

No. 4789. AGREEMENT CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS. DONE AT GENEVA ON 20 MARCH 1958¹

ENTRY INTO FORCE of Regulation No. 46 (*Uniform provisions concerning the approval of rear-view mirrors, and of motor vehicles with regard to the installation of rear-view mirrors*) as an annex to the above-mentioned Agreement

The said Regulation came into force on 1 September 1981 in respect of France and Italy, in accordance with article 1 (5) of the Agreement:

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF REAR-VIEW MIRRORS, AND OF MOTOR VEHICLES WITH REGARD TO THE INSTALLATION OF REAR-VIEW MIRRORS

1. SCOPE

This Regulation applies:

- 1.1. to *rear-view mirrors* intended to be installed on motor vehicles of M and N categories
- 1.2. to the *installation of rear-view mirrors* on motor vehicles of M and N categories.

I. Rear-view mirrors

2. DEFINITIONS

For the purpose of this Regulation,

- 2.1. "*rear-view mirror*" means any device intended to give, within the field of vision defined in paragraph 16.5., a clear view to the rear, excluding complex optical systems such as periscopes.
- 2.2. "*interior rear-view mirror*" means a device as defined in paragraph 2.1. which can be fitted in the passenger compartment of a vehicle.
- 2.3. "*exterior rear-view mirror*" means a device as defined in paragraph 2.1. which can be mounted on the external surface of a vehicle.
- 2.4. "*additional rear-view mirror*" means a rear-view mirror other than a device of the type defined in paragraph 2.1. which may be fitted to the inside or outside of the vehicle provided that it complies with the provisions of paragraph 6. other than 6.1. and of paragraph 7. other than 7.1. and 7.2.4.
- 2.5. "*rear-view mirror type*" means devices which do not differ in respect of the following main characteristics:

¹ United Nations, *Treaty Series*, vol. 335, p. 211; for subsequent actions, see references in Cumulative Indexes Nos. 4 to 14, as well as annex A in volumes 915, 917, 926, 932, 940, 943, 945, 950, 951, 955, 958, 960, 961, 963, 966, 973, 974, 978, 981, 982, 985, 986, 993, 995, 997, 1003, 1006, 1010, 1015, 1019, 1020, 1021, 1024, 1026, 1031, 1035, 1037, 1038, 1039, 1040, 1046, 1048, 1050, 1051, 1055, 1059, 1060, 1065, 1066, 1073, 1078, 1079, 1088, 1092, 1095, 1097, 1098, 1106, 1110, 1111, 1112, 1122, 1126, 1130, 1135, 1136, 1138, 1139, 1143, 1144, 1145, 1146, 1147, 1150, 1153, 1156, 1157, 1162, 1177, 1181, 1196, 1197, 1198, 1199, 1205, 1211, 1213, 1214, 1216, 1218, 1222, 1223, 1224, 1225, 1235, 1237, 1240, 1242 and 1247.

- 2.5.1. the dimensions and radius of curvature of the rear-view mirror reflecting surface,
- 2.5.2. the design, shape or materials of the rear-view mirrors, including the connexion with the bodywork.
- 2.6. “*class of rear-view mirrors*” means all devices having one or more common characteristics or functions. Interior rear-view mirrors are grouped in Class I. Additional interior rear-view mirrors are grouped in Class Is. Exterior rear-view mirrors are grouped in Classes II and III. Additional exterior rear-view mirrors are grouped in Classes IIs and IIIs.
- 2.7. “*r*” means the average of the radii of curvature measured over the reflecting surface, in accordance with the method described in annex 7, paragraph 2 to this Regulation.
- 2.8. “*principal radii of curvature at one point obtained on the reflecting surface (ri)*” means the values obtained using the apparatus defined in annex 7, measured on the arc of the reflecting surface passing through the centre of the mirror parallel to the segment *b*, as defined in paragraph 7.1.2.1., and on the arc perpendicular to this segment.
- 2.9. “*radius of curvature at one point on the reflecting surface (rp)*” means the arithmetic average of the principal radii of curvature *ri* and *r'i*, i.e.:
- $$r_p = \frac{r_i + r'_i}{2}$$
- 2.10. “*centre of the mirror*” means the centroid of the visible area of the reflecting surface.
- 2.11. “*radius of curvature of the constituent parts of the rear-view mirror*” means the radius “*c*” of the arc of the circle which most closely approximates to the curved form of the part in question.
- 2.12. “*vehicle categories M and N*” means those defined in paragraphs 5.2.2. and 5.2.3. of Regulation No. 13.

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a type of rear-view mirror shall be submitted by the holder of the trade name or mark or by his duly accredited representative.
- 3.2. For each class of rear-view mirror the application shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
- 3.2.1. a technical description, including mounting instructions and specifying the type(s) of vehicles for which the rear-view mirror is intended,
- 3.2.2. drawings sufficiently detailed to enable:
- 3.2.2.1. the class to be identified,
- 3.2.2.2. compliance with the general specifications prescribed in paragraph 6. to be verified,
- 3.2.2.3. compliance with the dimensions prescribed in paragraph 7.1. to be verified, and
- 3.2.2.4. compliance with the positioning of the spaces provided for the approval mark and prescribed by paragraph 4.2. below to be checked.
- 3.3. In addition, the application for approval shall be accompanied by four samples of the type of rear-view mirror. At the request of the laboratory, supplementary samples may be required.

4. MARKINGS

- 4.1. The samples of rear-view mirrors submitted for approval shall bear the trade name or mark of the manufacturer; this marking shall be clearly legible and be indelible.
- 4.2. Every rear-view mirror shall possess on its holder a space large enough to accommodate the approval mark, which must be legible when the rear-view mirror has been mounted on the vehicle; this space shall be shown on the drawings referred to in paragraph 3.2.2. above.

5. APPROVAL

- 5.1. If the samples submitted for approval meet the requirements of paragraphs 6. to 8. of this Regulation, approval of the pertinent type of rear-view mirror shall be granted.
- 5.2. An approval number shall be assigned to each type approved. The first two digits shall be the highest number of the series of amendments incorporated in the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another rear-view mirror type.
- 5.3. Notice of approval or of refusal of approval of a type of rear-view mirror pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to model in annex 1 hereto and of drawings (supplied by the applicant for approval) of the rear-view mirror in a format not exceeding A 4 (210 × 297 mm) or folded to that format and on an appropriate scale of 1:1.
- 5.4. There shall be affixed, conspicuously and in the space referred to in paragraph 4.2. above, to every rear-view mirror conforming to a type approved under this Regulation, in addition to the mark prescribed in paragraph 4.1., an international approval mark consisting of:
 - 5.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval,*
 - 5.4.2. the approval number; this number consists of the component type approval number which appears on the certificate completed for this type (see annex 1) preceded by two figures indicating the sequence number of the latest series of amendments to this Regulation.
 - 5.4.3. an additional symbol in the form of a figure in Roman numerals followed, if necessary, by the letter "S" showing the class to which the rear-view mirror belongs.
- 5.5. The approval mark and the additional symbol shall be clearly legible and be indelible.
- 5.6. Annex 3 to this Regulation gives an example of the arrangement of the aforesaid approval mark and additional symbol.

6. GENERAL REQUIREMENTS

- 6.1. All rear-view mirrors shall be adjustable.
- 6.2. The edge of the reflecting surface shall be enclosed in a holder which, on its perimeter, shall have a value of "c" \geq 2.5 mm at all points and in all directions. If the reflecting surface projects beyond the holder, the radius of curvature "c" of the edge of the projecting part shall be not less than

* 1 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 and 20 for Poland; subsequent numbers shall be assigned to other countries in the chronological order in which they ratify the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, 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.

2.5 mm and shall return into the holder under a force of 50 N applied to the point of greatest projection relative to the holder in a horizontal direction approximately parallel to the longitudinal median plane of the vehicle.

- 6.3. When the rear-view mirror is mounted on a plane surface, all its parts, irrespective of the adjustment position of the device, including those parts remaining attached to the holder after the test set out in paragraph 8.2., which are in potential static contact with a sphere, either 165 mm in diameter, in the case of interior rear-view mirrors, or 100 mm in diameter, in the case of exterior rear-view mirrors, shall have a radius of curvature "c" of not less than 2.5 mm.
- 6.3.1. Edges of fixing holes or recesses, which are less than 12 mm in width are exempt from the radius requirements of paragraph 6.3. provided they are blunted.
- 6.4. The attachment device on the vehicle shall be so designed that a cylinder with a 50 mm radius, having at its axis the axis, or one of the axes, of pivot or rotation which ensure deflection of the rear-view mirror in the direction of impact concerned, passes through at least part of the surface to which the device is attached.
- 6.5. In the case of exterior rear-view mirrors, the parts referred to in paragraphs 6.2. and 6.3., made of a material with a Shore A hardness not greater than 60, are exempt from the corresponding provisions.
- 6.6. In the case of interior rear-view mirrors, when the parts referred to in paragraphs 6.2. and 6.3. are made of soft material of a hardness less than 50 Shore A, mounted on a rigid support, the prescriptions of paragraphs 6.2. and 6.3. apply only to the support.

7. SPECIAL SPECIFICATIONS

7.1. Dimensions

7.1.1. Interior rear-view mirrors (Class I)

The dimensions of the reflecting surface shall be such that it is possible to inscribe thereon a rectangle having one side of length 4 cm and the other of length "a";

$$a = 15 \text{ cm} \times \frac{1}{1 + \frac{1\,000}{r}}$$

7.1.2. Exterior rear-view mirrors (Classes II and III)

7.1.2.1. The dimensions of the reflecting surface shall be such that it is possible to inscribe thereon:

7.1.2.1.1. a rectangle of a height of 4 cm and of base length, in centimeters, "a", and

7.1.2.1.2. a segment parallel to the height of the rectangle and of length, in centimeters, "b".

7.1.2.2. The minimum values of "a" and "b" are given in the table below:

<i>Class of rear-view mirrors</i>	<i>Categories of vehicles for which the rear-view mirrors are designed</i>	<i>a</i>	<i>b</i>
II	M ₂ , M ₃ , N ₂ and N ₃	$\frac{17}{1 + \frac{1\,000}{r}}$	20
III	M ₁ and N ₁	$\frac{13}{1 + \frac{1\,000}{r}}$	7

- 7.2. *Reflecting surface and coefficient of reflection*
- 7.2.1. The reflecting surface of a rear-view mirror shall be either flat or spherically convex.
- 7.2.2. Differences between the radii of curvature.
- 7.2.2.1. The difference between r_i or r'_i and r_p at each reference point shall not exceed 0.15 r.
- 7.2.2.2. The difference between any of the radii of curvature (r_{p1} , r_{p2} , and r_{p3}) and r shall not exceed 0.15 r.
- 7.2.2.3. When "r" is not less than 3,000 mm, the value of 0.15 r quoted in paragraphs 7.2.2.1. and 7.2.2.2. is replaced by 0.25 r.
- 7.2.3. The value of "r" shall not be less than:
- 7.2.3.1. 1,800 mm for Class II rear-view mirrors
- 7.2.3.2. 1,200 mm for Class I and III rear-view mirrors.
- 7.2.4. The value of the normal coefficient of reflection, determined according to the method described in annex 5 to this Regulation, shall not be less than 40 per cent. If the mirror has two positions ("day" and "night"), the "day" position shall allow the colours of the signals used for road traffic to be recognized. The value of the normal coefficient of reflection in the "night" position shall not be less than 4 per cent.
- 7.2.5. The reflecting surface shall retain the characteristics specified in paragraph 7.2.4., in spite of prolonged exposure to adverse weather conditions, in normal conditions of use.

8. TESTS

- 8.1. Rear-view mirrors shall be subjected to the tests described in paragraphs 8.2. to 8.3. below, to determine their behaviour under impact on and bending of the holder secured to the stem or support.
- 8.1.1. The test prescribed in paragraph 8.2. shall not be required for Class II and Class IIs exterior rear-view mirrors of which no part is less than 2 m from the ground, whatever the adjustment position may be, when the vehicle is under the load corresponding to its maximum technically permissible weight. In this case, the manufacturer shall provide a description stipulating that the rear-view mirror must be mounted in such a way that none of its parts, in any of the possible adjustment positions, is less than 2 m above the ground when the vehicle is under the load corresponding to its maximum technically permissible weight. Where advantage is taken of this derogation, the arm shall be indelibly marked with the symbol Δ . In addition, the type approval certificate shall be endorsed to this effect.
- 8.2. *Impact test*
- 8.2.1. Description of the test device.
- 8.2.1.1. The test device shall consist of a pendulum capable of swinging about two horizontal axes at right angles to each other, one of which is perpendicular to the front plane containing the "release" trajectory of the pendulum. The end of the pendulum shall comprise a hammer formed by a rigid sphere with a diameter of 165 ± 1 mm and having a 5 mm-thick rubber covering of Shore A 50 hardness. A device shall be provided which permits determination of the maximum angle assumed by the arm in the plane of release. There shall be a support firmly fixed to the structure supporting the pendulum which serves to hold the specimens in compliance with the impact require-

ments stipulated in paragraph 8.2.2.6. below. Figure 1 below gives the dimensions of the test facility and the special design specifications.

- 8.2.1.2. The centre of percussion of the pendulum shall coincide with the centre of the sphere which forms the hammer. It is at a distance "1" from the axis of oscillation in the release plane which is equal to $1\text{ m} \pm 5\text{ mm}$. The reduced mass of the pendulum to its centre of percussion is $m_0 = 6.8 \pm 0.05\text{ kg}$ (the relationship between the centre of gravity of the pendulum and its axis of rotation is expressed in the equation: $m_0 = m \frac{d}{1}$).

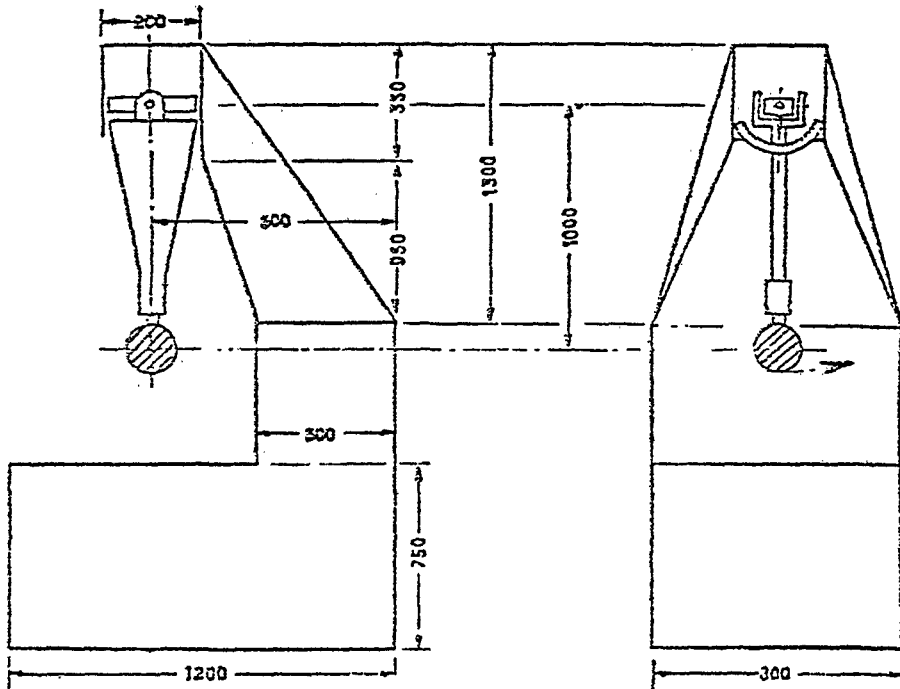


Figure 1

Dimensions in mm

8.2.2. Description of the test

- 8.2.2.1. The procedure used to clamp the rear-view mirror to the support shall be that recommended by the manufacturer of the device, or, where appropriate, by the vehicle manufacturer.
- 8.2.2.2. Positioning the rear-view mirror for the test
- 8.2.2.2.1. Rear-view mirrors shall be positioned on the pendulum impact rig such that the axes which are horizontal and vertical when installed on a vehicle in accordance with the vehicle or rear-view mirror manufacturers' mounting instructions, are in a similar position.

- 8.2.2.2.2. When a rear-view mirror is adjustable in relation to the base, the test position shall be the least favourable for any pivoting device to operate within the limits provided by the mirror or vehicle manufacturer.
- 8.2.2.2.3. When the rear-view mirror has a device for adjusting its distance from the base, the device shall be set in the position where the distance between the holder and the base is shortest.
- 8.2.2.2.4. When the reflecting surface is mobile in the holder, it shall be adjusted so that the upper corner which is furthest from the vehicle, is in the position of greatest projection relative to the holder.
- 8.2.2.3. Except for test 2 for interior rear-view mirrors (paragraph 8.2.2.6.1.) when the pendulum is in a vertical position, the horizontal and longitudinal vertical planes passing through the centre of the hammer, shall pass through the centre of the mirror as defined in paragraph 2.10. The longitudinal direction of oscillation of the pendulum shall be parallel to the longitudinal plane of the vehicle.
- 8.2.2.4. When, under the conditions governing adjustment prescribed in paragraphs 8.2.2.2.1. and 8.2.2.2.2., parts of the rear-view mirror limit the return of the hammer, the point of impact shall be shifted in a direction perpendicular to the axis of rotation or pivot in question. This displacement shall be that which is strictly necessary for the implementation of the test. It shall be limited in such a way that:
- 8.2.2.4.1. The sphere delimiting the hammer intersects the cylinder defined in paragraph 6.4. or remains at least tangential to it,
- 8.2.2.4.2. and the point of contact of the hammer is located at least 10 mm from the periphery of the reflecting surface.
- 8.2.2.5. The test consists in allowing the hammer to fall from a height corresponding to a pendulum angle of 60° from the vertical so that the hammer strikes the rear-view mirror at the moment when the pendulum reaches the vertical position.
- 8.2.2.6. The rear-view mirrors are subjected to impact in the following different conditions:
- 8.2.2.6.1. Interior rear-view mirrors:
- 8.2.2.6.1.1. Test 1—The point of impact shall be as defined in paragraph 8.2.2.3. The impact shall be such that the hammer strikes the rear-view mirror on the reflecting surface side.
- 8.2.2.6.1.2. Test 2—On the edge of the holder in such a way that the impact produced makes an angle of 45° with the plane of the mirror and is situated in the horizontal plane passing through the centre of the mirror. The impact is directed in the reflecting surface side.
- 8.2.2.6.2. Exterior rear-view mirrors:
- 8.2.2.6.2.1. Test 1—The point of impact shall be as defined in paragraphs 8.2.2.3. or 8.2.2.4. The impact shall be such that the hammer strikes the rear-view mirror on the reflecting surface side.
- 8.2.2.6.2.2. Test 2—The point of impact shall be as defined in paragraphs 8.2.2.3. or 8.2.2.4. The impact shall be such that the hammer strikes the rear-view mirror on the opposite side to the reflecting surface.
- 8.3. *Bending test on the holder fixed to the stem*
- 8.3.1. Description of the test.

- 8.3.1.1. The holder shall be placed horizontally in a device in such a way that the adjustment parts of the mounting can be clamped securely. In the direction of the greatest dimension of the holder, the end nearest the point of fixing on the adjustment part shall be immobilized by means of a fixed stop 15 mm wide, covering the entire width of the holder.
- 8.3.1.2. At the other end, a stop identical to the one described above shall be placed on the holder so that the specified test load can be applied to it (figure 2).
- 8.3.1.3. The end of the holder opposite that at which the force is applied may be clamped instead of kept in position as shown in Figure 2.
- 8.3.2. The test load shall be 25 kg applied for one minute.

Example of bending test apparatus for rear-view mirror holders

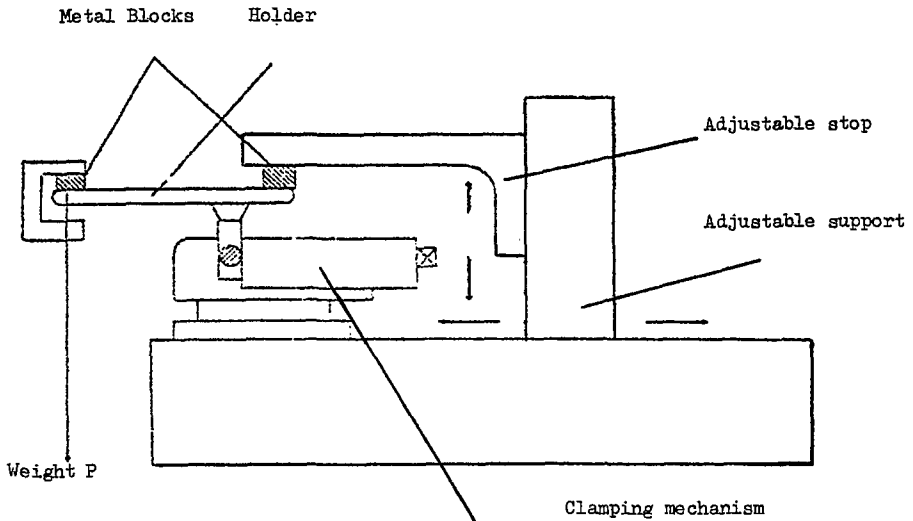


Figure 2

8.4. *Results of the tests*

- 8.4.1. In the tests described in paragraph 8.2., the pendulum shall return in such a way that the projection on the release plane of the position taken by the arm makes an angle of at least 20° with the vertical
- 8.4.1.1. The accuracy of the angle measurement shall be $\pm 1^\circ$.
- 8.4.1.2. This requirement is not applicable to rear-view mirrors stuck to the windscreen, in respect of which the requirement stipulated in paragraph 8.4.2. shall be applied after the test.
- 8.4.2. Should there be a breakage of the mounting of the rear-view mirror during the tests described in paragraph 8.2. for rear-view mirrors stuck to the windscreen, the part remaining shall not project from the base by more than 1 cm and the configuration remaining after the test shall comply with the conditions prescribed in paragraph 6.3.

- 8.4.3. The mirror shall not break during the tests described in paragraphs 8.2. and 8.3. However, breakage of the mirror shall be allowed if one of the following conditions is fulfilled:
 - 8.4.3.1. The fragments of glass still adhere to the back of the holder or to a surface firmly attached to the holder, except that partial separation of the glass from its backing is permitted, provided this does not exceed 2.5 mm either side of the crack. It is permissible for small splinters to become detached from the surface of the glass at the point of impact,
 - 8.4.3.2. the mirror is made of safety glass.

9. MODIFICATION OF TYPE OF REAR-VIEW MIRROR

- 9.1. Every type-modification of the rear-view mirror shall be notified to the administrative department which approved the type of rear-view mirror. The department may then either:
 - 9.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect, and that, in any case, the rear-view mirror still meets the requirements; or
 - 9.1.2. require a further test report from the technical service responsible for conducting the tests.
- 9.2. Notice of confirmation of approval, specifying the modifications, or of refusal of approval shall be communicated by the procedure specified in paragraph 5.3. above to the Parties to the Agreement which apply this Regulation.

10. CONFORMITY OF PRODUCTION

- 10.1. Every rear-view mirror bearing an approval mark as prescribed under this Regulation shall conform to the type approved and shall comply with the requirements of paragraphs 6.7. and 8. above.
- 10.2. In order to verify conformity as prescribed in paragraph 10.1. above, a sufficient number of serially-produced rear-view mirrors bearing the approval mark required by this Regulation shall be subjected to random checks.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 11.1. The approval granted in respect of a type of rear-view mirror pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 10.1. above is not complied with or if the type of rear-view mirror did not satisfy the requirements prescribed in paragraph 10.2. above.
- 11.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation thereof by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of rear-view mirror under this Regulation, he shall inform thereof the authority which granted the approval. Upon receiving the relevant communication that authority shall inform the other Parties to the Agreement which apply this Regulation thereof by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "PRODUCTION DISCONTINUED".

II. Installation of rear-view mirrors

13. DEFINITIONS

For the purpose of this Regulation,

- 13.1. "type of vehicle as regards rear-view mirrors" means motor vehicles which are identical in respect of the following basic features:
- 13.1.1. the bodywork features which reduce the field of vision,
- 13.1.2. the co-ordinates of point R of the driver's seat,
- 13.1.3. the positions and types of rear-view mirror specified.
- 13.2. "driver's ocular points" means two points 65 mm apart and 635 mm vertically above point R of the driver's seat as defined in annex 8. The straight line joining these points runs perpendicular to the vertical longitudinal median plane of the vehicle. The centre of the segment joining the two ocular points is in the longitudinal plane which shall pass by the centre of the seating position of the driver designated by the vehicle manufacturer.
- 13.3. "ambinocular vision" means the total field of vision obtained by the superimposition of the monocular fields of view of the right eye and the left eye (see figure 3).

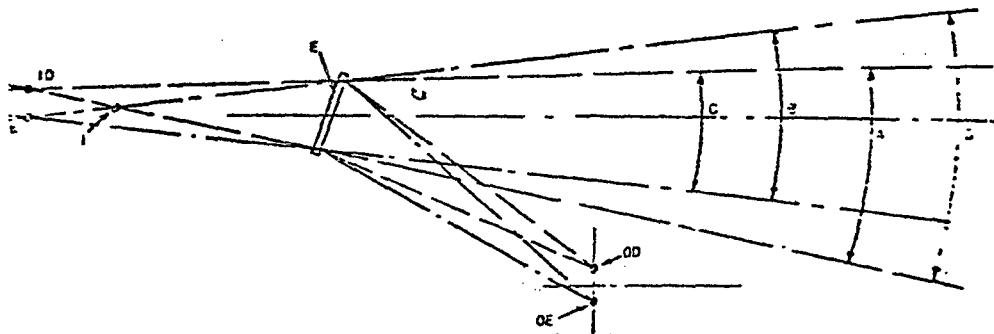


Figure 3

AMBINOCULAR VISION

- E —Interior rear-view mirror
- OD } —driver's eyes
OE }
- ID } —virtual monocular images
IE }
- I —virtual ambinocular image
- A —angle of visibility of the left eye
- B —angle of visibility of the right eye
- C —binocular angle of visibility
- D —ambinocular angle of visibility

14. APPLICATION FOR APPROVAL

- 14.1. The application for approval of a vehicle type with regard to the installation of rear-view mirrors shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 14.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
 - 14.2.1. A description of the vehicle type with respect to the items mentioned in paragraph 13.1. above,
 - 14.2.2. a list of the components necessary to identify rear-view mirrors which can be installed on the vehicle,
 - 14.2.3. drawings showing the position of the rear-view mirror and its adapting components on the vehicle, and
 - 14.2.4. indications by the manufacturer stating:
 - 14.2.4.1. data relating to point R of the driver's seating position,
 - 14.2.4.2. the maximum width of the body when the vehicle is supplied complete with body,
 - 14.2.4.3. the maximum and minimum body widths for which the rear-view mirror is approved (in the case of chassis-cab mentioned in paragraph 16.3.3.).
- 14.3. A vehicle representative of the vehicle type to be approved shall be submitted to the technical service responsible for conducting the approval tests.

15. APPROVAL

- 15.1. If the vehicle type submitted for approval in accordance with paragraph 14. above meets the requirements of paragraph 16. of this Regulation, approval shall be granted.
- 15.2. An approval number shall be assigned to each type approved. The first two digits shall be the highest number of the series of amendments incorporated in the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another vehicle type.
- 15.3. Notice of approval or of refusal of approval of a vehicle type 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 2 to this Regulation and of drawings (supplied by the applicant for approval) in a format not exceeding A 4 (210 × 297 mm) or folded to that format and on an appropriate scale.
- 15.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a type approved under this Regulation an international approval mark consisting of:
 - 15.4.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval;*
 - 15.4.2. the number of this Regulation, to the right of the circle prescribed in paragraph 15.4.1.,
- 15.5. 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 15.4.1. need not be repeated; in such a case the additional numbers

* See paragraph 5.4.1., footnote (*).

and symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 15.4.1.

- 15.6. The approval mark shall be clearly legible and indelible.
- 15.7. The approval mark shall be placed close to or on the vehicle data plate fitted by the manufacturer.
- 15.8. Annex 4 to this Regulation gives examples of arrangements of the approval mark.

16. REQUIREMENTS

16.1. The vehicle shall meet the following requirements:

- 16.1.1. The rear-view mirrors installed on the vehicle shall be of a type approved under this Regulation.
- 16.1.2. Rear-view mirrors shall be fixed in such a way that the mirror does not move so as to significantly change the field of vision as measured, or vibrate to an extent which would cause the driver to misinterpret the nature of the image received.
 - 16.1.2.1. The conditions prescribed in paragraph 16.1.2. shall be maintained when the vehicle is moving at speeds of up to 80 per cent of its maximum design speed, but not exceeding 150 km/h.
- 16.1.3. Exterior rear-view mirrors fitted on vehicles of categories M2, M3, N2 and N3 shall be Class II mirrors and those which are fitted on vehicles of category M1 and N1 shall be Class II or Class III mirrors.

16.2. *Number*

- 16.2.1. All vehicles of categories M1 and N1 shall be fitted with both an interior and an exterior rear-view mirror. The latter shall be fitted on the left side of the vehicle in countries with right-hand rule of the road, and on the right side of the vehicle in countries with left-hand rule of the road.
 - 16.2.1.1. If the interior mirror does not meet the requirements prescribed in paragraph 16.5.2., an “additional” exterior rear-view mirror shall be fitted to the vehicle. The latter shall be fitted to the right side of the vehicle in countries with right-hand rule of the road, and to the left side of the vehicle in countries with left-hand rule of the road.
 - 16.2.1.2. If the interior rear-view mirror does not provide any rearward vision, its presence shall not be required.
- 16.2.2. All vehicles in categories M2, M3, N2 and N3 shall be fitted with two exterior rear-view mirrors, one on each side of the vehicle.

16.3. *Position*

- 16.3.1. Rear-view mirrors shall be so placed that the driver, when sitting in the driving seat in a normal driving position, has a clear view of the road to the rear of the vehicle.
- 16.3.2. Exterior rear-view mirrors shall be visible through the side windows or through the portion of the windscreen that is swept by the windscreen wiper. This provision shall not apply to exterior rear-view mirrors fitted on the right side of vehicles of categories M2 and M3 in countries with right-hand rule of the road and on the left side of vehicles of the same categories in countries with left-hand rule of the road.

- 16.3.3. In the case of any vehicle which is tested in chassis-cab form when the field of vision is measured, the minimum and maximum body widths shall be stated by the manufacturer, and if necessary, simulated by dummy head boards. All vehicle and mirror configurations taken into consideration during the tests shall be shown on the type-approval certificate.
- 16.3.4. A two-plane or "double" mirror shall not be permitted if the two planes are necessary to meet the field of vision requirements. However, if the main glass meets all the requirements for a Class II or Class III mirror, it shall be acceptable. The auxiliary glass shall be taken into account when assessing the height from the ground and projection in accordance with paragraph 16.3.7. The enclosure of the auxiliary glass shall also comply with the conditions specified in paragraph 6.2.
- 16.3.5. The prescribed exterior rear-view mirror on the driver side of the vehicle shall be located so as to form an angle of not more than 55° between the vertical longitudinal median plane of the vehicle and the vertical plane which passes through the centre of the rear-view mirror and through the centre of the straight 65 mm line which joins the driver's two ocular points.
- 16.3.6. The rear-view mirror(s) shall not protrude beyond the external bodywork of the vehicle substantially more than is necessary to comply with the requirements concerning fields of vision laid down in paragraph 16.5.
- 16.3.7. Where the bottom edge of an exterior rear-view mirror is less than 2 m above the ground when the vehicle is laden, this rear-view mirror shall not project more than 0.20 m beyond the over-all width of the vehicle when not fitted with the rear-view mirror.
- 16.3.8. Subject to the requirements of paragraphs 16.3.6. and 16.3.7., rear-view mirrors may project beyond the permissible maximum widths of vehicles.
- 16.4. *Adjustment*
- 16.4.1. The interior rear-view mirror shall be such that the driver can adjust it when in his driving position.
- 16.4.2. The exterior rear-view mirror on the driver's side shall be capable of adjustment from inside the vehicle, the door being closed, although the window may be open. However, it may be locked in position from the outside.
- 16.4.3. The requirements of paragraph 16.4.2. shall not apply to exterior rear-view mirrors which, after being pushed into the retracted position can be restored to the extended position without adjustment.
- 16.5. *Field of vision*
- 16.5.1. The fields of vision defined below shall be established using ambinocular vision, the eyes being at the "driver's ocular points" as defined in paragraph 13.2. The fields of vision shall be determined when the vehicle is in running order as defined in [document TRANS/SC1/WP29/36, annex 3, paragraph 5.1.2., second paragraph] plus one front seat passenger, the mass of the passenger being 75 kg \pm 1 per cent. They shall be established through windows which have a total light transmission factor of at least 70 per cent measured normal to the surface.
- 16.5.2. Interior rear-view mirror
- 16.5.2.1. The field of vision shall be such that the driver can see at least a 20 m-wide flat horizontal portion of the road centred on the vertical longitudinal median plane of the vehicle, from 60 m behind the driver's ocular points (annex 6, figure 1) to the horizon.

- 16.5.2.2. The field of vision may be reduced by the presence of a head-rest and devices such as, in particular, sun visors, rear windscreen wipers and heating elements, provided they do not obscure more than 15 per cent of the prescribed field of vision when projected onto a vertical plane perpendicular to the longitudinal median plane of the vehicle.
- 16.5.3. Left-hand exterior rear-view mirrors for vehicles driven on the right-hand side of the road, and right-hand exterior rear-view mirrors for vehicles driven on the left-hand side of the road.
- 16.5.3.1. The field of vision shall be such that the driver can see at least a 2.50 m-wide flat, horizontal portion of the road, which is bounded on the right (for vehicles driven on the right) or the left (for vehicles driven on the left) by the plane which is parallel to the median longitudinal vertical plane passing through the outermost point of the vehicle on the left (for vehicles driven on the right) or the right (for vehicles driven on the left) and extend for 10 m behind the driver's ocular points to the horizon (annex 6, figure 2).
- 16.5.4. Right-hand exterior rear-view mirrors for vehicles driven on the right, and left-hand exterior rear-view mirrors for vehicles driven on the left.
- 16.5.4.1. The field of vision shall be such that the driver can see at least a 3.50 m-wide flat, horizontal portion of the road which is bounded on the left (for vehicles driven on the right) or the right (for vehicles driven on the left) by the plane which is parallel to the median longitudinal vertical plane of the vehicle, passes through the outermost point of the vehicle on the right (for vehicles driven on the right) or the left (for vehicles driven on the left) and which extends from 30 m behind the driver's ocular points to the horizon.
- 16.5.4.2. In addition, the road shall be visible to the driver, over a width of 0.75 m, from a point 4 m behind the vertical plane passing through the driver's ocular points (annex 6, figure 2).
- 16.5.5. *Obstructions*
- The fields of vision specified above do not take account of obstructions caused by door handles, outline marker lights, direction indicators, the extremities of rear bumpers and obstructions due to the bodywork similar to those caused by the above-mentioned elements.
- 16.5.6. *Test procedure*
- The field of vision shall be determined by placing powerful light sources at the ocular points and examining the light reflected on a vertical monitoring screen. Other equivalent methods may be used.
17. MODIFICATION OF VEHICLE TYPE
- 17.1. Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:
- 17.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the vehicle still meets the requirements, or
- 17.1.2. require a further test report from the technical service responsible for conducting the tests.
- 17.2. Notice of confirmation of approval, specifying the modifications, or of refusal of approval, shall be communicated by the procedure specified in paragraph 15.3. above to the Parties to the Agreement which apply this Regulation.

- 18. CONFORMITY OF PRODUCTION
 - 18.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform to the vehicle type approved and shall comply with the requirements of paragraph 16. above.
 - 18.2. In order to verify conformity as prescribed in paragraph 18.1. above, a vehicle bearing the approval mark required by this Regulation shall be taken from the series.
- 19. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
 - 19.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 18.1. above is not complied with or if the vehicle fails to pass the checks prescribed in paragraph 18.2. above.
 - 19.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties which apply this Regulation thereof by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".
- 20. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

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

ANNEX 1

(Maximum format: A 4 (210 × 297 mm))

Name of administration



Communication concerning the approval (or refusal or withdrawal of approval) of a type of rear-view mirror, pursuant to Regulation No. ...

- Approval No.
- 1. Rear-view mirror of class I, II, III, Is, IIs, IIIs*
 - 2. Trade name or mark
 - 3. Manufacturer's name and address
 - 4. If applicable, name and address of manufacturer's representative
 - 5. Symbol Δ defined in paragraph 8.1.1.: yes/no*
2m

* Strike out what does not apply.

- 6. Submitted for approval on
- 7. Technical service responsible for conducting approval tests
- 8. Date of report issued by that service
- 9. Number of report issued by that service
- 10. Approval granted/refused*
- 11. Place
- 12. Date
- 13. Signature
- 14. The following documents, bearing the approval number shown above, are annexed to this communication:
 - ... descriptive notes,
 - ... drawings and diagrams of rear-view mirror;
 - ... photographs

ANNEX 2

(Maximum format: A 4 (210 × 297 mm))

Name of administration



Communication concerning the approval (or refusal or withdrawal of approval) of a vehicle type with regard to the installation of rear-view mirrors, pursuant to Regulation No. ...

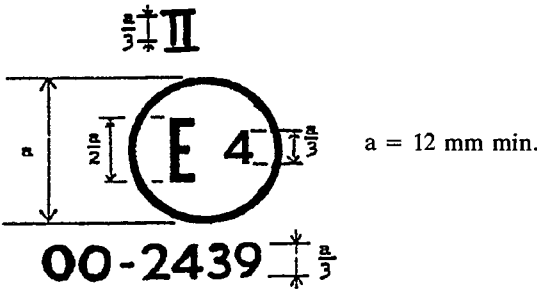
- Approval No.
- 1. Trade name or mark of the vehicle
 - 2. Vehicle type
 - 3. Manufacturer's name and address
 - 4. If applicable, name and address of manufacturer's representative
 - 5. Trade name or mark of rear-view mirrors and component type-approval number
 - 6. Extension of type approval of the vehicle to cover the following rear-view mirror type

* Strike out what does not apply.

- 7. Identification data of the “R” point of the vehicle seating position
- 8. Maximum and minimum body width for which the rear-view mirror is approved (in the case of chassis-cab referred to in paragraph 16.3.3.)
- 9. Vehicle submitted for approval on
- 10. Technical service responsible for conducting approval tests
- 11. Date of report issued by that service
- 12. Number of report issued by that service
- 13. Approval granted/refused*
- 14. Place
- 15. Date
- 16. Signature
- 17. The following documents are annexed to this communication:
 - ... drawings of attachments for rear-view mirror(s),
 - ... drawings and lay-out plans showing the position of installation and the characteristics of the parts of the structure on which the rear-view mirror(s) is (are) mounted
 - ... general views of the front of the vehicle and of the compartment in which the rear-view mirrors are placed, and specifications of the nature of the constituent materials.

ANNEX 3

ARRANGEMENT OF THE REAR-VIEW-MIRROR APPROVAL MARK
(See paragraph 5.4. of the Regulation)



A rear-view mirror bearing the above approval mark is a rear-view mirror of class II approved in the Netherlands (E4) under No. 00-2439.

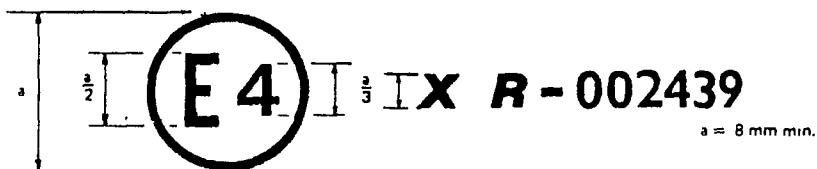
NOTE: The approval number and the additional symbol must be placed close to the circle and either above or below the “E” or to left or right of that letter. The digits of the approval number must be on the same side of the “E” and point in the same direction. The additional symbol must be directly opposite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

* Strike out what does not apply.

ANNEX 4

ARRANGEMENTS OF THE VEHICLE APPROVAL MARK
CONCERNING THE INSTALLATION OF REAR-VIEW MIRRORS*Model A*

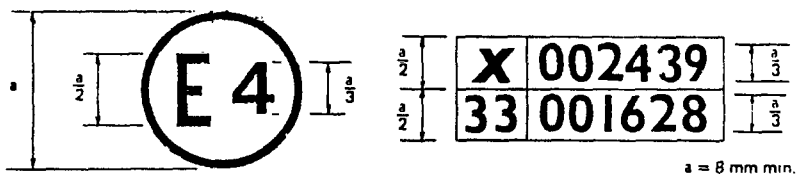
(See paragraph 15.4. of the Regulation)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E4) with regard to the installation of rear-view mirrors pursuant to Regulation No. "X"* in its original form.

Model B

(See paragraph 15.5. of the Regulation)



The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E4) pursuant to Regulations Nos. "X" and 33.** The approval numbers indicate that, at the date when the respective approvals were given, both Regulations had not been amended.

ANNEX 5

TEST METHOD FOR DETERMINING REFLECTIVITY

1. DEFINITIONS

1.1. CIE standard illuminant A.***

λ	\bar{x}	(λ)
600	1.062	2
620	0.854	4
650	0.283	5

* To be assigned by the Secretary-General after notification of the Regulation by two Parties to the 1958 Agreement.

** The second number is given merely as an example.

*** Definitions taken from CIE Publication 50(45), International Electrotechnical Vocabulary, Group 45: lighting.

- 1.2. CIE standard source A:* Gas-filled tungsten filament lamp operating at a correlated colour temperature of $T_{68} = 2\ 855.6$ K.
- 1.3. CIE 1931 standard colorimetric observer:* Receptor of radiation whose colorimetric characteristics correspond to the spectral tristimulus values $\bar{x}(\lambda)$, $\bar{y}(\lambda)$, $\bar{z}(\lambda)$ (see table).
- 1.4. CIE spectral tristimulus values:* Tristimulus values of the spectral components of an equi-energy spectrum in the CIE (XYZ) system.
- 1.5. Photopic vision:* Vision by the normal eye when it is adapted to levels of luminance of at least several candelas per square metre.

2. APPARATUS

2.1. General.

2.1.1. The apparatus shall consist of a light source, a holder for the test sample, a receiver unit with a photodetector and an indicating meter (see figure 1), and a means of eliminating the effects of extraneous light.

2.1.2. The receiver may incorporate a light-integrating sphere to facilitate measuring the reflectance of non-flat (convex) mirrors (see figure 2).

2.2. Spectral characteristics of light source and receiver.

2.2.1. The light source shall consist of a CIE standard source A and associated optics to provide a near-collimated light beam. A voltage stabilizer is recommended to maintain a fixed lamp voltage during instrument operation.

2.2.2. The receiver shall have a photodetector with a spectral response proportional to the photopic luminosity function of the CIE (1931) standard colorimetric observer (see table). Any other combination of illuminant-filter-receptor giving the overall equivalent of CIE standard illuminant A and photopic vision may be used. When an integrating sphere is used in the receiver, the interior surface of the sphere shall be coated with a matt (diffusive) spectrally non-selective white coating.

2.3. Geometric conditions.

2.3.1. The angle of the incident beam (Θ) should preferably be 0.44 ± 0.09 rad ($25 \pm 5^\circ$) from the perpendicular to the test surface and shall not exceed the upper limit of the tolerance (i.e. 0.53 rad or 30°). The axis of the receptor shall make an angle (Θ) with this perpendicular equal to that of the incident beam (see figure 1). The incident beam upon arrival at the test surface shall have a diameter of not less than 19 mm (0.75 in). The reflected beam shall not be wider than the sensitive area of the photodetector, shall not cover less than 50 per cent of such area, and as nearly as possible shall cover the same area segment as used during instrument calibration.

2.3.2. When an integrating sphere is used in the receiver section, the sphere shall have a minimum diameter of 127 mm (5 in). The sample and incident beam apertures in the sphere wall shall be of such a size as to admit the entire incident and reflected light beams. The photodetector shall be located so as not to receive direct light from either the incident or the reflected beams.

2.4. Electrical characteristics of the photodetector-indicator unit.

The photodetector output as read on the indicating meter shall be a linear function of the light intensity on the photosensitive area. Means (electrical and/or optical) shall be provided to facilitate zeroing and calibration adjustments. Such means shall not affect the linearity or the spectral characteristics of the instrument.

* Definitions taken from CIE Publication 50(45), International Electrotechnical Vocabulary, Group 45: lighting.

The accuracy of the receptor-indicator unit shall be with ± 2 per cent of full scale, or ± 10 per cent of the magnitude of the reading, whichever is the smaller.

2.5. Sample holder.

The mechanism shall be capable of locating the test sample so that the axes of the source arm and receptor are intersect at the reflecting surface. The reflecting surface may lie within or at either face of the mirror sample, depending on whether it is a first-surface, second-surface, or prismatic "flip" type mirror.

3. PROCEDURE

3.1. Direct calibration method

3.1.1. In the direct calibration method, air is used as the reference standard. This method is applicable for those instruments which are so constructed as to permit calibration at the 100 per cent point by swinging the receiver to a position directly on the axis of the light source (see Figure 1).

3.1.2. It may be desired in some cases (such as when measuring low-reflectivity surfaces) to use an intermediate calibration point (between 0 and 100 per cent on the scale) with this method. In these cases a neutral density filter of known transmittance shall be inserted in the optical path, and the calibration control shall then be adjusted until the meter reads the percentage transmission of the neutral density filter. This filter shall be removed before making reflectivity measurements.

3.2. Indirect calibration method

The indirect calibration method is applicable for those instruments with fixed source and receiver geometry. A properly calibrated and maintained reflectance standard is required. This reference standard should preferably be a flat mirror with a reflectance value as near as possible to that of the test samples.

3.3. Flat mirror measurement

The reflectance of flat mirror samples can be measured on instruments employing either the direct or indirect calibration method. The reflectance value is read directly from the indicating meter.

3.4. Non-flat (convex) mirror measurement

The measurement of the reflectance of non-flat (convex) mirrors requires the use of instruments which incorporate an integrating sphere in the receiver unit (see Figure 2). If the instrument indicating meter indicates n_e divisions with a reference standard mirror of E per cent reflectance, then, with a mirror of unknown reflectance, n_x divisions will correspond to a reflectance of X per cent, given by the formula:

$$X = E \frac{n_x}{n_e}$$

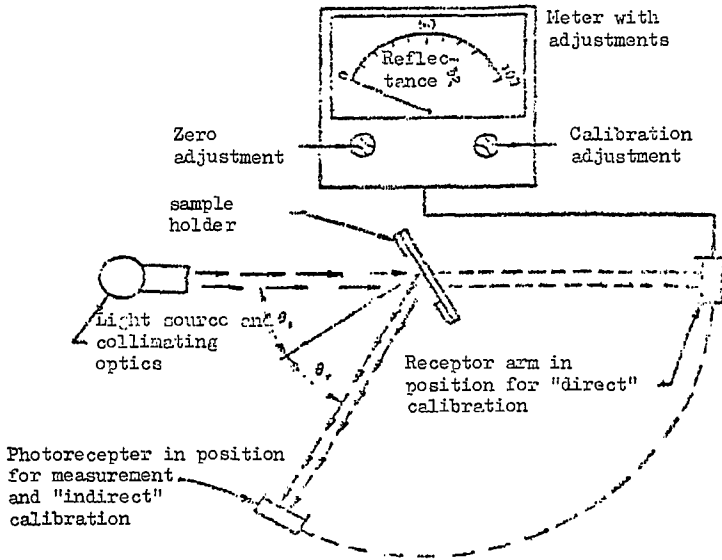


Figure 1

GENERALIZED REFLECTOMETER SHOWING GEOMETRIAS FOR THE TWO CALIBRATION METHODS

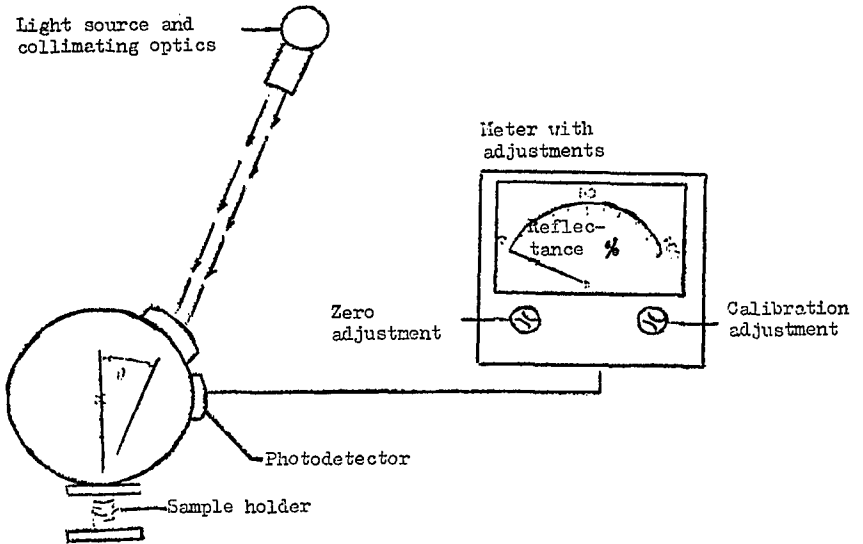


Figure 2

GENERALIZED REFLECTOMETER, INCORPORATING AN INTEGRATING SPHERE IN THE RECEIVER

SPECTRAL TRISTIMULUS VALUES FOR THE CIE 1931
STANDARD COLORIMETRIC OBSERVER*

(This table is taken from IEC Publication 50(45) (1970))

λ nm	$\bar{x}(\lambda)$	$\bar{y}(\lambda)$	$\bar{z}(\lambda)$
380	0.001 4	0.000 0	0.006 5
390	0.004 2	0.000 1	0.020 1
400	0.014 3	0.000 4	0.067 9
410	0.043 5	0.001 2	0.207 4
420	0.134 4	0.004 0	0.845 6
430	0.283 9	0.011 6	1.385 6
440	0.348 3	0.023 0	1.747 1
450	0.336 2	0.038 0	1.772 1
460	0.290 8	0.060 0	1.669 2
470	0.195 4	0.091 0	1.287 6
480	0.095 6	0.139 0	0.813 0
490	0.032 0	0.208 0	0.465 2
500	0.004 9	0.323 0	0.272 0
510	0.009 3	0.503 0	0.158 2
520	0.063 3	0.710 0	0.078 2
530	0.165 5	0.862 0	0.042 2
540	0.290 4	0.954 0	0.020 3
550	0.433 4	0.995 0	0.008 7
560	0.594 5	0.995 0	0.003 9
570	0.762 1	0.952 0	0.002 1
580	0.916 3	0.870 0	0.001 7
590	1.026 3	0.757 0	0.001 1
600	1.062 2	0.631 0	0.000 8
610	1.002 6	0.503 0	0.000 3
620	0.854 4	0.381 0	0.000 2
630	0.642 4	0.265 0	0.000 0
640	0.447 9	0.175 0	0.000 0
650	0.283 5	0.107 0	0.000 0
660	0.164 9	0.061 0	0.000 0
670	0.087 4	0.032 0	0.000 0
680	0.046 8	0.017 0	0.000 0
690	0.022 7	0.008 2	0.000 0
700	0.011 4	0.004 1	0.000 0
710	0.005 8	0.002 1	0.000 0
720	0.002 9	0.001 0	0.000 0
730	0.001 4	0.000 5	0.000 0
740	0.000 7	0.000 2**	0.000 0
750	0.000 3	0.000 1	0.000 0
760	0.000 2	0.000 1	0.000 0
770	0.000 1	0.000 0	0.000 0
780	0.000 0	0.000 0	0.000 0

* Abridged table. The values of $\bar{y}(\lambda) = V(\lambda)$ are rounded off to four decimal places.

** Changed in 1966 (from 3 to 2).

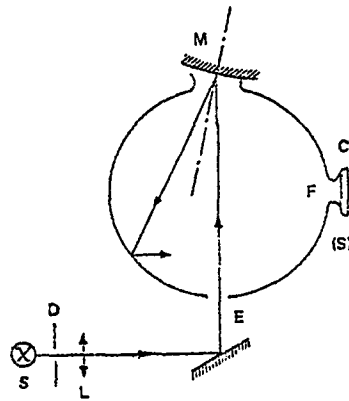


Figure 1

EXAMPLE OF DEVICE FOR MEASURING THE REFLECTION FACTOR OF SPHERICAL MIRRORS

Key

- C = Receiver
- D = Diaphragm
- E = Window of entry
- F = Window of measurement
- L = Lens
- M = Object window
- S = Light source
- (S) = Integrating sphere

ANNEX 6

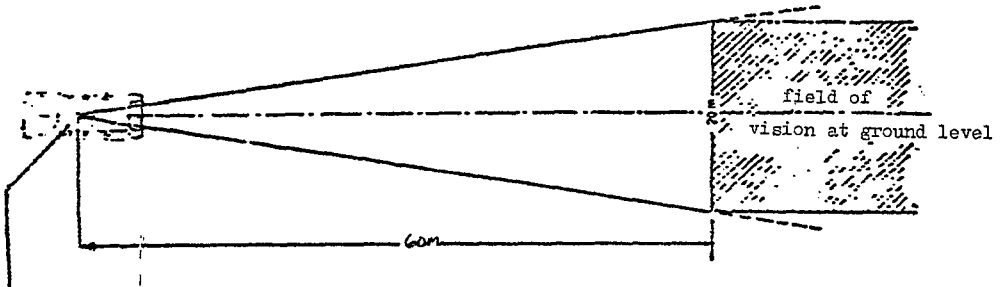


Figure 1

INTERIOR REAR-VIEW MIRRORS

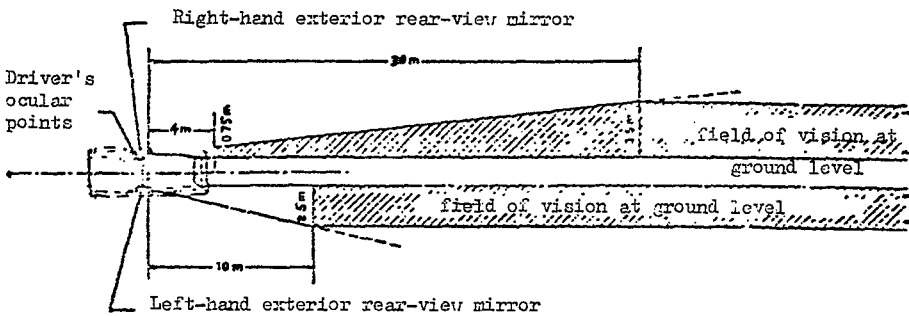


Figure 2

EXTERIOR REAR-VIEW MIRRORS

(Examples of vehicles circulating on the right side)

ANNEX 7

PROCEDURE FOR DETERMINING THE RADIUS OF CURVATURE “r”
OF A MIRROR’S REFLECTING SURFACE

1. Measurements

1.1. Equipment

The “spherometer” described in Figure 1 is used.

1.2. Measuring points

[1.2.1.] The principal radii of curvature shall be measured at 3 points situated as close as possible to positions at $\frac{1}{3}$, $\frac{1}{2}$ and $\frac{2}{3}$ of the distance along the arc of the reflecting surface passing through the centre of the mirror and parallel to segment b, or of the arc passing through the curve of the mirror which is perpendicular to it if this arc is the longest.

1.2.2. Where, because of mirror size, it is impossible to obtain measurements in the directions defined in item [1.2.1.] the technical departments responsible for the tests may take measurements at this point in two perpendicular directions as close as possible to those prescribed above.

2. Calculation of the radius of curvature (r)

“r” expressed in mm is calculated using the formula:

$$r = \frac{r_{p1} + r_{p2} + r_{p3}}{3}$$

where r_{p1} is the radius of curvature at the first measuring point, r_{p2} at the second and r_{p3} at the third.

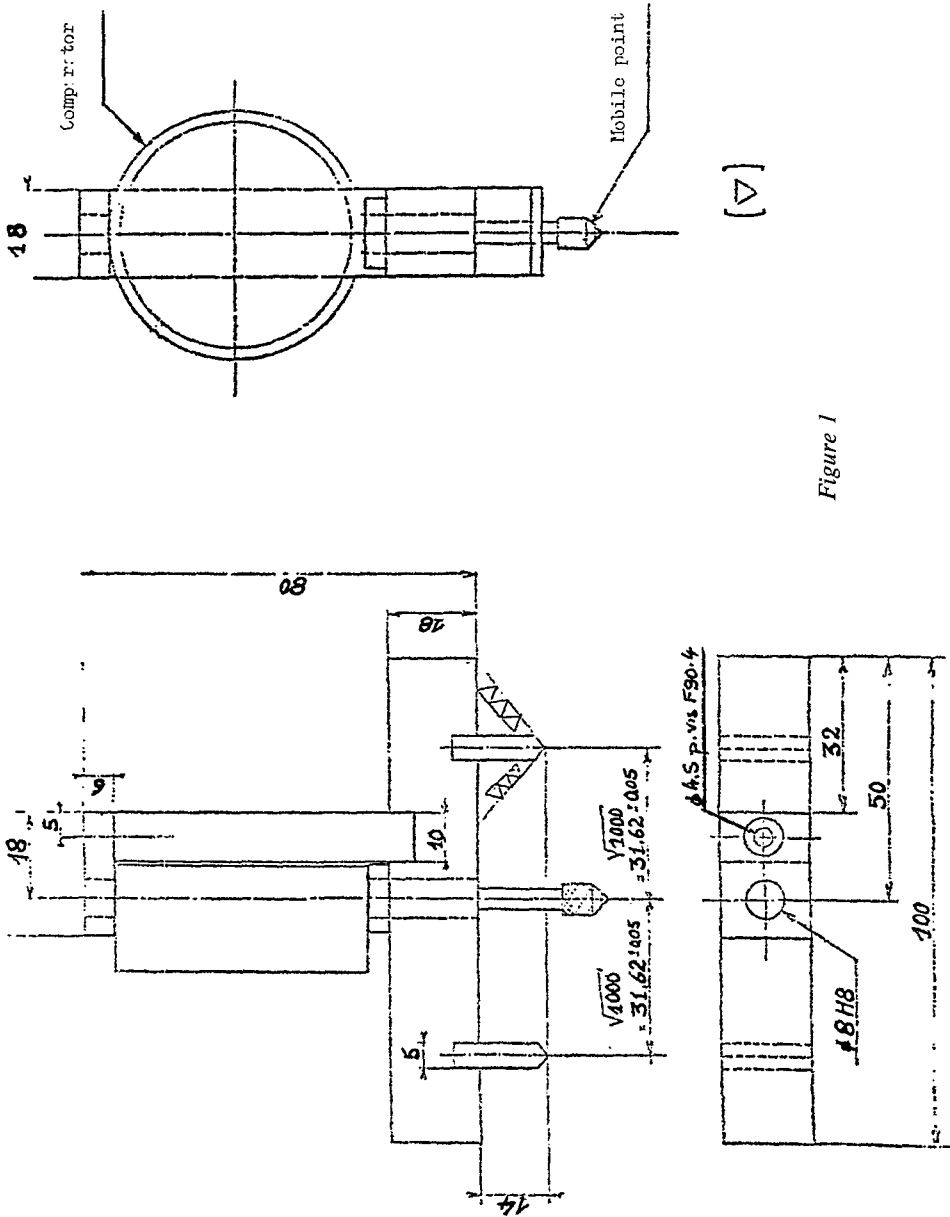


Figure 1

ANNEX 8

PROCEDURE FOR DETERMINING THE H POINT AND THE ACTUAL SEAT-BACK ANGLE AND
VERIFYING THEIR RELATIONSHIP WITH THE R POINT AND THE DESIGN SEAT-BACK
ANGLE

[To be determined]

Authentic texts: English and French.

Registered ex officio on 1 September 1981.
