every modification of the tractor type shall be notified to the administrative department, which approved the tractor type. The department may then either:
- 6.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the tractor still complies with the requirements; or
- 6.1.2. require a further test report from the technical service responsible for conducting the tests.
- 6.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3 above to the Parties to the Agreement which apply this Regulation.
- 6.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension.
7. CONFORMITY OF PRODUCTION
- 7.1. Every tractor bearing an approval mark as prescribed by this Regulation shall conform to the tractor type approved and satisfy the requirements of paragraph 5 above.
- 7.2. In order to verify conformity as prescribed in paragraph 7.1. above, a sufficient number of random checks shall be made on serially-manufactured tractors bearing the approval mark required under this Regulation.
8. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 8.1. The approval granted in respect of a tractor type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 7.1 are not complied with or if the tractor fails to pass the checks prescribed in paragraph 7 above.
- 8.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation 'APPROVAL WITHDRAWN'.
9. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a tractor type approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation 'PRODUCTION DISCONTINUED'.

10. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal or extension or withdrawal of approval, issued in other countries, are to be sent.

Figure 1

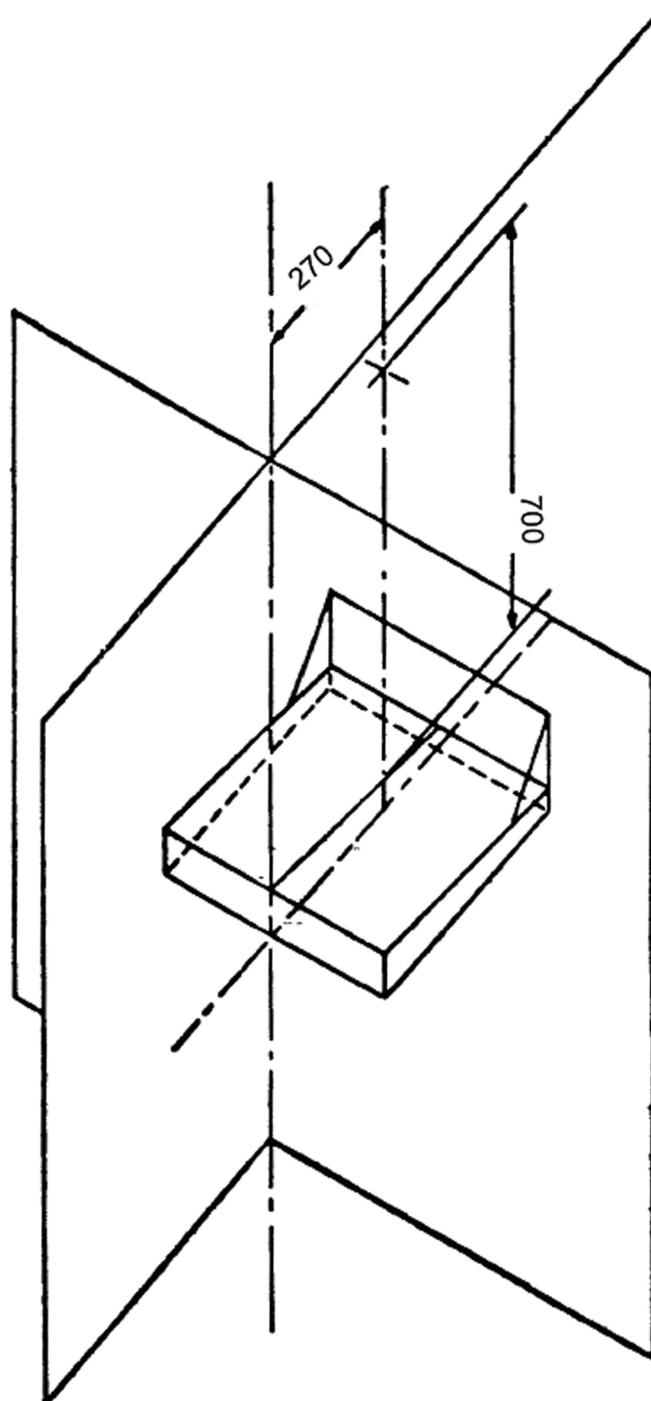


Figure 2

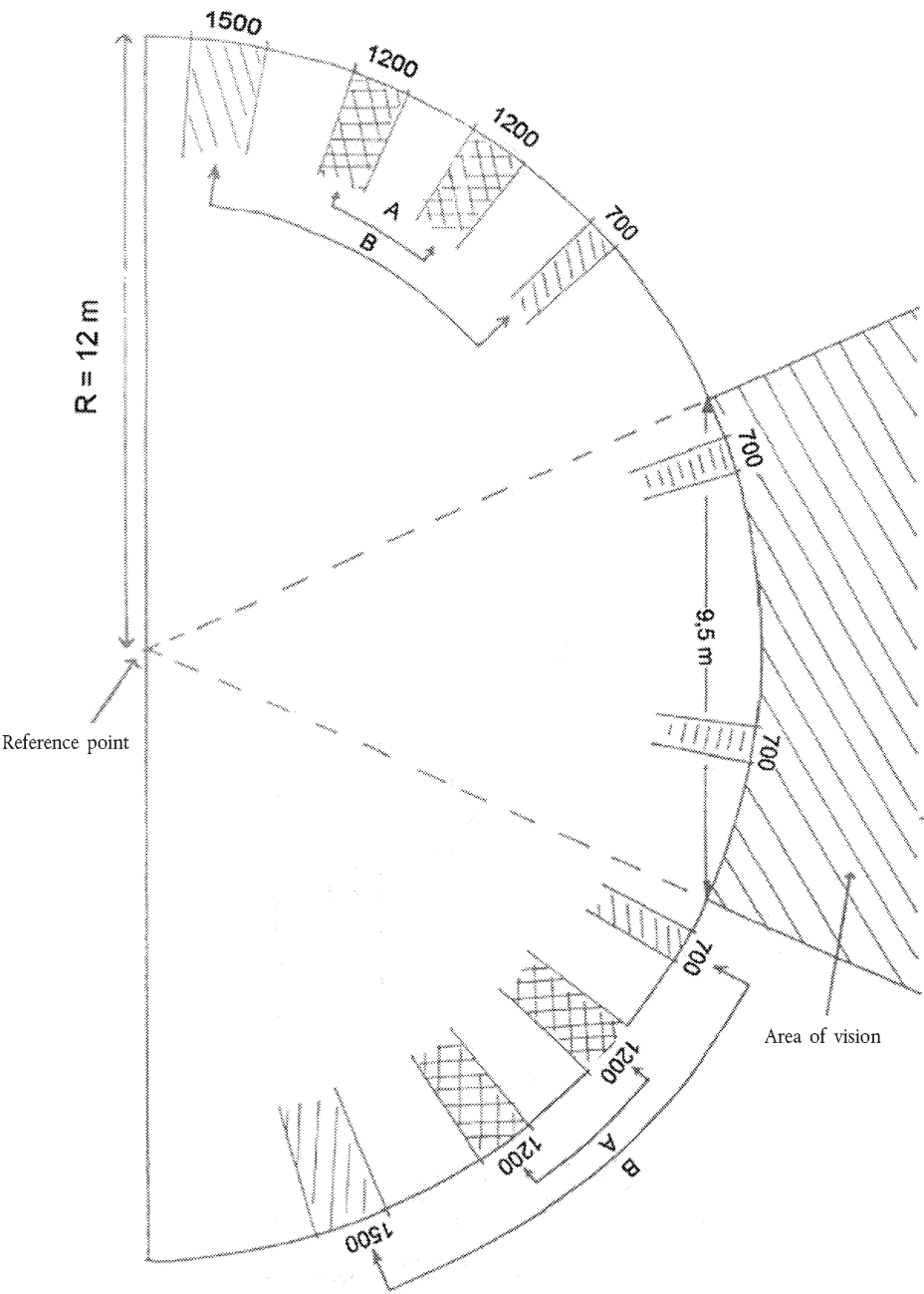
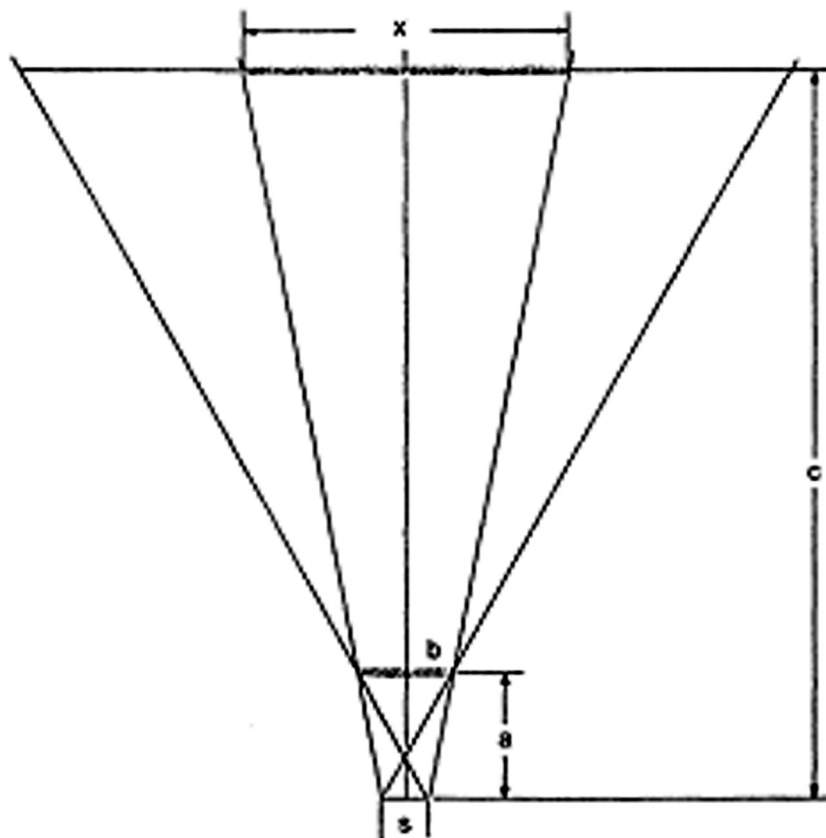


Figure 3



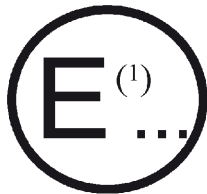
$$\frac{\frac{x}{2} - \frac{s}{2}}{c} = \frac{\frac{b}{2} - \frac{s}{2}}{a}$$

$$x = \frac{b - 65}{a} \times 12000 + 65$$

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## ANNEX I

(Maximum format: A4 (210 × 297 mm))

Communication concerning <sup>(2)</sup>: APPROVAL

REFUSAL OF APPROVAL

EXTENSION OF APPROVAL

WITHDRAWAL OF APPROVAL

PRODUCTION DEFINITELY

DISCONTINUED

of a tractor type with regard to the driver's field of vision, pursuant to Regulation No 71

Approval No ..... Extension No .....

1. Trade name or mark of tractor .....
2. Tractor type .....
3. Manufacturer's name and address .....
4. If applicable, name and address of manufacturer's representative .....
5. Brief description of tractor .....
6. The most adverse arrangement of tyre equipment for forward vision  
(front, rear) .....
7. Tractor submitted for approval on .....
8. Technical service responsible for conducting approval tests .....
9. Date of report issued by that service .....
10. Number of report issued by that service .....
11. Approval granted/refused/extended/withdrawn <sup>(2)</sup> .....
12. Reason(s) of extension (if applicable) .....
13. Site of approval mark on tractor .....
14. Place .....
15. Date .....
16. Signature .....
17. The following documents, bearing the approval number shown above, are annexed to this communication:  
dimensioned drawings;  
exploded view or photograph of the passenger compartment.

<sup>(1)</sup> Name of administration.<sup>(2)</sup> Strike out what does not apply.

ANNEX 2

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

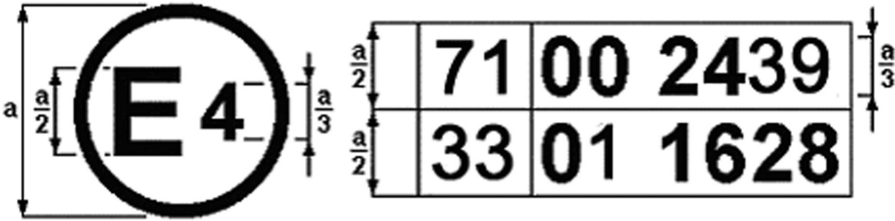
(see paragraph 4.4 of this Regulation)



The above approval mark affixed to a tractor shows that the tractor type concerned has, with regard to the driver's field of vision, been approved in the Netherlands (E 4) pursuant to Regulation No 71 under the approval number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 71 in its original form.

MODEL B

(see paragraph 4.5 of this Regulation)



The above approval mark affixed to a tractor shows that the tractor type concerned has been approved in the Netherlands (E 4) pursuant to Regulations No 71 and No 33 <sup>(1)</sup>. The first two digits of the approval numbers indicate that, at the dates when the respective approvals were granted, Regulation No 71 had not been modified, and Regulation No 33 already included the 01 series of amendments.

<sup>(1)</sup> The latter number is given as an example only.

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:  
<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>

**Regulation No 125 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicles with regard to the forward field of vision of the motor vehicle driver**

Incorporating all valid text up to:

Supplement 1 to the original version of the Regulation — Date of entry into force: 3 February 2008

Supplement 2 to the original version of the Regulation — Date of entry into force: 19 August 2010

CONTENTS

REGULATION

1. Scope and purpose
2. Definitions
3. Application for approval
4. Approval
5. Specifications
6. Test procedure
7. Modification of vehicle type and extension of approval
8. Conformity of production
9. Penalties for non-conformity of production
10. Production definitely discontinued
11. Names and addresses of Technical Services responsible for conducting approval tests, and of Administrative Departments

ANNEXES

- Annex 1 — Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a type of vehicle with regard to the driver's forward field of vision pursuant to Regulation No 125
- Annex 2 — Arrangements of approval marks
- Annex 3 — Procedure for determining the 'H' point and the actual torso angle for seating positions in motor vehicles
- Annex 4 — Method for determining the dimensional relationships between the vehicle's primary reference marks and the three-dimensional reference grid

1. SCOPE AND PURPOSE
- 1.1. This Regulation applies to the 180° forward field of vision of drivers of category M1 vehicles <sup>(1)</sup>.
- 1.2. Its purpose is to ensure an adequate field of vision when the windscreen and other glazed surfaces are dry and clean.
- 1.3. The requirements of this Regulation are so worded as to apply to category M1 vehicles in which the driver is on the left. In category M1 vehicles in which the driver is on the right these requirements shall be applied by inverting the criteria, when appropriate.

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



## 2. DEFINITIONS

For the purposes of this Regulation:

- 2.1. 'Approval of a vehicle type' means the full procedure whereby a Contracting Party to the Agreement certifies that a vehicle type meets the technical requirements of this Regulation;
- 2.2. 'Vehicle type with regard to the field of vision' means vehicles which do not differ in such essential aspects as:
  - 2.2.1. the external and internal forms and arrangements within the area specified in paragraph 1 which may affect visibility; and
  - 2.2.2. the shape and dimensions of the windscreen and its mounting;
- 2.3. 'Three-dimensional reference grid' means a reference system which consists of a vertical longitudinal plane X-Z, a horizontal plane X-Y and a vertical transverse plane Y-Z (see Annex 4, appendix, figure 6); the grid is used to determine the dimensional relationships between the position of design points on drawings and their positions on the actual vehicle. The procedure for situating the vehicle relative to the grid is specified in Annex 4; all coordinates referred to ground zero shall be based on a vehicle in running order<sup>(1)</sup> plus one front-seat passenger, the mass of the passenger being 75 kg  $\pm$  1 per cent.
  - 2.3.1. Vehicles fitted with suspension enabling their ground clearance to be adjusted shall be tested under the normal conditions of use specified by the vehicle manufacturer.
- 2.4. 'Primary reference marks' means holes, surfaces, marks and identification signs on the vehicle body. The type of reference mark used and the position of each mark relative to the X, Y and Z coordinates of the three-dimensional reference grid and to a design ground plane shall be specified by the vehicle manufacturer. These marks may be the control points used for body-assembly purposes.
- 2.5. 'Seat-back angle' means the angle defined in Annex 3, paragraph 2.6 or 2.7.
- 2.6. 'Actual seat-back angle' means the angle defined in Annex 3, paragraph 2.6.
- 2.7. 'Design seat-back angle' means the angle defined in Annex 3, paragraph 2.7.
- 2.8. 'V points' means points whose position in the passenger compartment is determined as a function of vertical longitudinal planes passing through the centres of the outermost designated seating positions on the front seat and in relation to the 'R' point and the design angle of the seat-back, which points are used for verifying compliance with the field of vision requirements.

<sup>(1)</sup> The mass of a vehicle in running order includes the mass of the vehicle and its body with cooling fluid, lubricants, fuel, 100 per cent of other liquids, tools, spare wheel and driver. The mass of the driver is evaluated at 75 kg (distributed as follows: 68 kg for the mass of the occupant and 7 kg for the mass of luggage, in accordance with ISO Standard 2416:1992. The tank contains 90 per cent and the other liquid-containing appliances (other than those intended for waste water) 100 per cent of the capacity declared by the manufacturer.

- 2.9. 'R point or seating reference point' means the point defined in Annex 3, paragraph 2.4.
- 2.10. 'H point' means the point defined in Annex 3, paragraph 2.3.
- 2.11. 'Windscreen datum points' means points situated at the intersection with the windscreen of lines radiating forward from the V points to the outer surface of the windscreen.
- 2.12. 'Armoured vehicle' means a vehicle intended for the protection of conveyed passengers and/or goods and complying with armour plating anti-bullet requirements.
- 2.13. 'Transparent area' means that area of a vehicle windscreen or other glazed surface whose light transmittance measured at right angles to the surface is not less than 70 per cent. In the case of armoured vehicles the light transmittance factor is not less than 60 per cent.
- 2.14. 'P points' means the points about which the driver's head rotates when he views objects on a horizontal plane at eye level.
- 2.15. 'E points' means points representing the centres of the driver's eyes and used to assess the extent to which A pillars obscure the field of vision.
- 2.16. 'A pillar' means any roof support forward of the vertical transverse plane located 68 mm in front of the V points and includes non-transparent items such as windscreen mouldings and door frames, attached or contiguous to such a support.
- 2.17. 'Horizontal seat-adjustment range' means the range of normal driving positions designated by the vehicle manufacturer for the adjustment of the driver's seat in the direction of the X axis (see paragraph 2.3 above).
- 2.18. 'Extended seat-adjustment range' means the range designated by the vehicle manufacturer for the adjustment of the seat in the direction of the X axis (see paragraph 2.3 above) beyond the range of normal driving positions specified in paragraph 2.16 and used for converting seats into beds or facilitating entry to the vehicle.
3. APPLICATION FOR APPROVAL
- 3.1. The application for approval of a vehicle type with regard to the driver's field of vision shall be submitted by the vehicle manufacturer or by his authorized representative.
- 3.2. It shall be accompanied by the documents mentioned below in triplicate and include the following particulars:
- 3.2.1. a description of the vehicle type with regard to the items mentioned in paragraph 2.2, together with dimensional drawings and either a photograph or an exploded view of the passenger compartment. The numbers and/or symbols identifying the vehicle type shall be specified; and
- 3.2.2. particulars of the primary reference marks in sufficient detail to enable them to be readily identified and the position of each in relation to the others and to the 'R' point verified.

- 3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the Technical Service conducting the approval tests.
4. APPROVAL
- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 5 below, approval of that vehicle shall be granted.
- 4.2. An approval number shall be assigned to each type approved; its first two digits (00 for the Regulation in its initial form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to the same vehicle type equipped with another type of field of vision, or to another vehicle type.
- 4.3. Notice of approval or of refusal or withdrawal of approval pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 and photographs and/or plans supplied by the applicant being in a format not exceeding A4 (210 × 297 mm), or folded to that format, and on an appropriate scale.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark conforming to the model described in Annex 2, consisting of:
- 4.4.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval <sup>(1)</sup>;
- 4.4.2. the number of this Regulation, followed by the letter 'R', a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1 above.
- 4.5. If the vehicle conforms to a vehicle type approved under one or more other Regulations, annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 need not be repeated; in such a case, the Regulation and approval numbers and the additional symbols shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1 above.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate.

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

5. SPECIFICATIONS

5.1. Driver's field of vision.

5.1.1. The transparent area of the windscreen must include at least the windscreen datum points (see Annex 4, appendix, figure 1):

5.1.1.1. a horizontal datum point forward of V1 and 17° to the left (see Annex 4, appendix, figure 1);

5.1.1.2. an upper vertical datum point forward of V1 and 7° above the horizontal;

5.1.1.3. a lower vertical datum point forward of V2 and 5° below the horizontal;

5.1.1.4. to verify compliance with the forward-vision requirement on the opposite half of the windscreen, three additional datum points, symmetrical to the points defined in paragraphs 5.1.1.1 to 5.1.1.3 in relation to the median longitudinal plane of the vehicle, are obtained.

5.1.2. The angle of obstruction for each 'A' pillar, as described in paragraph 5.1.2.1, shall not exceed 6° (see Annex 4, appendix, figure 3). In the case of armoured vehicles that angle shall not exceed 10°.

The angle of obstruction of the 'A' pillar on the passenger side, as defined in paragraph 5.1.2.1.2, need not be determined if the two pillars are located symmetrically in relation to the median longitudinal vertical plane of the vehicle.

5.1.2.1. The angle of obstruction of each A pillar shall be measured by superimposing in a plane the following two horizontal sections:

Section 1: starting from the Pm point situated at the location defined in paragraph 5.3.1.1, draw a plane forming an angle of 2° upwards in relation to the horizontal plane passing forward through Pm. Determine the horizontal section of the 'A' pillar starting from the foremost point of the intersection of the 'A' pillar and the inclined plane (see Annex 4, appendix, figure 2).

Section 2: repeat the same procedure, taking a plane declining at an angle of 5° downwards in relation to the horizontal plane passing forward through Pm (see Annex 4, appendix, figure 2).

5.1.2.1.1. The angle of obstruction of the A pillar on the driver's side is the angle formed on the plane view by a parallel, starting from E2, to the tangent joining E1 with the outer edge of section S2 and the tangent joining E2 to with the inner edge of section S1 (see Annex 4, appendix, figure 3).

5.1.2.1.2. The angle of obstruction of the A pillar on the passenger side is the angle formed on the plane view by the tangent joining E3 to the inner edge of section S1 and a parallel, starting from E3, to the tangent joining E4 to the outer edge of section S2 (see Annex 4, appendix, figure 3).

5.1.2.2. No vehicle shall have more than two A pillars.

- 5.1.3. Other than the obstructions created by the A pillars, the fixed or movable vent or side window division bars, outside radio aerials, rear-view mirrors and windscreen wipers, there should be no obstruction in the driver's 180° forward direct field of vision below a horizontal plane passing through V1, and above three planes through V2, one being perpendicular to the plane X-Z and declining forward 4° below the horizontal, and the other two being perpendicular to the plane Y-Z and declining 4° below the horizontal (see Annex 4, appendix, figure 4).

The following are not considered to be obstructions to the field of vision:

- (a) embedded or printed 'radio aerial' conductors, no wider than the following:
- (i) embedded conductors: 0,5 mm;
  - (ii) printed conductors: 1,0 mm. These 'radio aerial' conductors shall not cross zone A <sup>(1)</sup>. However, three 'radio aerial' conductors may cross zone A if their width does not exceed 0,5 mm;
- (b) within zone A located 'defrosting/demisting' normally in 'zigzag' or sinusoidal form having the following dimensions:
- (i) maximum visible width: 0,030 mm;
  - (ii) maximum conductor density:
    - (a) if the conductors are vertical: 8/cm;
    - (b) if the conductors are horizontal: 5/cm.

- 5.1.3.1. An obstruction created by the steering-wheel rim and the instrument panel inside the steering wheel will be tolerated if a plane through V2, perpendicular to the plane X-Z and tangential to the highest part of the steering-wheel rim, is declined at least 1° below the horizontal.

The steering wheel, if adjustable, shall be placed in the normal position indicated by the manufacturer or, failing that, midway between the limits of its range(s) of adjustment.

## 5.2. Position of the V points

- 5.2.1. The position of the V points in relation to the 'R' point, as indicated by XYZ coordinates from the three dimensional reference grid, are as shown in Tables I and IV.
- 5.2.2. Table I indicates the basic coordinates for a design seat-back angle of 25°. The positive direction for the coordinates is indicated in Annex 4, appendix, figure 1.

Table I

V-point	X	Y	Z
V1	68 mm	- 5 mm	665 mm
V2	68 mm	- 5 mm	589 mm

## 5.3. Position of the P points

- 5.3.1. The position of the P points in relation to the 'R' point, as indicated by the XYZ coordinates from the three-dimensional reference grid, are as shown by Tables II, III and IV.

<sup>(1)</sup> As defined in Annex 18, paragraph 2.2 of Regulation No 43 concerning the approval of safety glazing and glazing material.

- 5.3.1.1. Table II sets out the base coordinates for a design seat-back angle of 25°. The positive direction of the coordinates is set out in Annex 4, appendix, figure 1.

The Pm point is the point of intersection between the straight line joining P1, P2 and the longitudinal vertical plane passing through the 'R' point.

Table II

Point P	X	Y	Z
P1	35 mm	– 20 mm	627 mm
P2	63 mm	47 mm	627 mm
Pm	43,36 mm	0 mm	627 mm

- 5.3.1.2. Table III indicates the further corrections to be made to the X coordinates of P1 and P2 when the horizontal seat-adjustment range as defined in paragraph 2.16 exceeds 108 mm. The positive direction for the coordinates is indicated in Annex 4, appendix, figure 1.

Table III

Horizontal seat-adjustment range	$\Delta x$
108 to 120 mm	– 13 mm
121 to 132 mm	– 22 mm
133 to 145 mm	– 32 mm
146 to 158 mm	– 42 mm
more than 158 mm	– 48 mm

- 5.4. Correction for design seat-back angles other than 25°

Table IV indicates the further corrections to be made to the X and Z coordinates of each P point and each V point when the design seat-back angle is not 25°. The positive direction for the coordinates is indicated in Annex 4, appendix, figure 1.

Table IV

Seat-back angle (in °)	Horizontal coordinates $\Delta x$	Vertical coordinates $\Delta z$	Seat-back angle (in °)	Horizontal coordinates $\Delta x$	Vertical coordinates $\Delta z$
5	– 186 mm	28 mm	23	– 18 mm	5 mm
6	– 177 mm	27 mm	24	– 9 mm	3 mm
7	– 167 mm	27 mm	25	0 mm	0 mm
8	– 157 mm	27 mm	26	9 mm	– 3 mm
9	– 147 mm	26 mm	27	17 mm	– 5 mm
10	– 137 mm	25 mm	28	26 mm	– 8 mm
11	– 128 mm	24 mm	29	34 mm	– 11 mm
12	– 118 mm	23 mm	30	43 mm	– 14 mm
13	– 109 mm	22 mm	31	51 mm	– 18 mm
14	– 99 mm	21 mm	32	59 mm	– 21 mm
15	– 90 mm	20 mm	33	67 mm	– 24 mm
16	– 81 mm	18 mm	34	76 mm	– 28 mm
17	– 72 mm	17 mm	35	84 mm	– 32 mm
18	– 62 mm	15 mm	36	92 mm	– 35 mm
19	– 53 mm	13 mm	37	100 mm	– 39 mm
20	– 44 mm	11 mm	38	108 mm	– 43 mm
21	– 35 mm	9 mm	39	115 mm	– 48 mm
22	– 26 mm	7 mm	40	123 mm	– 52 mm

- 5.5. Position of the E points
- 5.5.1. E1 and E2 points are each 104 mm from P1.  
  
E2 is 65 mm from E1 (see Annex 4, appendix, figure 4).
- 5.5.2. The straight line joining E1 and E2 is rotated about P1 until the tangent joining E1 to the outer edge of Section 2 of the 'A' pillar on the driver's side is normal to the straight line E1-E2 (see Annex 4, appendix, figure 3).
- 5.5.3. E3 and E4 are each 104 mm from points P2 E3 is 65 mm from E4 (see Annex 4, Appendix, Figure 4).
- 5.5.4. The straight line E3-E4 is rotated about P2 until the tangent joining E4 to the outer edge of Section 2 of the A pillar on the passenger's side is normal to the straight line E3-E4 (see Annex 4, appendix, figure 3).
- 6. TEST PROCEDURE
- 6.1. Driver's field of vision
- 6.1.1. The dimensional relationships between the vehicle's primary reference marks and the three-dimensional reference grid shall be determined by the procedure prescribed in Annex 4.
- 6.1.2. The position of the points V1 and V2 is determined in relation to the 'R' point as indicated by the XYZ coordinates of the three-dimensional reference grid and are shown in Table I under paragraph 5.2.2 and Table IV under paragraph 5.4. The windscreen datum points shall then be found from the corrected V points as prescribed in paragraph 5.1.1.
- 6.1.3. The relationship between the P points, the 'R' point, and the centre-line of the driver's seating position, as indicated by XYZ coordinates from the three-dimensional reference grid, shall be determined from Tables II and III in paragraph 5.3. The correction for design seat-back angles other than 25° is shown in Table IV under 5.4.
- 6.1.4. The angle of obstruction (see paragraph 5.1.2) shall be measured in the inclined planes, as indicated in Annex 4, appendix, figure 2. The relationship between P1 and P2, which are connected to E1 and E2 and E3 and E4 respectively, is shown in Annex 4, appendix, figure 5.
- 6.1.4.1. Straight line E1-E2 shall be set as described in paragraph 5.5.2. The angle of obstruction of the A pillar on the driver's side shall be measured as specified in paragraph 5.1.2.1.1.
- 6.1.4.2. Straight line E3-E4 shall be set as described in paragraph 5.5.4. The angle of obstruction of the A pillar on the passenger side shall then be measured as specified in paragraph 5.1.2.1.2.
- 6.1.5. The manufacturer may measure the angle of obstruction either on the vehicle or in the drawings. In the event of doubt the Technical Services may require the tests be carried out on the vehicle.
- 7. MODIFICATION OF VEHICLE TYPE AND EXTENSION OF APPROVAL
- 7.1. Every modification of the vehicle type as defined in paragraph 2.2 above shall be notified to the Administrative Department which approved the vehicle type. The department may then either:
  - 7.1.1. consider that the modifications made do not have an adverse effect on the conditions of the granting of the approval and grant an extension of approval;
  - 7.1.2. consider that the modifications made affect the conditions of the granting of the approval and require further tests or additional checks before granting an extension of approval.

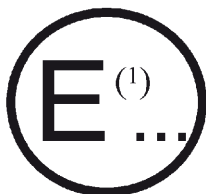
- 7.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.3 above to the Contracting Parties to the Agreement which apply this Regulation.
- 7.3. The Competent Authority shall inform the other Contracting Parties of the extension by means of the communication form which appears in Annex 2 to this Regulation. It shall assign a serial number to each extension, to be known as the extension number.
8. CONFORMITY OF PRODUCTION
- 8.1. Procedures concerning conformity of production shall conform to the general provisions defined in Appendix 2 to the Agreement (E/ECE/324-E/ECE/TRANS/505/Rev.2) and meet the following requirements:
- 8.2. A vehicle approved pursuant to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements of paragraph 5 above;
- 8.3. The Competent Authority which has granted approval may at any time verify the conformity of control methods applicable to each production unit. The normal frequency of such inspections shall be once every two years.
9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 8 above are not complied with.
- 9.2. If a Contracting Party withdraws an approval it had previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by sending them a communication form conforming to the model in Annex 1 to this Regulation.
10. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall so inform the authority which granted the approval, which in turn shall forthwith inform the other Contracting Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
11. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS
- The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Administrative Departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval are to be sent.
-



## ANNEX 1

## COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning <sup>(2)</sup>: APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a type of vehicle with regard to the driver's forward field of vision pursuant to Regulation No 125

Approval No: ..... Extension No: .....

1. Trademark: .....
2. Type and trade name(s): .....
3. Name and address of manufacturer: .....
4. If applicable, name and address of manufacturer's representative: .....
5. Brief description of vehicle: .....
6. Data to enable the identification of reference point 'R' of the seating position designated for the driver in relation to the primary reference marks: .....
7. Identification, place and relative positions of the primary reference marks: .....
8. Date of submission of vehicle for approval: .....
9. Technical Service performing the approval tests: .....
10. Date of report issued by that service: .....
11. Number of report issued by that service: .....
12. Approval with regard to the driver's field of vision is granted/refused <sup>(2)</sup>: .....
13. Place: .....
14. Date: .....
15. Signature: .....
16. Annexed to this communication are the following documents, bearing the approval number indicated above:
  - ..... dimensional drawings
  - ..... exploded view or photograph of the passenger compartment
17. Any remarks: .....

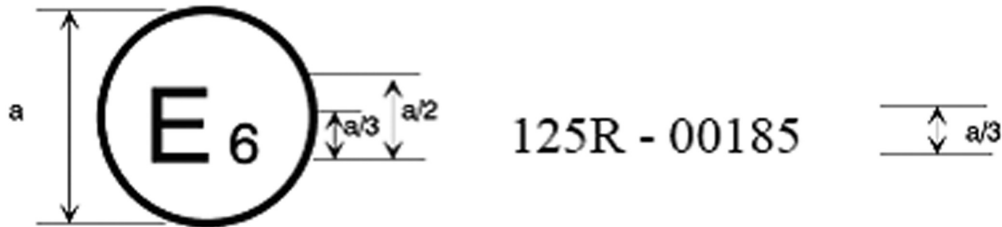
<sup>(1)</sup> Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).

<sup>(2)</sup> Delete what does not apply.

## ANNEX 2

## ARRANGEMENTS OF APPROVAL MARKS

(see paragraphs 4.4 to 4.4.2 of this Regulation)



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

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in Belgium (E6) with regard to the driver's forward field of vision pursuant to Regulation No 125. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 125 in its original form.

## ANNEX 3

**Procedure for determining the 'H' point and the actual torso angle for seating positions in motor vehicles****1. PURPOSE**

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

**2. DEFINITIONS**

For the purposes of this annex.

- 2.1. 'Reference data' means one or several of the following characteristics of a seating position:
- 2.1.1. the 'H' point and the 'R' point and their relationship;
- 2.1.2. the actual torso angle and the design torso angle and their relationship.
- 2.2. 'Three-dimensional H-point machine' (3-D 'H' machine) means the device used for the determination of 'H' points and actual torso angles. This device is described in Appendix 1 to this annex.
- 2.3. 'H' point means the pivot centre of the torso and thigh of the 3-D H machine installed in the vehicle seat in accordance with the procedure described in paragraph 4 below. The 'H' point is located in the centre of the centre line of the device which is between the 'H' point sight buttons on either side of the 3-D H machine. The 'H' point corresponds theoretically to the 'R' point (for tolerances, see paragraph 3.2.2 below). Once determined in accordance with the procedure described in paragraph 4, the 'H' point is considered as fixed in relation to the seat-cushion structure and as moving with it when the seat is adjusted.
- 2.4. 'R' point or 'seating reference point' means a design point defined by the vehicle manufacturer for each seating position and established with respect to the three-dimensional reference system.
- 2.5. 'Torso line' means the centre line of the probe of the 3-D H machine with the probe in the fully rearward position.
- 2.6. 'Actual torso angle' means the angle measured between a vertical line through the 'H' point and the torso line using the back angle quadrant on the 3-D H machine. The actual torso angle corresponds theoretically to the design torso angle (for tolerances, see paragraph 3.2.2 below).
- 2.7. 'Design torso angle' means the angle measured between a vertical line through the 'R' point and the torso line in a position corresponding to the design position of the seat-back specified by the vehicle manufacturer.
- 2.8. 'Centre plane of occupant' (CPO) means the median plane of the 3-D H machine positioned in each designated seating position; it is represented by the co-ordinate of the 'H' point on the Y axis. For individual seats, the centre plane of the seat coincides with the centre plane of the occupant. For other seats, the centre plane of the occupant is specified by the manufacturer.
- 2.9. 'Three-dimensional reference system' means a system as described in Appendix 2 of this annex.
- 2.10. 'Fiducial marks' are physical points (holes, surfaces, marks or indentations) on the vehicle body as defined by the manufacturer.
- 2.11. 'Vehicle measuring attitude' means the position of the vehicle as defined by the coordinates of fiducial marks in the three-dimensional reference system.

**3. REQUIREMENTS****3.1. Data presentation**

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

- 3.1.1. the coordinates of the 'R' point relative to the three-dimensional reference system;

<sup>(1)</sup> In any seating position other than front seats where the 'H' point cannot be determined using the 'three-dimensional H-point machine' or other procedures, the 'R' point indicated by the vehicle manufacturer may be taken as a reference at the discretion of the Competent Authority.

- 3.1.2. the design torso angle;
- 3.1.3. all indications necessary to adjust the seat (if it is adjustable) to the measuring position set out in paragraph 4.3 below.
- 3.2. Relationship between measured data and design specifications
- 3.2.1. The coordinates of the 'H' point and the value of the actual torso angle obtained by the procedure set out in paragraph 4 below shall be compared, respectively, with the coordinates of the 'R' point and the value of the design torso angle indicated by the vehicle manufacturer.
- 3.2.2. The relative positions of the 'R' point and the 'H' point and the relationship between the design torso angle and the actual torso angle shall be considered satisfactory for the seating position in question if the 'H' point, as defined by its coordinates, lies within a square of 50 mm side length with horizontal and vertical sides whose diagonals intersect at the 'R' point, and if the actual torso angle is within 5° of the design torso angle.
- 3.2.3. If these conditions are met, the 'R' point and the design torso angle shall be used to demonstrate compliance with the provisions of this Regulation;
- 3.2.4. If the 'H' point or the actual torso angle does not satisfy the requirements of item 3.2.2 above, the 'H' point and the actual torso angle shall be determined twice more (three times in all). If the results of two of these three operations satisfy the requirements, the conditions of paragraph 3.2.3 above shall apply;
- 3.2.5. If the results of at least two of the three operations described in paragraph 3.2.4 above do not satisfy the requirements of paragraph 3.2.2 above, or if the verification cannot take place because the vehicle manufacturer has failed to supply information regarding the position of the 'R' point or regarding the design torso angle, the centroid of the three measured points or the average of the three measured angles shall be used and be regarded as applicable in all cases where the 'R' point or the design torso angle is referred to in this Regulation.
4. PROCEDURE FOR 'H' POINT AND ACTUAL TORSO ANGLE DETERMINATION
- 4.1. The vehicle shall be preconditioned, at the manufacturer's discretion, at a temperature of 20 °C + 10 °C to ensure that the seat material reaches room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for one minute to flex the cushion and back. At the manufacturer's request, all seat assemblies shall remain unloaded for a minimum period of 30 minutes prior to installation of the 3-D H machine.
- 4.2. The vehicle shall be in the measuring attitude defined in paragraph 2.11 above.
- 4.3. The seat, if it is adjustable, shall be adjusted first to the rearmost normal driving or riding position, as indicated by the vehicle manufacturer, taking into consideration only the longitudinal adjustment of the seat, excluding seat travel used for purposes other than normal driving or riding positions. Where other modes of seat adjustment exist (vertical, angular, seat-back, etc.), these will then be adjusted to the position specified by the vehicle manufacturer. For suspension seats, the vertical position shall be rigidly fixed corresponding to a normal driving position as specified by the manufacturer.
- 4.4. The area of the seating position taken up by the 3-D H machine shall be covered by a muslin cotton, of sufficient size and appropriate texture, described as a plain cotton fabric having 18,9 threads per cm<sup>2</sup> and weighing 0,228 kg/m<sup>2</sup>, or knitted or non-woven fabric having equivalent characteristics.
- If the test is performed on a seat outside the vehicle, the floor on which the seat is placed shall have the same essential characteristics<sup>(1)</sup> as the floor of the vehicle in which the seat is intended to be used.
- 4.5. Place the seat and back assembly of the 3-D H machine so that the centre plane of the occupant (CPO) coincides with the centre plane of the 3-D H machine. At the manufacturer's request, the 3-D H machine may be moved inboard with respect to the CPO if the 3-D H machine is located so far outboard that the seat edge will not permit levelling of the 3-D H machine.

<sup>(1)</sup> Tilt angle, height difference with a seat mounting, surface texture, etc.

- 4.6. Attach the foot and lower leg assemblies to the seat-pan assembly, either individually or by using the T-bar and lower leg assembly. The line through the 'H' point sight buttons shall be parallel to the ground and perpendicular to the longitudinal centre plane of the seat.
- 4.7. Adjust the feet and leg positions of the 3-D H machine as follows:
- 4.7.1. Designated seating position: driver and outside front passenger
- 4.7.1.1. Both feet and leg assemblies shall be moved forward in such a way that the feet take up natural positions on the floor, between the operating pedals if necessary. Where possible the left foot shall be located at approximately the same distance to the left of the centre plane of the 3-D H machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3-D H machine is brought to the horizontal by readjustment of the seat pan if necessary, or by adjusting the leg and foot assemblies towards the rear. The line passing through the 'H' point sight buttons shall be maintained perpendicular to the longitudinal centre plane of the seat.
- 4.7.1.2. If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure, move the left foot until it is supported. The alignment of the sight buttons shall be maintained.
- 4.7.2. Designated seating position: outboard rear seat
- For rear seats or auxiliary seats, the legs are located as specified by the manufacturer. If the feet then rest on parts of the floor which are at different levels, the foot which first comes into contact with the front seat shall serve as a reference and the other foot shall be so arranged that the spirit level giving the transverse orientation of the seat of the device indicates the horizontal.
- 4.7.3. Other designated seating positions:
- The general procedure indicated in paragraph 4.7.1 above shall be followed, except that the feet shall be placed as specified by the vehicle manufacturer.
- 4.8. Apply lower leg and thigh weights and level the 3-D H machine.
- 4.9. Tilt the back pan forward against the forward stop and draw the 3-D H machine away from the seat-back using the T-bar. Reposition the 3-D H machine on the seat by one of the following methods:
- 4.9.1. If the 3-D H machine tends to slide rearward, use the following procedure. Allow the 3-D H machine to slide rearward until a forward horizontal restraining load on the T-bar is no longer required, i.e. until the seat pan contacts the seat-back. If necessary, reposition the lower leg.
- 4.9.2. If the 3-D H machine does not tend to slide rearward, use the following procedure. Slide the 3-D H machine rearward by applying a horizontal rearward load to the T-bar until the seat pan contacts the seat-back (see figure 2 of the Appendix 1 to this annex).
- 4.10. Apply a  $100 \pm 10$  N load to the back and pan assembly of the 3-D H machine at the intersection of the hip angle quadrant and the T-bar housing. The direction of load application shall be maintained along a line passing through the above intersection to a point just above the thigh bar housing (see figure 2 of Appendix 1 to this annex). Then carefully return the back pan to the seat-back. Care must be exercised throughout the remainder of the procedure to prevent the 3-D H machine from sliding forward.
- 4.11. Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3-D H machine level.
- 4.12. Tilt the back pan forward to release the tension on the seat-back. Rock the 3-D H machine from side to side through a  $10^\circ$  arc ( $5^\circ$  to each side of the vertical centre plane) for three complete cycles to release any accumulated friction between the 3-D H machine and the seat.

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

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

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

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

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

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

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

4.14. Take all measurements:

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

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

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

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

This place shall be:

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

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

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## Appendix 1

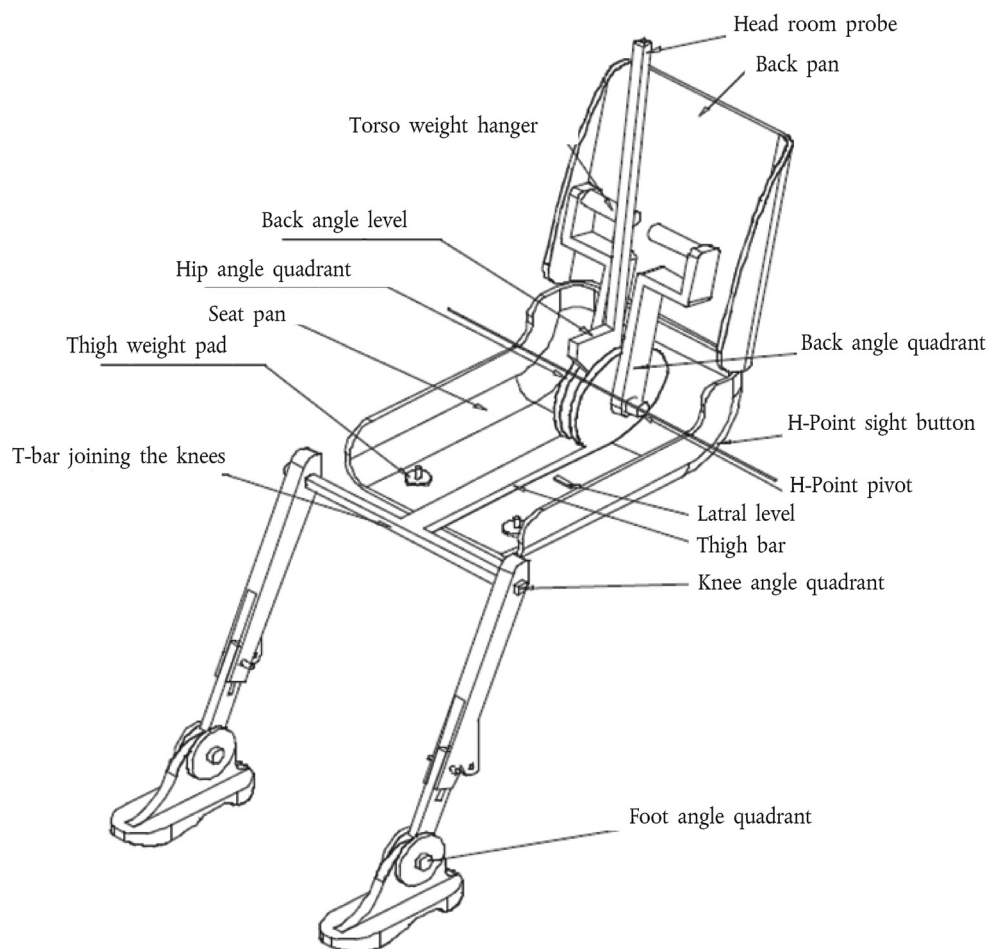
**Description of the three-dimensional 'H' point machine (3-D H machine) <sup>(1)</sup>****1. BACK AND SEAT PANS**

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

**2. BODY AND LEG ELEMENTS**

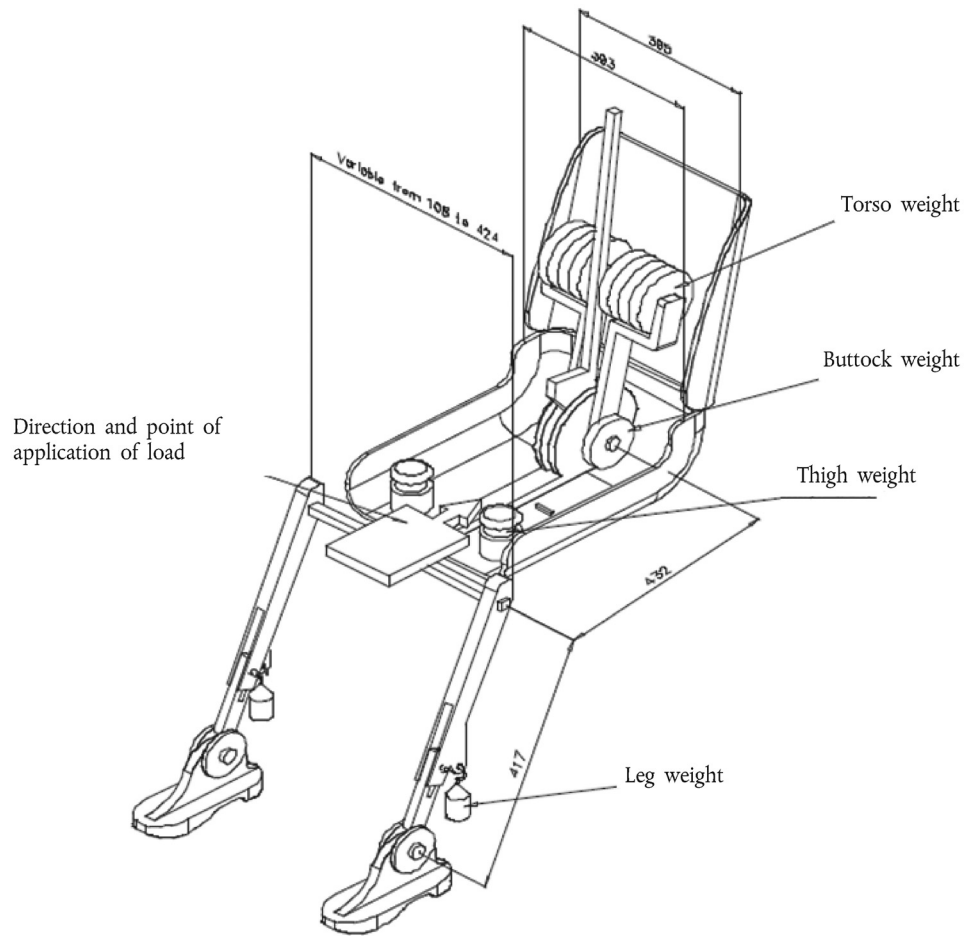
Lower leg segments are connected to the seat pan assembly at the T-bar joining the knees, which is a lateral extension of the adjustable thigh bar. Quadrants are incorporated in the lower leg segments to measure knee angles. Shoe and foot assemblies are calibrated to measure the foot angle. Two spirit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

Figure 1

**3-D H machine elements designation**

<sup>(1)</sup> The machine corresponds to that described in ISO Standard 6549-1980. For details of the construction of the 3-D H machine refer to Society of Automotive Engineers (SAE), 400 Commonwealth Drive, Warrendale, Pennsylvania 15096, United States of America.

Figure 2

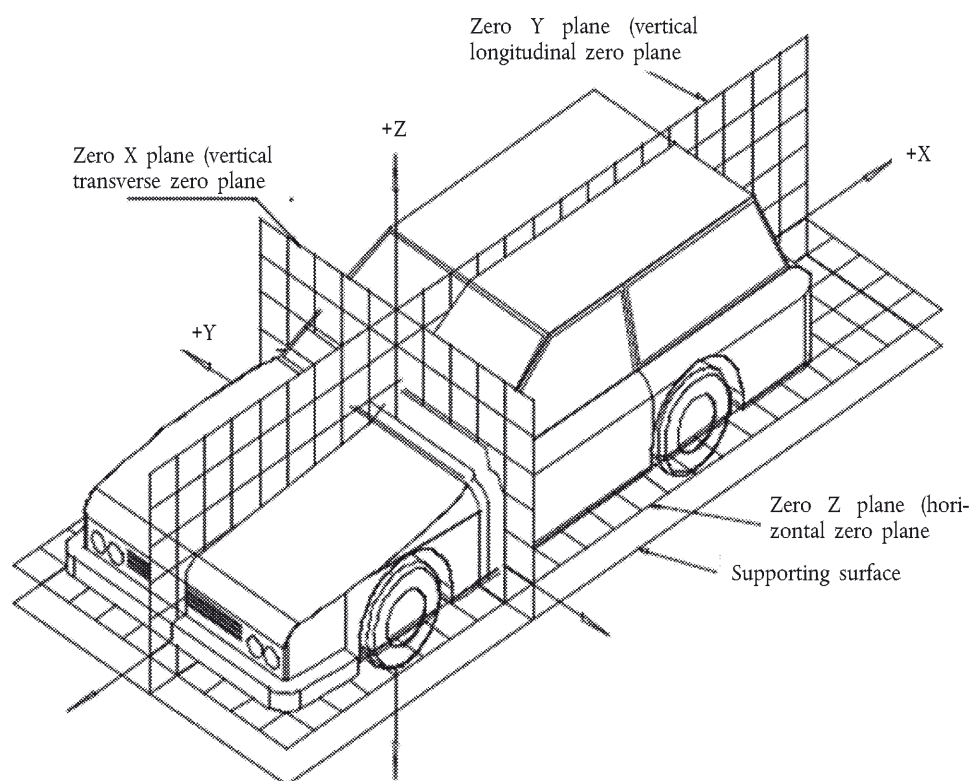
**Dimensions of the 3-D H machine elements and load distribution**



## Appendix 2

**THREE-DIMENSIONAL REFERENCE SYSTEM**

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



<sup>(1)</sup> The reference system corresponds to ISO Standard 4130:1978.

## Appendix 3

## REFERENCE DATA CONCERNING SEATING POSITIONS

## 1. CODING OF REFERENCE DATA

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

L = left

C = centre,

R = right.

## 2. DESCRIPTION OF VEHICLE MEASURING ATTITUDE

## 2.1. Coordinates of fiducial marks

X .....

Y .....

Z .....

## 3. LIST OF REFERENCE DATA

3.1. Seating position: .....

## 3.1.1. Coordinates of the 'R' point:

X .....

Y .....

Z .....

3.1.2. Design torso angle: .....

3.1.3. Specifications for seat adjustment <sup>(1)</sup>

horizontal: .....

vertical: .....

angular: .....

torso angle: .....

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

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<sup>(1)</sup> Strike out what does not apply.

## ANNEX 4

**Method for determining the dimensional relationships between the vehicle's primary reference marks and the three-dimensional reference grid****1. RELATIONSHIP BETWEEN REFERENCE GRID AND VEHICLE'S PRIMARY REFERENCE MARKS**

To verify specific dimensions on or within a vehicle submitted for approval in accordance with this Regulation, the relationship between the coordinates of the three-dimensional reference grid, defined in paragraph 2.3, which has been laid out at the initial vehicle-design stage, and the positions of the primary reference marks, defined in paragraph 2.4, must be established accurately so that specific points on the vehicle manufacturer's drawings can be identified on an actual vehicle produced from those drawings.

**2. METHOD FOR ESTABLISHING RELATIONSHIP OF REFERENCE GRID TO REFERENCE MARKS**

For this purpose, a ground reference plane shall be constructed which is marked with the X-X measurement and the Y-Y measurement. The method of achieving this is set out in figure 6 of the appendix of this annex, the reference plane being a hard, flat, level surface upon which the vehicle stands, and which has two measuring scales firmly fixed to its surface; these shall be graduated in millimetres, the X-X scale being not less than eight metres long and the Y-Y scale not less than four metres long. The two scales must be set at right angles to each other as shown in figure 6 of the appendix to this annex. The intersection of these scales is the ground zero.

**3. EXAMINATION OF THE REFERENCE PLANE**

In order to provide for minor variations in the level of the reference plane or test area, it will be necessary to measure the deviations from ground zero along both the X and Y scales at intervals of 250 mm and to record the readings obtained so that corrections can be made when checking the vehicle.

**4. ACTUAL TEST ATTITUDE**

In order to provide for minor changes in suspension height, etc., it will be necessary to have available a means of bringing the reference marks to the correct coordinate positions relative to the design attitude before further measurements are taken. In addition, it must be possible to make minor lateral and/or longitudinal adjustments of the vehicle's position so as to place it accurately in relation to the reference grid.

**5. RESULTS**

The vehicle having been correctly placed relative to the reference grid and in its design attitude, the site of the necessary points for studying the forward visibility requirements can be readily determined.

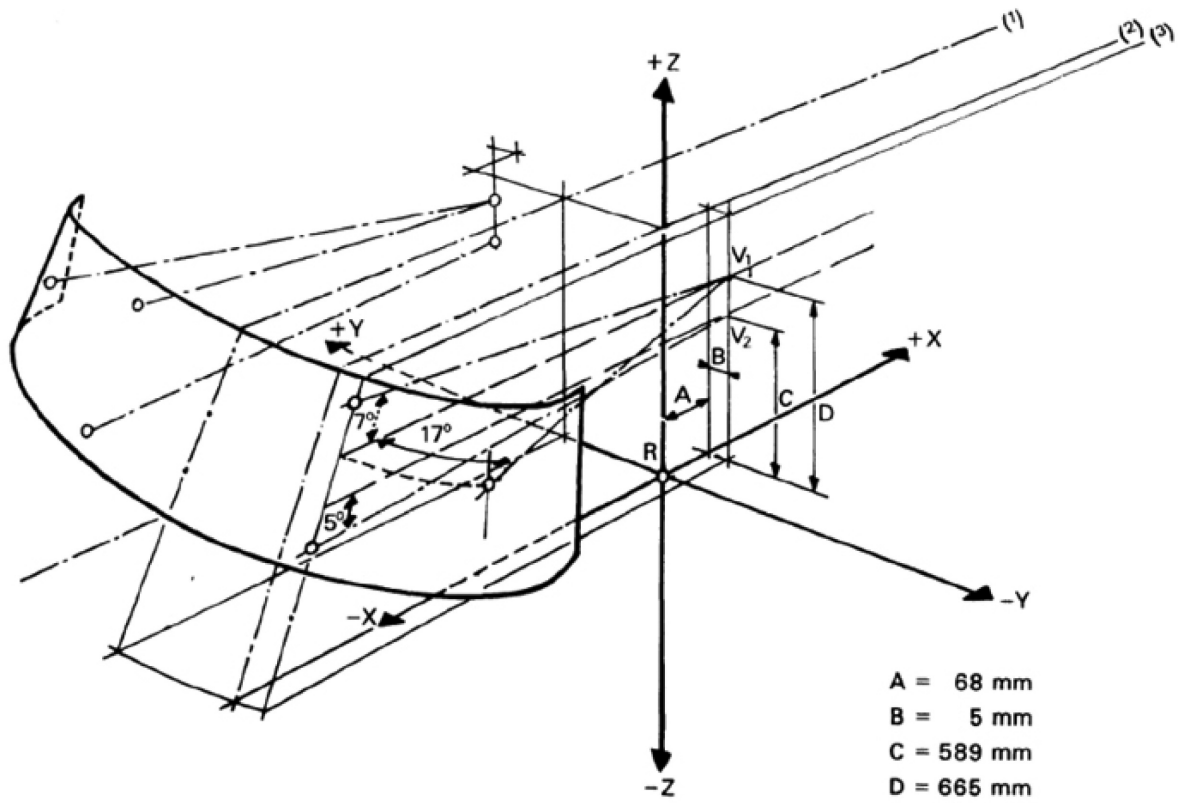
Test methods to determine these requirements may include the use of theodolites, light sources or shadow devices, or any other method, which can be shown to give equivalent results.

---

## Appendix

Figure 1

## Determination of V points



- (1) Line tracing the median longitudinal plane of the vehicle.
- (2) Line tracing the vertical plane passing through R.
- (3) Line tracing the vertical plane passing through V1 and V2.

Figure 2

## Observation points of the A pillars

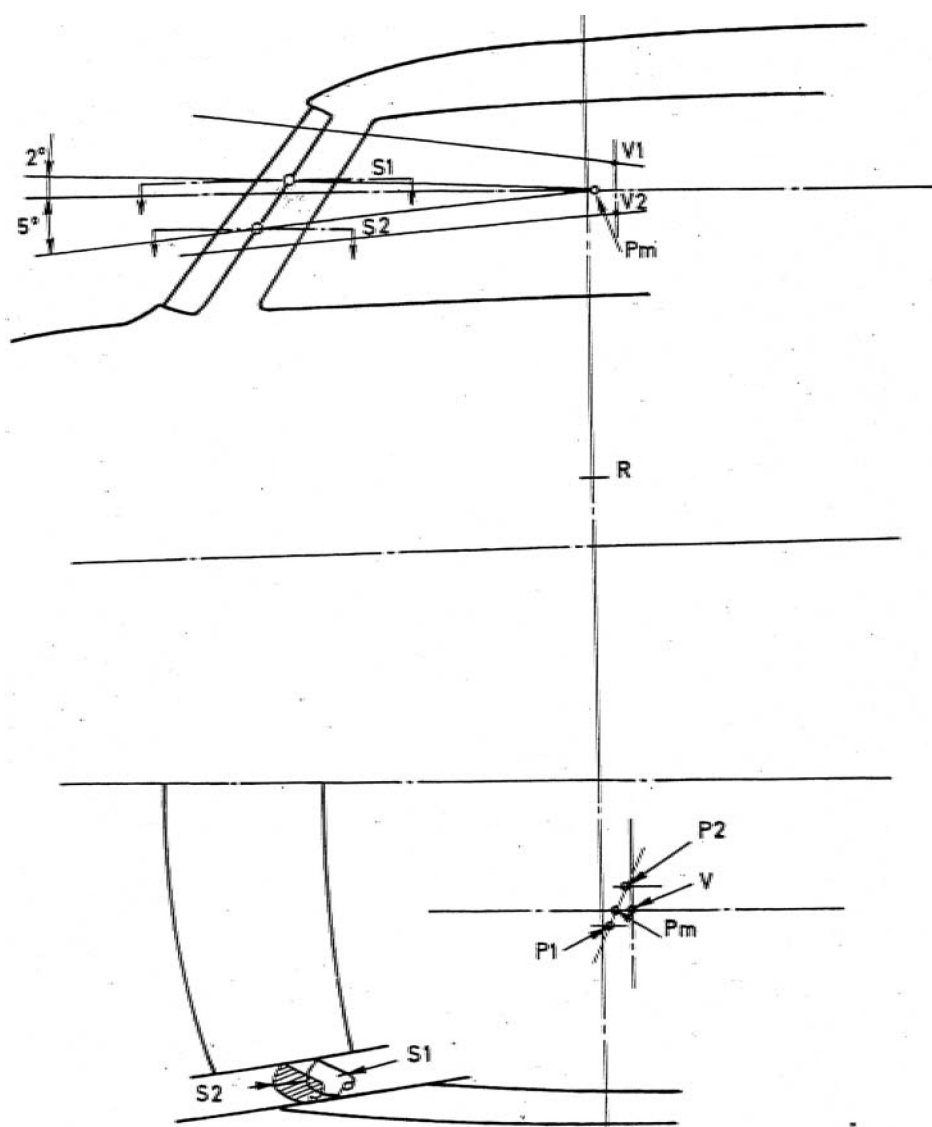


Figure 3

## Angles of obstruction

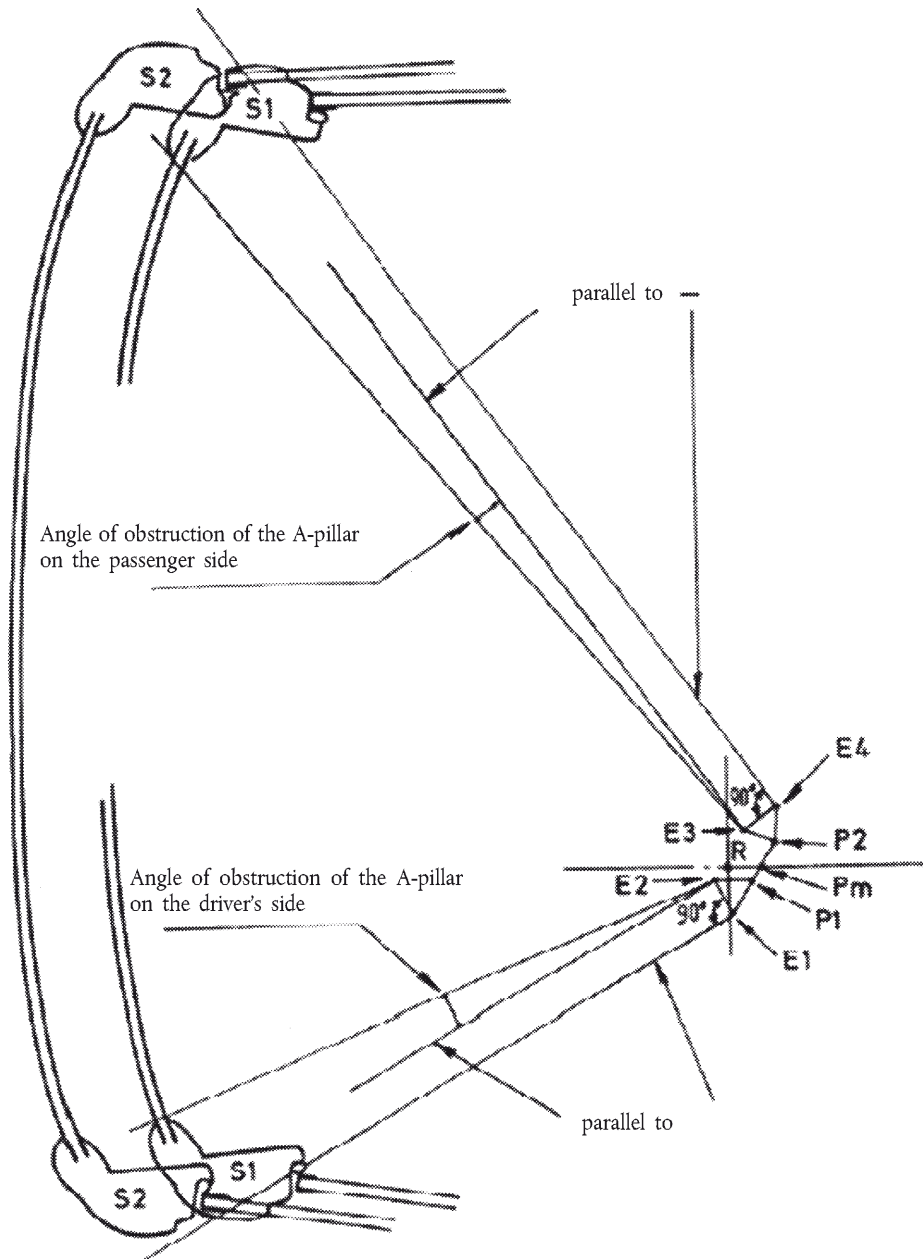


Figure 4

Evaluation of obstructions in the 180° forward direct field of vision of the driver

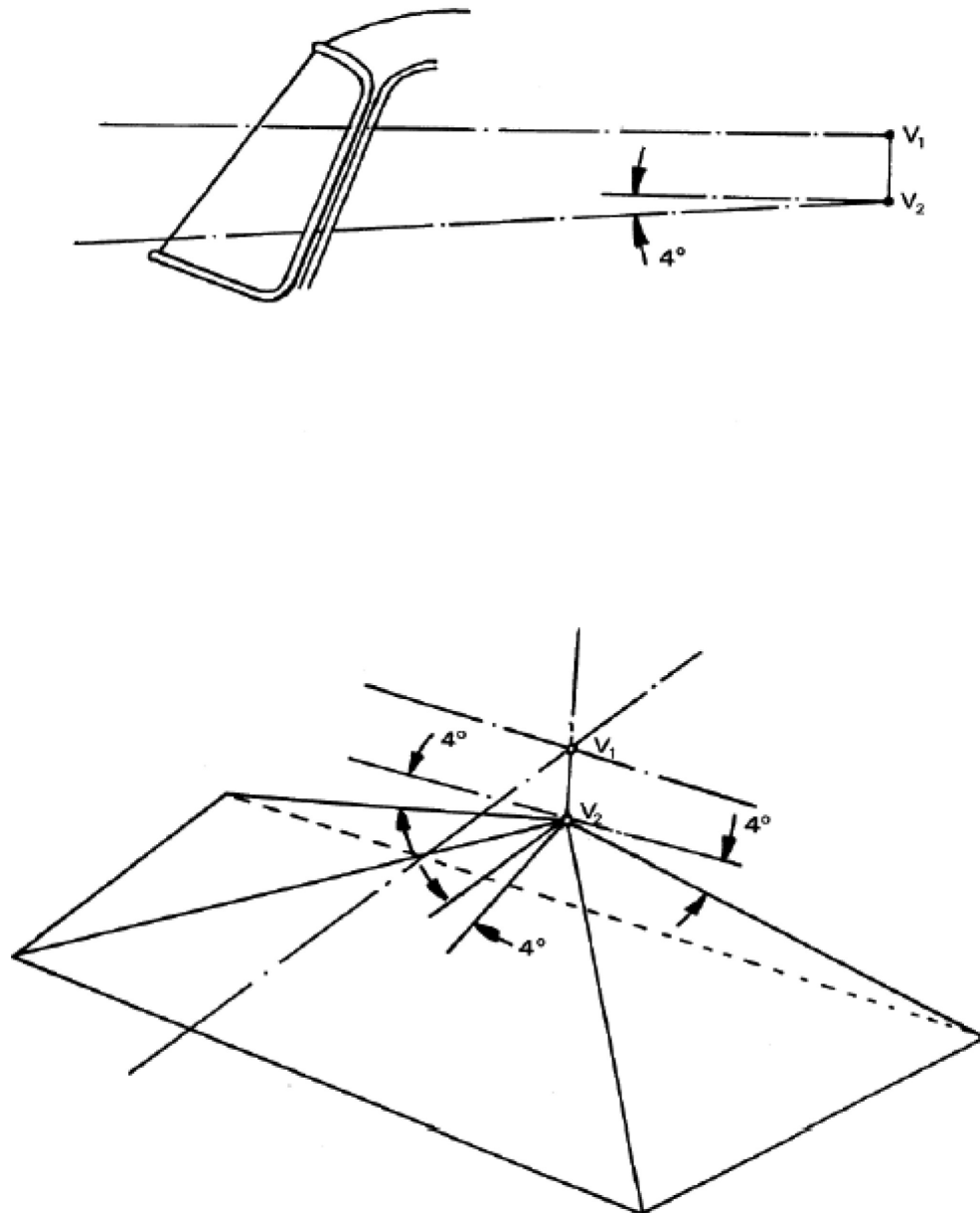


Figure 5

Dimensional diagram showing relative positions of E points and P points

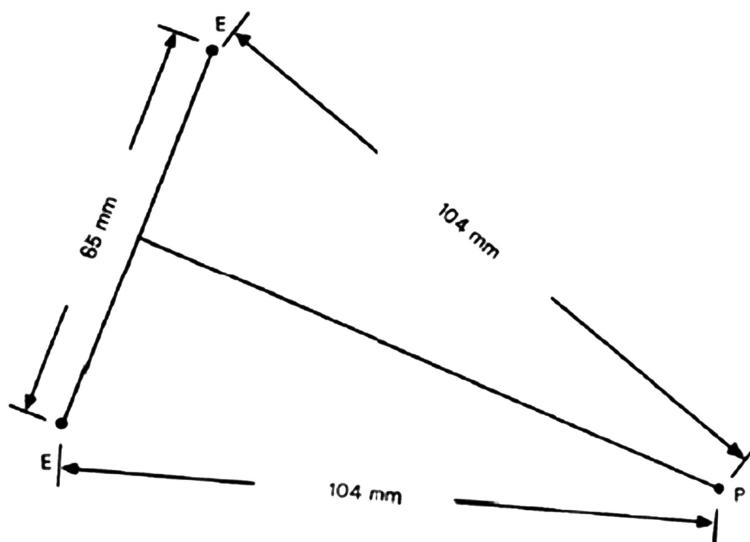
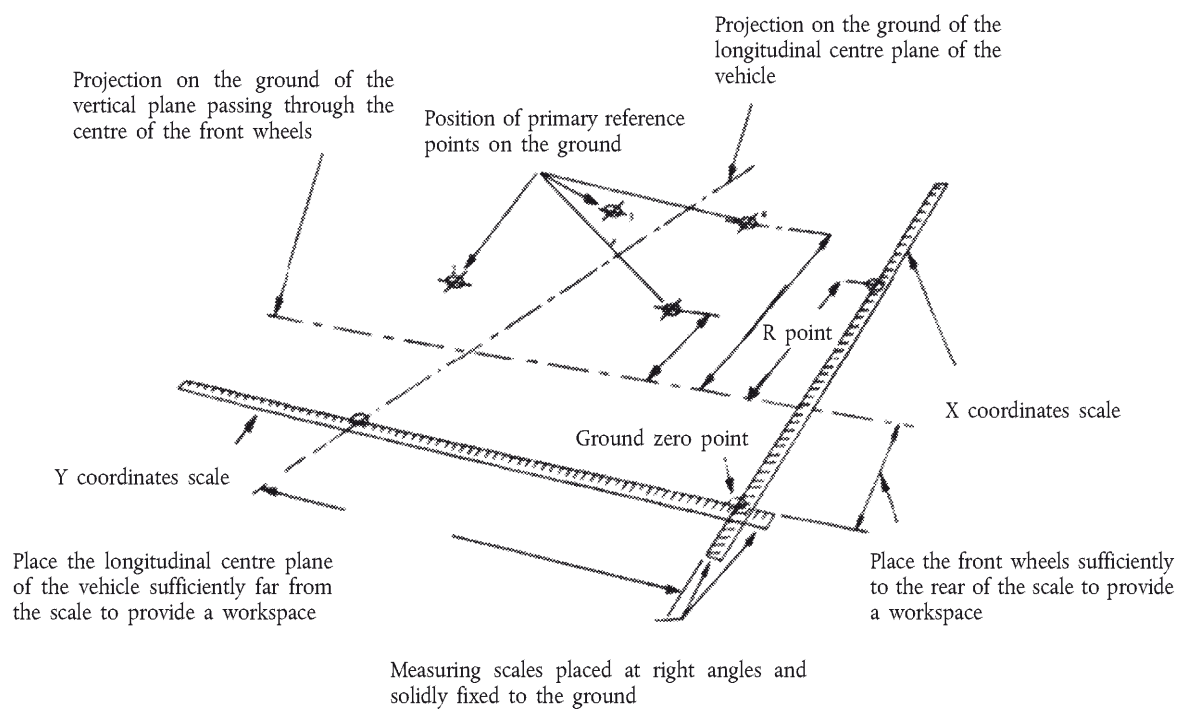


Figure 6

Level work place











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