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Contents

II *Non-legislative acts*

ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS

- ★ **Regulation No 1 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam and/or a driving beam and equipped with filament lamps of category R2 and/or HS1** 1
- ★ **Regulation No 6 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers** 40
- ★ **Regulation No 8 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11)** 71
- ★ **Regulation No 19 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of power-driven vehicle front fog lamps** 113
- ★ **Regulation No 20 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H4 lamps)** 170
- ★ **Regulation No 46 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of devices for indirect vision and of motor vehicles with regard to the installation of these devices** 211
- ★ **Regulation No 118 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform technical prescriptions concerning the burning behaviour of materials used in the interior construction of certain categories of motor vehicles** 263
- ★ **Regulation No 121 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of vehicles with regard to the location and identification of hand controls, tell-tales and indicators** 290

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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/wp29fdocsts.html>

Regulation No 1 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam and/or a driving beam and equipped with filament lamps of category R2 and/or HS1

Incorporating all valid text up to:

02 series of amendments — Date of entry into force: 8 September 2001

CONTENTS

REGULATION

Scope

1. Definitions
2. Application for approval
3. Markings
4. Approval
5. General specifications
6. Illumination
7. Gauging of discomfort
8. Standard headlamp
9. Conformity of production
10. Penalties for non-conformity of production
11. Modification and extension of approval of a type of headlamp
12. Production definitely discontinued
13. Names and addresses of technical services responsible for conducting approval tests and of administrative departments
14. Transitional provisions

ANNEXES

- Annex 1 — Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a type of headlamp pursuant to Regulation No 1
- Annex 2 — Special headlamps for agricultural or forest tractors and other slow-moving vehicles
- Annex 3 — Minimum requirements for conformity of production control procedures
- Annex 4 — Tests for stability of photometric performance of headlamps in operation
- Annex 5 — Examples of arrangements of approval marks
- Annex 6 — Measuring screens
- Annex 7 — Requirements for lamps incorporating lenses of plastic material — testing of lens or material samples and of complete lamps
- Annex 8 — Minimum requirements for sampling by an inspector

SCOPE ⁽¹⁾

This regulation applies to motor vehicles headlamps which may incorporate lenses of glass or plastic material.

1. DEFINITIONS

For the purpose of this Regulation,

- 1.1. 'Lens' means the outermost component of the headlamp (unit) which transmits light through the illuminating surface;
- 1.2. 'Coating' means any product or products applied in one or more layers to the outer face of a lens;
- 1.3. Headlamps of different 'types' are headlamps which differ in such essential respects as:
 - 1.3.1. The trade name or mark;
 - 1.3.2. The characteristics of the optical system;
 - 1.3.3. The inclusion of additional components capable of altering the optical effects by reflection, refraction or absorption; and/or deformation during operation;
 - 1.3.4. Suitability for right-hand or left-hand traffic or for both traffic systems;
 - 1.3.5. Ability to provide a passing beam or a driving beam or both;
 - 1.3.6. The materials constituting the lenses and coating, if any.
 - 1.3.7. The holder intended to accommodate the filament lamp (or lamps) of one of the following categories: R2 and/or HS1 ⁽²⁾.

⁽¹⁾ Nothing in this Regulation shall prevent a Party to the Agreement applying this Regulation from prohibiting the combination of a headlamp incorporating a lens of plastic material approved under this Regulation with a mechanical headlamp-cleaning device (with wipers).

⁽²⁾ Application for approval of a filament lamp: see Regulation No 37. 'Type of filament lamp' should not be confused with 'category of filament lamp'. This regulation concerns headlamps using filament lamps of categories R2 and/or HS1. These categories of filament lamps differ essentially in their design and, more particularly, in the cap. They are not interchangeable, but within one filament lamp category there are normally several types.

2. APPLICATION FOR APPROVAL

- 2.1. The application for approval shall be submitted by the owner of the trade name or mark or by his duly accredited representative. It shall specify: Whether the headlamp is intended to provide both a passing beam and a driving beam or only one of these beams;

Whether, if the headlamp is intended to provide a passing beam, it is designed for both left-hand and right-hand traffic or for either left-hand or right-hand traffic only.

If the headlamp is equipped with an adjustable reflector, the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle.

- 2.2. The application shall be accompanied, in respect of each type of headlamp, by:

- 2.2.1. Drawings in triplicate in sufficient detail to permit identification of the type and representing a frontal view of the headlamp, with details of lens ribbing if any, and the cross-section; the drawings shall indicate the space reserved for the approval mark;

If the headlamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle, if the headlamp is for use in that (those) position(s) only;

- 2.2.2. A brief technical specification;

- 2.2.3. Two samples of the type of headlamp;

- 2.2.4. For the test of plastic material of which the lenses are made;

- 2.2.4.1. thirteen lenses;

- 2.2.4.1.1. six of these lenses may be replaced by six samples of material at least 60 × 80 mm in size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 × 15 mm;

- 2.2.4.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;

- 2.2.4.2. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.

- 2.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.

- 2.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

3. MARKINGS ⁽³⁾

- 3.1. Headlamps submitted for approval shall bear the trade name or mark of the applicant.

⁽³⁾ In the case of headlamps designed to meet the requirements of traffic moving on one side of the road only (either right or left), it is further recommended that the area which can be occulted to prevent discomfort to users in a country where traffic moves on the opposite side of the road should be outlined indelibly on the front lens. This marking is not necessary, however, where the area is clearly apparent from the design.

- 3.2. They shall comprise, on the lens and on the main body ⁽⁴⁾, spaces of sufficient size for the approval mark and the additional symbols referred to in paragraph 4; these spaces shall be indicated on the drawings referred to in paragraph 2.2.1 above.
- 3.3. In the case of headlamps designed to satisfy the requirements both of countries with right-hand traffic and of countries with left-hand traffic, the two settings of the optical unit on the vehicle or of the filament lamp on the reflector shall be marked by the capital letters R and D, and L and G, respectively.
4. APPROVAL
- 4.1. General
- 4.1.1. If all the samples of a type of headlamp submitted pursuant to paragraph 2 above satisfy the provisions of this Regulation, approval shall be granted.
- 4.1.2. Where grouped, combined or reciprocally incorporated lamps satisfy the requirements of more than one Regulation, a single international approval mark may be affixed provided that each lamp of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it. This requirement shall not apply to headlamps fitted with a two-filament bulb when a single beam is approved.
- 4.1.3. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of headlamp covered by this Regulation except in the case of an extension of the approval to a device differing only in the colour of the light emitted.
- 4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of headlamp pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model shown in annex 1 to this Regulation, with the indications according to paragraph 2.2.1 and if the headlamp is equipped with an adjustable reflector and if the headlamp is to be used only in mounting positions according to the indications in paragraph 2.2.1, the applicant shall be obliged by the approval to inform the user in a proper way about the correct mounting position(s).
- 4.1.5. In addition to the mark prescribed in paragraph 3.1, an approval mark as described in paragraphs 4.2 and 4.3 below shall be affixed in the spaces referred to in paragraph 3.2 above to every headlamp conforming to a type approved under this Regulation.
- 4.2. Composition of the approval mark
- The approval mark shall consist of:
- 4.2.1. an international approval mark comprising:
- 4.2.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽⁵⁾;
- 4.2.1.2. the approval number prescribed in paragraph 4.1.3.

⁽⁴⁾ If the lens cannot be detached from the main body of the headlamp, a space on the lens shall be sufficient.

⁽⁵⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 (vacant), 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30-36 (vacant) and 37 for Turkey. 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.

- 4.2.2. the following additional symbol (or symbols):
- 4.2.2.1. on headlamps meeting left-hand traffic requirements only, a horizontal arrow, pointing to the right of an observer facing the headlamp, i.e. to the side of the road on which the traffic moves;
- 4.2.2.2. on headlamps designed to meet the requirements of both traffic systems by means of an appropriate adjustment of the setting of the optical unit or the filament lamp, a horizontal arrow with a head on each end, the heads pointing respectively to the left and to the right;
- 4.2.2.3. on headlamps meeting the requirements of this Regulation in respect of the passing beam only, the letter 'C';
- 4.2.2.4. on headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letter 'R';
- 4.2.2.5. on headlamps meeting the requirements of this Regulation in respect of both the passing beam and the driving beam, the letters 'CR';
- 4.2.2.6. on headlamps incorporating a lens of plastic material, the group of letters 'PL' shall be affixed near the symbols prescribed in paragraphs 4.2.2.3 to 4.2.2.5 above.
- 4.2.2.7. In every case the relevant operating mode used during the test procedure according to paragraph 1.1.1.1 of annex 4 and the permitted voltage(s) according to paragraph 1.1.1.2 of annex 4 shall be stipulated on the approval certificate and on the communication form transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation.

In the corresponding cases the device shall be marked as follows:

On headlamps meeting the requirements of this Regulation which are so designed that the filament of the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated: an oblique stroke (/) shall be placed behind the passing lamp symbol in the approval mark.

On headlamps meeting the requirements of annex 4 to this Regulation only when supplied with a voltage of 6 V or 12 V, a symbol consisting of the number 24 crossed out by an oblique cross (X), shall be placed near the filament lamp holder.

- 4.2.2.8. The two digits of the approval number which indicate the series of amendments in force at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.
- 4.2.2.9. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 above shall be clearly legible and be indelible even when the device is fitted in the vehicle.
- 4.3. Arrangement of the approval mark
- 4.3.1. Independent lamps
- Annex 5, figures, 1 to 9 to this Regulation gives examples of arrangements of the approval marks with the above-mentioned additional symbols.
- 4.3.2. Grouped, combined or reciprocally incorporated lamps
- 4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:
- 4.3.2.1.1. it is visible after their installation;

- 4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.
- 4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:
 - 4.3.2.2.1. either on the appropriate light-emitting surface,
 - 4.3.2.2.2. or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified (see four possible examples in annex 5).
 - 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.
 - 4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.
 - 4.3.2.5. Annex 5, figure 10, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.
- 4.3.3. Lamps, the lens of which is used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps

The provisions laid down in paragraph 4.3.2 above are applicable.

- 4.3.3.1. In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.2 above and bears the approval marks of the actual functions. If different types of headlamps comprise the same main body, the latter may bear the different approval marks.
- 4.3.3.2. Annex 5, figure 11, to this Regulation gives examples of arrangements of approval marks relating to the above case.

5. GENERAL SPECIFICATIONS

- 5.1. Each sample shall conform to the specifications set forth in paragraphs 6 and 7 below.
- 5.2. Headlamps shall be so made as to retain their prescribed photometric characteristics and to remain in good working order when in normal use, in spite of the vibrations to which they may be subjected.
- 5.3. Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicle as to comply with the rules applicable to them. Such a device need not be fitted on components in which the reflector and the diffusing lens cannot be separated provided the use of such units is confined to vehicles on which the headlamps setting can be adjusted by other means. Where a headlamp providing a driving beam and a headlamp providing a passing beam, each equipped with its own filament lamp, are assembled to form a composite unit, the adjusting device shall enable each optical system individually to be duly adjusted.

However, this shall not apply to headlamps assemblies whose reflectors are indivisible. For this type of assembly, the requirements of paragraph 6 below shall apply.

- 5.4. The components by which the filament lamp is fixed to the reflector shall be so made that, even in darkness, the filament lamp can be fixed in no position but the correct one. The filament lamp-holder shall conform to the dimensional characteristics as given in the following data sheets of IEC Publication 61-2:

Filament lamp	Holder	Data sheet
R2	P45t-41	7005-95-1
H51	PX43t	7005-34-1

- 5.5. Headlamps designed to satisfy the requirements both of countries in which traffic moves on the right and of those in which it moves on the left may be adapted for traffic on a given side of the road either by an appropriate initial adjustment when the vehicle is fitted out or by selective setting by the driver. Such initial adjustment or selective setting shall consist, for example, of fixing either the optical unit at a given angle on the vehicle or the filament lamp at a given angle in relation to the optical unit. In all cases, only two precisely differentiated setting positions, one for right-hand and one for left-hand traffic, shall be possible, and the design shall preclude inadvertent shifting of the headlamp from one position to another or its setting in an intermediate position. Where two different setting positions are provided for the filament lamp, the components attaching the filament lamp to the reflector must be so designed and manufactured that, in each of its two settings, the filament lamp will be held in position with the precision required for headlamps intended for traffic on only one side of the road.
- 5.6. Complementary tests shall be done according to the requirements of annex 4 to ensure that in use there is no excessive change in photometric performance.
- 5.7. Conformity with the requirements of paragraphs 5.2 to 5.5 shall be verified visually and, where necessary, by a test fitting.
- 5.8. If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of annex 7.

6. ILLUMINATION

- 6.1.1. Headlamps shall be so made that with suitable R2 and/or HS1 filament lamp(s) they provide adequate illumination without dazzle in the case of passing beam and good illumination in the case of the driving beam.
- 6.1.2. The illumination produced by the headlamp shall be checked on a vertical screen set at a distance of 25 m in front of the headlamp and at right angles to its axis (see annex 6).
- 6.1.3. The headlamp shall be checked by means of (a) standard (etalon) filament lamp(s) designed for a rated voltage of 12 V, any selective-yellow filters ⁽⁶⁾ being replaced by geometrically identical uncoloured filters with a transmission factor of at least 80 per cent. During the checking of the headlamp the voltage at the terminals of the filament lamp shall be regulated so as to obtain the following characteristics:

Filament lamp category	Approximate supply voltage (V) for measurement	Light flux (in lumens)	
		driving-beam filament	passing-beam filament
R2	12	700	450
H51	12	700	450

- 6.1.4. The dimensions determining the position of the filament(s) and the shield inside the standard filament lamp are shown on the relevant data sheet of Regulation No 37.
- 6.1.5. The bulb of the standard filament lamp shall be of such optical shape and quality that it does not cause any reflection or refraction adversely affecting the light distribution. Compliance with this requirement shall be checked by measuring the light distribution obtained when a standard headlamp is fitted with the standard (etalon) filament lamp.

⁽⁶⁾ These filters shall consist of all the components, including the lens, which are intended to colour the light.

- 6.2. The passing beam must produce a sufficiently sharp 'cut-off' to permit satisfactory adjustment with its aid. The 'cut-off' must be a horizontal straight line on the side opposite to the direction of the traffic for which the headlamp is intended; on the other side it should be horizontal or within an angle of 15° above the horizontal.

The headlamp shall be so adjusted that:

- 6.2.1. in the case of headlamps designed to meet the requirements of right-hand traffic, the 'cut-off' on the left half of the screen ⁽⁷⁾ is horizontal and, in the case of headlamps designed to meet the requirements of left-hand traffic, the 'cut-off' on the right half of the screen is horizontal;
- 6.2.2. this horizontal part of the 'cut-off' is situated on the screen 25 cm below the outline of the horizontal plane passing through the focus of the headlamp (see annex 6 to this Regulation);
- 6.2.3. the screen is in the position indicated in annex 6 ⁽⁸⁾.

When so adjusted, the headlamp shall, if it is intended to provide a passing beam and a driving beam, comply with the requirements referred to in paragraphs 6.3 and 6.5 below. If it is intended primarily to provide a passing beam, it need comply only with the requirements referred to in paragraph 6.3 ⁽⁹⁾.

Where a headlamp so adjusted does not meet the requirements referred to in paragraphs 6.3 and 6.5, its adjustment may be changed, provided that the axis of the beam or the point of intersection HV specified in annex 6 to this Regulation is not laterally displaced by more than 1° (= 44 cm) to the right or left ⁽¹⁰⁾. To facilitate adjustment by means of the 'cut-off', the headlamp may be partially occulted in order to sharpen the 'cut-off'.

If the headlamp is designed solely to provide a driving beam, it shall be so adjusted that the area of maximum illumination is centred on the point of intersection of the lines hh and vv. Such a headlamp need meet only the requirements referred to in paragraph 6.5.

- 6.3. The illumination produced on the screen by the passing beam shall meet the requirements of the following table ⁽¹¹⁾:

Point on measuring screen		Required illumination in lux
Headlamps for right-hand traffic	Headlamps for left-hand traffic	
Point R 50 L	Point H 50 R	≤ 0.4
Point 75 R	Point 75 L	≥ 6
Point 50 R	Point 50 L	≥ 6
Point 25 L	Point 25 R	≥ 1,5
Point 25 R	Point 25 L	≥ 1,5
Any point in zone III		≤ 0,7
Any point in zone IV		≥ 2
Any point in zone I		≤ 20

It is understood that, where the flux of the standard filament lamp used for measurement is other than 450 lumens, the measurements as taken will be corrected proportionally to the rates of the fluxes. There shall be no lateral variations detrimental to good visibility in any of the zones I, II, III and IV.

⁽⁷⁾ The adjustment screen should be sufficiently wide to allow examination of the 'cut-off' over a range of at least 5° from the line vv.

⁽⁸⁾ If, in the case of a headlamp designed to satisfy the requirements of this Regulation with respect to the passing beam only, the focal axis diverges appreciably from the general direction of the beam, lateral adjustment shall be effected to the manner which best satisfies the requirements for illumination at points 75 and 50.

⁽⁹⁾ A 'Passing beam' headlamp of this kind may incorporate a driving beam for which no specifications are laid down.

⁽¹⁰⁾ The limit of non-adjustment of 1° to the right of left is not incompatible with vertical non-adjustment. The latter is limited only by the requirements of paragraph 6.5.

⁽¹¹⁾ See annex 2 on the subject of special headlamps for agricultural or forest tractors and other slow-moving vehicles.

Headlamps designed to meet the requirements of both right-hand and left-hand traffic must, in each of the two setting positions of the optical unit or of the filament lamp, meet the requirements set forth above for the corresponding traffic system.

- 6.4. The illumination values in zones 'A' and 'B' as shown in figure P1C in annex 6 shall be checked by the measurement of the photometric values of points 1 to 8 on this figure; these values shall lie within the following limits:

$$1 + 2 + 3 \geq 0,3 \text{ lux, and}$$

$$4 + 5 + 6 \geq 0,6 \text{ lux, and}$$

$$0,7 \text{ lux} \geq 7 \geq 0,1 \text{ lux and}$$

$$0,7 \text{ lux} \geq 8 \geq 0,2 \text{ lux}$$

These new values shall not be required for headlamps which have been approved before the application date of Supplement 3 to the 01 series of amendments to this Regulation (2 December 1992) nor to the extensions of such approvals.

- 6.5. In the case of headlamps with an adjustable reflector the requirements of paragraphs 6.2 to 6.4 are applicable for each mounting position indicated according to paragraph 2.1. For verification the following procedure shall be used:

- 6.5.1. each applied position is realised on the test goniometer with respect to a line joining the centre of the light source and point HV on the aiming screen. The adjustable reflector is then moved into such a position that the light pattern on the screen corresponds to the aiming prescriptions of paragraphs 6.1, 6.2 and/or 6.4;

- 6.5.2. with the reflector initially fixed according to paragraph 6.5.1., the headlamp must meet the relevant photometric requirements of paragraphs 6.2, 6.3 and 6.4;

- 6.5.3. additional tests are made after the reflector has been moved vertically $\pm 2^\circ$ or at least into the maximum position, if less than 2° , from its initial position by means of the headlamps adjusting device. Having re-aimed the headlamp as a whole (by means of the goniometer for example) in the corresponding opposite direction the light output in the following directions shall be controlled and lie within the required limits: passing beam: points HV and 75R (75L respectively); driving beam: point HV (percentage of Emax).

- 6.5.4. if the applicant has indicated more than one mounting position, the procedure of paragraphs 6.5.1 to 6.5.3 shall be repeated for all the other positions;

- 6.5.5. if the applicant has not asked for special mounting positions, the headlamp shall be aimed for measurements of paragraphs 6.2 to 6.4 with the headlamps adjusting device in its mean position. The additional tests of paragraph 6.5.3 shall be made with the reflector moved into its extreme positions (instead of $\pm 2^\circ$) by means of the headlamps adjusting device.

- 6.6. Measurements of the illumination produced on the screen by the driving beam shall be taken with the same headlamp adjustment as for measurements under 6.3 above, or, in the case of a headlamp providing a driving beam only, in accordance with the final paragraph of 6.2.3. In the case where more than one light source is used to provide the main beam, the combined functions shall be used to determine the maximum value of the illumination (Emax).

The illumination produced on the screen by the driving beam shall meet the following requirements:

The point of intersection HV of the lines hh and vv shall be situated within the isolux 90 % of maximum illumination.

This maximum value shall not be less than 32 lux.

Starting from point of intersection HV, horizontally to the right and left, illumination shall be not less than 16 lux up to a distance of 1,125 m and not less than 4 lux up to a distance of 2,25 m. (Where the flux of the standard filament lamp used for measurements is other than 700 lumens, the measurements as taken must be corrected proportionally to the ratio of the fluxes.)

- 6.7. The screen illumination values mentioned under paragraphs 6.3 and 6.5 above shall be measured by means of a photo-electric cell, the useful area of which shall be contained within a square of 65 mm side.

7. GAUGING OF DISCOMFORT

The discomfort caused by the passing beam of headlamps shall be gauged ⁽¹²⁾.

8. STANDARD HEADLAMP

A headlamp shall be deemed to be a standard headlamp if it:

- 8.1. Satisfies the above-mentioned requirements for approval;
- 8.2. Has an effective diameter of not less than 160 mm;
- 8.3. Provides with a standard filament lamp, at the various points and in the various areas referred to in paragraph 6.3 above, illumination equal to:
- 8.3.1. not more than 90 % of the maximum limits, and
- 8.3.2. not less than 120 % of the minimum limits prescribed in the table in paragraph 6.3.

9. CONFORMITY OF PRODUCTION

- 9.1. Headlamps approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraph 6.
- 9.2. In order to verify that the requirements of paragraph 9.1 are met, suitable controls of the production shall be carried out.
- 9.3. The holder of the approval shall in particular:
- 9.3.1. ensure the existence of procedures for the effective control of the quality of products;
- 9.3.2. have access to the control equipment necessary for checking the conformity to each approved type;
- 9.3.3. ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the administrative service;
- 9.3.4. analyse the results of each type of test in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production;
- 9.3.5. ensure that for each type of product at least the tests prescribed in annex 3 to this Regulation are carried out;
- 9.3.6. ensure that any collecting of samples giving evidence of nonconformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

⁽¹²⁾ This requirement will be the subject of a recommendation for the benefit of administrations.

- 9.4. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit.
- 9.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.
- 9.4.2. The inspector may take samples at random to be tested in the manufacturer's laboratory. The minimum number of samples may be determined in the light of the results of the manufacturer's own checks.
- 9.4.3. When the quality lever appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in the application of paragraph 9.4.2 above, the inspector shall select samples, to be sent to the technical service which has conducted the type approval tests, using the criteria of annex 8.
- 9.4.4. The competent authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with the criteria of annex 8.
- 9.4.5. The competent authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the competent authority and their confidence in the arrangements for ensuring effective control of the conformity of production. In the case where negative results are recorded, the competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.
- 9.5. Headlamps with apparent defects are disregarded.
- 9.6. The reference mark is disregarded.
10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 10.1. The approval granted in respect of a headlamp pursuant to this Regulation may be withdrawn if the requirements specified above are not met or if a headlamp bearing the approval mark is not in conformity with the type approved.
- 10.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1 to this Regulation.
11. MODIFICATION AND EXTENSION OF APPROVAL OF A TYPE OF HEADLAMP
- 11.1. Every modification of the headlamp type shall be notified to the administrative department which approved the type of headlamp. The department may then either:
- 11.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the headlamp still complies with the requirements; or
- 11.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 11.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 above to the Parties to the Agreement applying this Regulation.
- 11.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.
- 11.4. Approvals granted before 18 March 1986 remain valid.

12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a headlamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

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

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval or production definitely discontinued, issued in other countries, are to be sent.

14. TRANSITIONAL PROVISIONS

14.1. As from six months after the official date of entry into force of Regulation No 112, Contracting Parties applying this Regulation shall cease to grant ECE approvals according to this Regulation.

14.2. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to this and any previous series of amendments of this Regulation.

14.3. Approvals granted under this Regulation before the date of entry into force of Regulation No. 112 and all extensions of approvals, including those to a preceding series of amendments to this Regulation granted subsequently, shall remain valid indefinitely.

14.4. Contracting Parties applying this Regulation shall continue to issue approvals for headlamps on the basis of this and any previous series of amendments to this Regulation, provided that the headlamps are intended as replacements for fitting to vehicles in use.

14.5. As from the official date of entry into force of Regulation No 112, no Contracting Party applying this Regulation shall prohibit the fitting on a new vehicle type of a headlamp approved under Regulation No 112.

14.6. Contracting Parties applying this Regulation shall continue to allow fitting on a vehicle type or vehicle of a headlamp approved to this Regulation.

14.7. Contracting Parties applying this Regulation shall continue to allow fitting or use on a vehicle in use of a headlamp approved to this Regulation as amended by any previous series of amendments, provided that the headlamp is intended for replacement.

ANNEX 1

COMMUNICATION

(maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of headlamp pursuant to Regulation No 1

Approval No Extension No

1. Trade name or mark of the device:
2. Manufacturer's name for the type of device:
3. Manufacturer's name and address:
4. If applicable, name and address of the 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. Brief description:
 Category as described by the relevant marking ⁽³⁾:
 Number and category of filament lamp or lamps:
 Colour of light emitted: white/selective yellow ⁽²⁾:
10. Position of the approval mark:
11. Reason(s) for extension (if applicable):
12. Approval granted/extended/refused/withdrawn ⁽²⁾:
13. Place:
14. Date:

15. Signature:

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

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

(2) Strike out what does not apply.

(3) Indicate the appropriate marking selected from the list below:

HC, HC, HC, HR, HR PL, HCR, HCR, HCR
 HC/R, HC/R, HC/R, HC/, HC/, HC/, HC PL, HC PL, HC PL
 HCR PL, HCR PL, HCR PL, HC/R PL, HC/R PL, HC/R PL
 HC/PL, HC/PL, HC/PL

ANNEX 2

Special headlamps for agricultural or forest tractors and other slow-moving vehicles

The provisions of this Regulation shall also apply to the approval of special headlamps for agricultural or forest tractors and other slow-moving vehicles, such headlamps being intended to provide both a driving beam and a passing beam and having a diameter D of less than 160 mm ⁽¹⁾, with the following modifications:

- (a) The minimum requirements for illumination laid down in paragraph 6.3 shall be reduced in the ratio

$$\left(\frac{D - 45}{160 - 45} \right)^2$$

subject to the following absolute lower limits:

3 lux at either point 75 R or point 75 L;

5 lux at either point 50 R or point 50 L;

1,5 lux in zone IV;

- (b) Instead of the symbol CR provided for in paragraph 4.2.2.5 of the Regulation, the headlamp shall be marked with the letter M in a downward-pointing triangle;
- (c) In the communication concerning approval, item 9 in annex 1 shall read: 'Headlamp for slow-moving vehicles only'.

⁽¹⁾ If the apparent surface of the reflector is not circular, the diameter shall be that of a circle with the same area as the apparent useful surface of the reflector.

ANNEX 3

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp:

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and zone III, the maximum unfavourable deviation may be respectively:

B 50 L (or R)	0,2 lx equivalent 20 per cent
	0,3 lx equivalent 30 per cent
Zone III	0,3 lx equivalent 20 per cent
	0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. or the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of + 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L (or R) ⁽¹⁾ (with a tolerance of + 0,1 lx), 75 R (or L), 25 R, 25 L, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 E_{max}, a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.6 of this Regulation.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left ⁽²⁾.

1.2.4. If the results of the tests described above do not meet the requirements, tests on the headlamps shall be repeated using another standard filament lamp.

1.3. With respect to the verification of the change in vertical position of the cut-off line under the influence of heat, the following procedure shall be applied:

One of the sampled headlamps shall be tested according to the procedure described in paragraph 2.1 of annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of annex 4.

The headlamp shall be considered as acceptable if Δr does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, a second headlamp shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 1,5 mrad.

1.4. The chromaticity coordinates shall be complied with.

The photometric performance of a headlamp emitting selective yellow light shall be the values contained in this Regulation multiplied by 0,84.

⁽¹⁾ Letters in brackets refer to headlamps intended for left-hand traffic.

⁽²⁾ The limit of non-adjustment of 1° to the right of left is not incompatible with vertical non-adjustment. The latter is limited only by the requirements of paragraph 6.5.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of headlamp 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 characteristics and the verification of the change in vertical position of the cut-off line under the influence of heat.

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 headlamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of headlamps 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 headlamp shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points E_{max} , HV ⁽³⁾, HL, HR ⁽⁴⁾ in the case of the driving beam, and to points B 50 L (or R), HV, 75 R (or L) and 25 L (or R) in the case of the passing beam (see figure in annex 6).

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 8 (first sampling) would be 0,95.

⁽³⁾ When the driving beam is reciprocally incorporated with the passing beam, HV in the case of the driving beam shall be the same measuring point as in the case of the passing beam.

⁽⁴⁾ HL and HR: points 'hh' located at 1,125 m to the left and to the right of point HV respectively.

ANNEX 4

Tests for stability of photometric performance of headlamps in operation

Once the photometric values have been measured according to the prescriptions of this Regulation, in points for $E_{\max}$ for driving beam and HV, 50 R, B 50 L for passing beam (or HV, 50 L, B 50 R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. 'Complete headlamp' shall be understood to mean the complete lamp itself including those surrounding body parts and lamps which could influence its thermal dissipation.

1. TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clean headlamp

The headlamp shall be operated for 12 hours as described in subparagraph 1.1.1 and checked as prescribed in subparagraph 1.1.2.

1.1.1. Test Procedure

The headlamp shall be operated for the specified time so that:

- 1.1.1.1. (a) in the case where only one lighting function (driving or passing beam) is to be approved, the corresponding filament is lit for the prescribed time ⁽¹⁾,
- (b) in the case of a reciprocally incorporated passing lamp and driving lamp (dual filament lamp or two filament lamps):

If the applicant declares that the headlamp is to be used with a single filament lit ⁽²⁾ at a time, the test shall be carried out in accordance with this condition, activating each specified function successively for half the time specified in paragraph 1.1.

In all other cases, the headlamp shall be subjected to the following cycle until the time specified is reached:

15 minutes, passing-beam filament lit

5 minutes, all filaments lit;

- (c) in the case of grouped lighting functions all the individual functions shall be lit simultaneously for the time specified for individual lighting functions
- (a) also taking into account the use of reciprocally incorporated lighting functions
- (b) according to the manufacturer's specifications.

1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply a wattage 15 % higher than the rated wattage specified in the Regulation for filament lamps (Regulation No 37) at a rated voltage of 6 V or 12 V, and 26 % higher than the rated wattage for 24 V filament lamps.

The applied wattage shall in all cases comply with the corresponding value of a filament lamp of 12 V rated voltage, except if the applicant for approval specifies that the headlamp may be used at a different voltage. In the latter case, the test shall be carried out with the filament lamp whose wattage is the highest that can be used.

⁽¹⁾ When the tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

⁽²⁾ Should two or more lamp filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the filaments simultaneously.

1.1.2. Test results

1.1.2.1. Visual inspection

Once the headlamp has been stabilised to the ambient temperature, the headlamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually, no distortion, deformation, cracking or change in colour of either the headlamp lens or the external lens, if any, shall be noticeable.

1.1.2.2. Photometric test

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

Passing beam:

50 R - B 50 L - HV for headlamps designed for right-hand traffic

50 L - B 50 R - HV for headlamps designed for left-hand traffic.

Driving beam:

Point of $E_{\max}$

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in para. 2 of this annex). A 10 % discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty headlamp

After being tested as specified in subparagraph 1.1 above, the headlamp shall be operated for one hour as described in paragraph 1.1.1, after being prepared as prescribed in paragraph 1.2.1, and checked as prescribed in paragraph 1.1.2.

1.2.1. Preparation of the headlamp

1.2.1.1. Test mixture

1.2.1.1.1. For headlamp with the outside lens in glass:

The mixture of water and a polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

1 part by weight of vegetal carbon dust (beechwood) with a particle size of 0-100 μm ,

0,2 parts by weight of NaCMC ⁽³⁾, and

an appropriate quantity of distilled water, with a conductivity of $\leq 1 \text{ mS/m}$.

The mixture must not be more than 14 days old.

1.2.1.1.2. For headlamp with outside lens in plastic material:

The mixture of water and polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

1 part by weight of vegetal carbon dust (beechwood) with a particle size of 0-100 μm ,

0,2 part by weight of NaCMC ⁽³⁾,

13 parts by weight of distilled water with a conductivity of $\leq 1 \text{ mS/m}$, and

2 ± 1 parts by weight of surface-actant ⁽⁴⁾.

The mixture must not be more than 14 days old.

⁽³⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 cP for a 2 % at 20 °C.

⁽⁴⁾ The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

1.2.1.2. Application of the test mixture to the headlamp

The test mixture shall be uniformly applied to the entire light emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20 % of the values measured for each following point under the conditions described in this annex:

Point of $E_{\max}$ in driving beam photometric distribution for a driving/passing lamp.

Point of $E_{\max}$ in driving beam photometric distribution for a driving lamp only. 50 R and 50 V ⁽⁵⁾ for a passing lamp only, designed for right-hand traffic.

50 L and 50 V for a passing lamp only, designed for left-hand traffic.

1.2.1.3. Measuring equipment

The measuring equipment shall be equivalent to that used during headlamp approval tests. A standard (reference) filament lamp shall be used for the photometric verification.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp.

The headlamp tested in accordance with paragraph 1 of this annex shall be subjected to the test described in paragraph 2.1 of this annex without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

Using a mass production filament lamp which has been aged for at least one hour the headlamp shall be operated on passing beam without being dismounted from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph 1.1.1.2 of this annex). The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B 50 L for right-hand traffic or B 50 R for left-hand traffic) shall be verified 3 minutes (r_3) and 60 minutes (r_{60}) respectively after operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

2.2. Test results

2.2.1. The result expressed in milliradians (mrad) shall be considered as acceptable when the absolute value $\Delta r_1 = r_3 - r_{60}$ recorded on the headlamp is not more than 1,0 mrad ($\Delta r_1 \leq 1,0$ mrad).

2.2.2. However, if this value is more than 1,0 mrad but not more than 1,5 mrad ($1,0 \text{ mrad} < \Delta r_1 \leq 1,5 \text{ mrad}$) a second headlamp shall be tested as described in paragraph 2.1 of this annex after being subjected three consecutive times to the cycle as described below, in order to stabilise the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing lamp for one hour (the voltage shall be adjusted as specified in paragraph 1.1.1.2 above).

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values Δr_1 measured on the first sample and Δr_{II} measured on the second sample is not more than 1,0 mrad

$$\frac{(\Delta r_1 + \Delta r_{II})}{2} \leq 1,0 \text{ mrad}$$

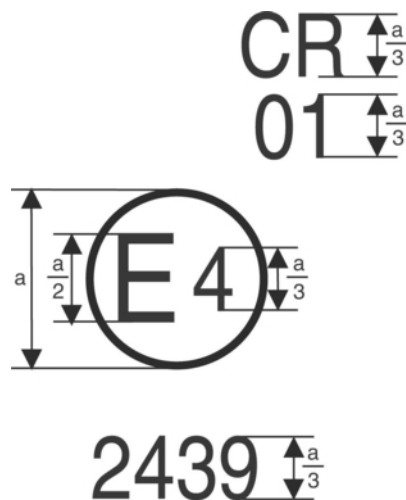
⁽⁵⁾ 50V is situated 375 mm below HV on the vertical line v-v on the screen at 25 m distance.

ANNEX 5

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS

(See paragraph 4 of this Regulation)

Figure 1



a = 12 mm min.

The headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation in respect of both the driving beam and the passing beam, and which is designed for right-hand traffic only.

Note:

The approval number and the additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Figure 2

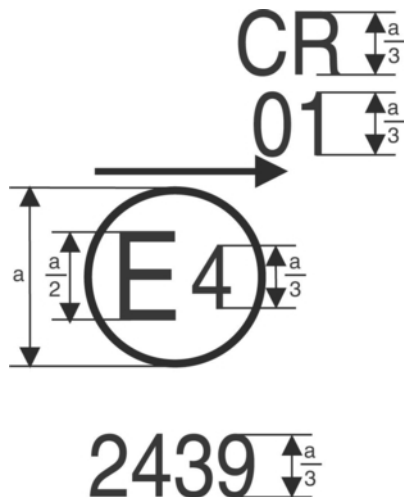


Figure 3a

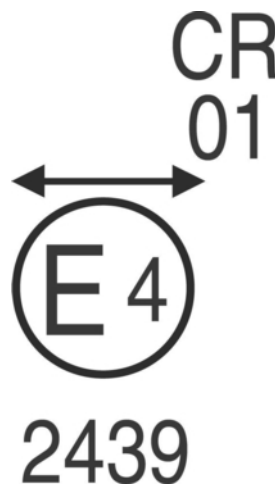


Figure 3b



The headlamp bearing the approval mark shown above is a headlamp meeting the requirements of this Regulation with respect to both the passing beam and the driving beam, and designed:

For left-hand traffic only

For both traffic systems, by means of an adjustment as desired of the optical unit or the lamp.

Figure 4



Figure 5



The headlamp bearing the approval mark shown above is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation with respect to the passing beam only, and designed:

For both traffic systems.

For right-hand traffic only.

Figure 6

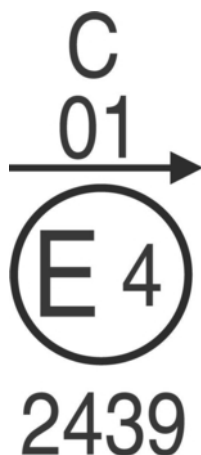
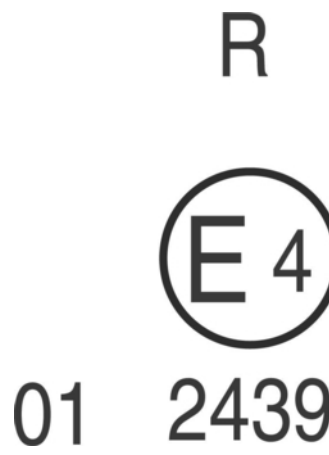


Figure 7



The headlamp bearing the approval mark shown above is a headlamp meeting the requirements of this Regulation:

With respect to the passing beam only, and designed for left-hand traffic only.

With respect to the driving beam only.

Figure 8

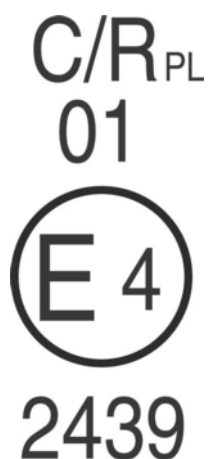
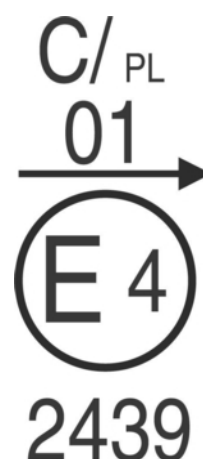


Figure 9



Identification of a headlamp incorporating the lens of plastic material meeting the requirements of Regulation No 1:

For both the passing beam and the driving beam
and designed for right-hand traffic only.

For the passing beam only and designed for
left-hand traffic only.

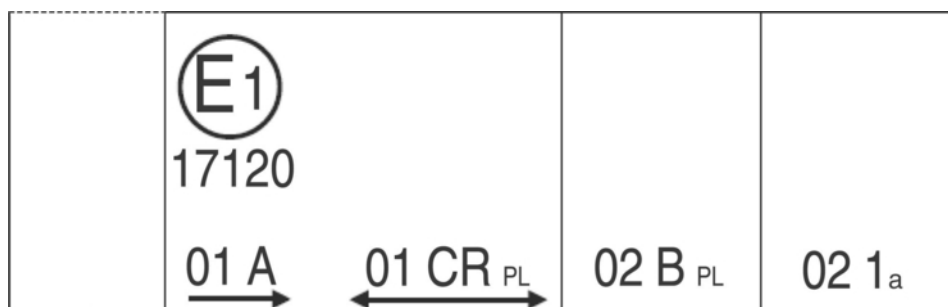
The passing lamp filament shall not be lit simultaneously with the driving lamp filament and/or any other headlamp with which it is reciprocally incorporated.

Simplified marking of grouped, combined or reciprocally incorporated lamps

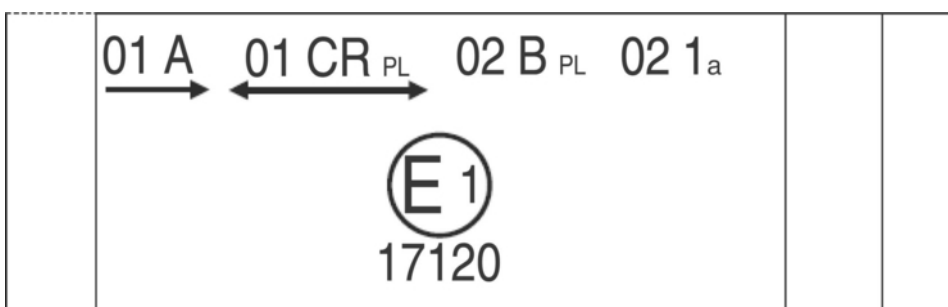
Figure 10

(The vertical and horizontal lines schematise the shape of the light-signalling device.
They are not part of the approval mark.)

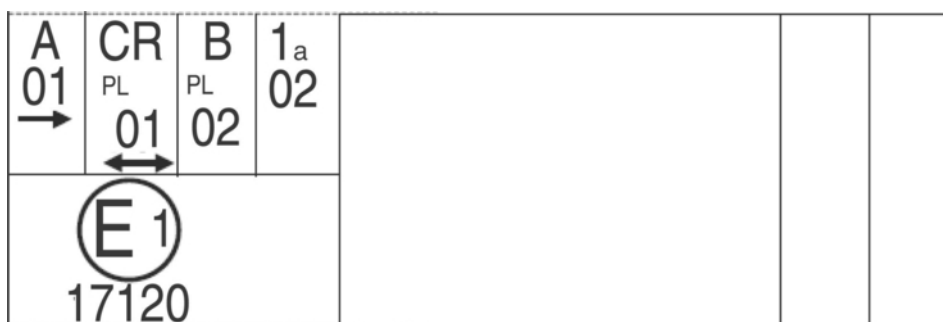
MODEL A



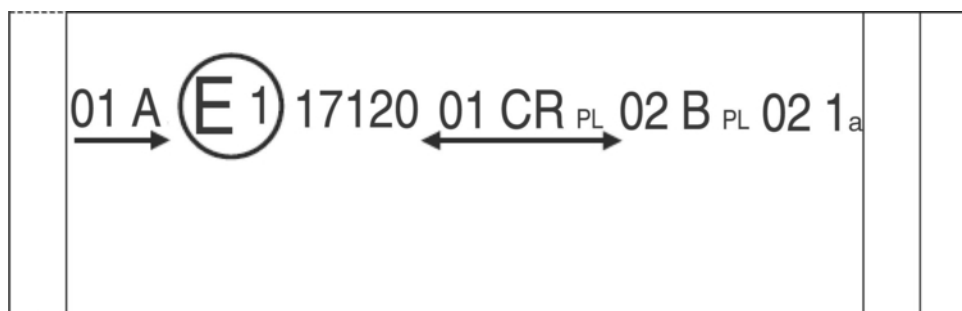
MODEL B



MODEL C



MODEL D



Note: The four examples shown above correspond to a lighting device bearing an approval mark relating to:

A front Position lamp approved in accordance with the 01 series of amendments to Regulation No 7,

A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in accordance with the 01 series of amendments to Regulation No 1 and incorporating a lens of plastic material,

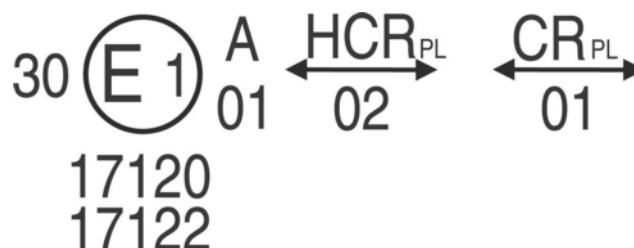
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19 and incorporating a lens of plastic material,

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No 6.

Figure 11

Lamp reciprocally incorporated with a headlamp

Example 1



The above example corresponds to the marking of a lens of plastic material intended to be used in different types of headlamps, namely:

either: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No 20 as amended by the 02 series of amendments,

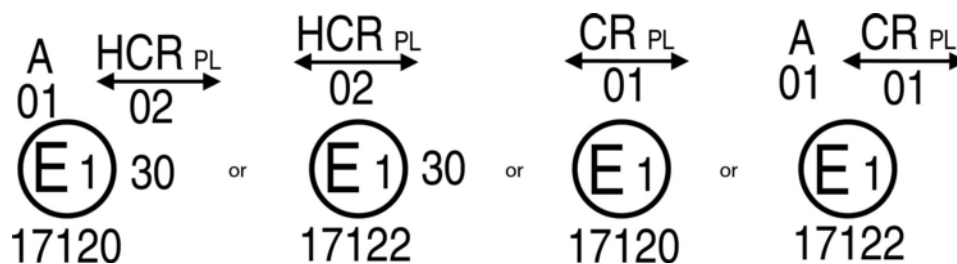
which is reciprocally incorporated with

a front position lamp approved in accordance with the 01 series of amendments to Regulation No 7;

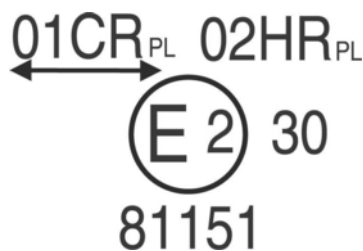
or: a headlamp with a passing beam designed for passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No 1 as amended by the 01 series of amendments,

which is reciprocally incorporated with the same front position lamp as above;

or even: either of the above-mentioned headlamps approved as a single lamp. The main body of the headlamp shall bear the only valid approval number, for instance:



Example 2



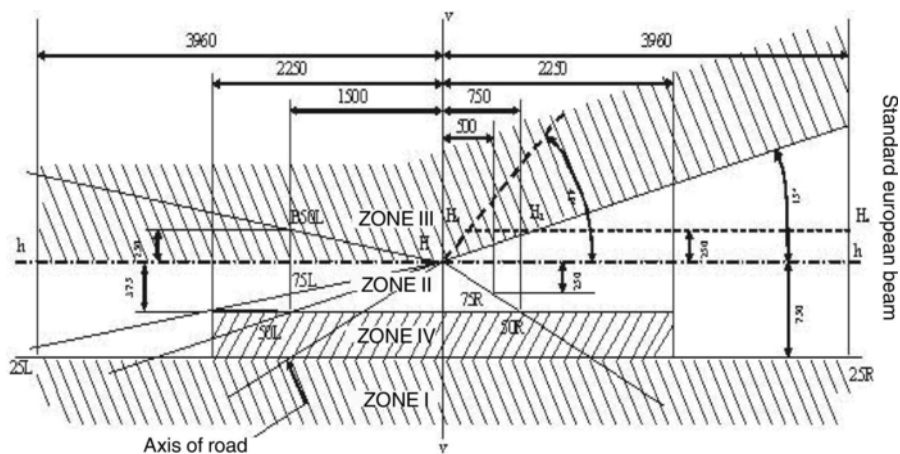
The above example corresponds to the marking of a lens of plastic material used in an assembly of two headlamps approved in France (E2), consisting of a headlamp emitting a passing beam designed for both traffic systems and of a driving beam with a maximum intensity comprised between x and y candelas, meeting the requirements of Regulation No 1, as amended by the 01 series of amendments and of a headlamp emitting a driving beam with a maximum intensity comprised between w and z candelas, meeting the requirements of Regulation No 20, as amended by the 02 series of amendments the maximum intensity of all the driving beams being comprised between 86 250 and 101 250 candelas.

ANNEX 6

MEASURING SCREENS

A. Headlamp for right-hand traffic

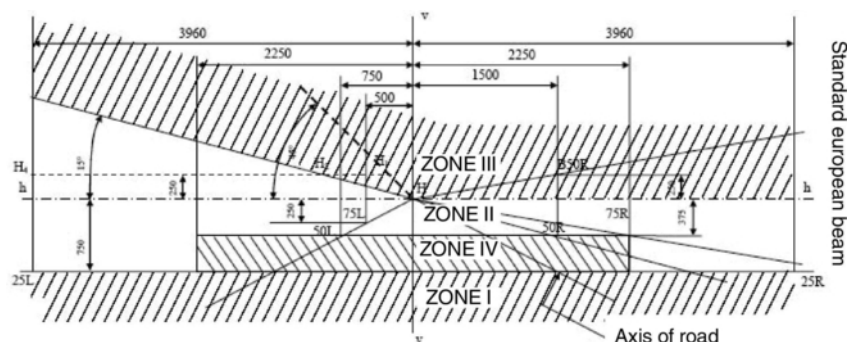
(Dimensions in mm)



h-h: horizontal plane } passing through focus of headlamp
 v-v: vertical plane }

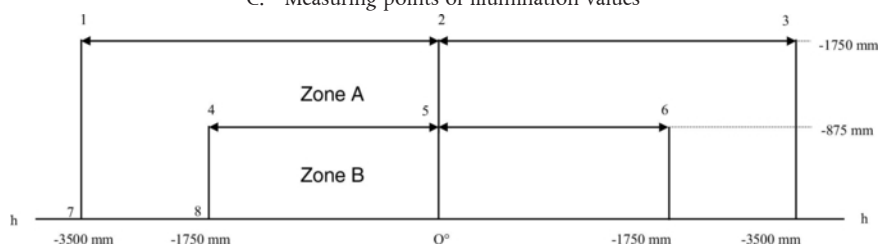
B. Headlamp for left-hand traffic

(Dimensions in mm)



h-h: horizontal plane } passing through focus of headlamp
 v-v: vertical plane }

C. Measuring points of illumination values



Note: Figure shows the measuring points for right-hand traffic. Points 7 and 8 move to their corresponding location at the right-hand side of the picture for left-hand traffic.

ANNEX 7

Requirements for lamps incorporating lenses of plastic material — testing of lens or material samples and of complete lamps

1. GENERAL SPECIFICATIONS

- 1.1. The samples supplied pursuant to paragraph 2.2.4 of this Regulation shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.
- 1.2. The two samples of complete lamps supplied pursuant to paragraph 2.2.3 of this Regulation and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6 below.
- 1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in appendix 1 to this annex.
- 1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1-2.5 below, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in appendix 1, table B, shall be mandatory.

2. TESTS

2.1. Resistance to temperature changes

2.1.1. Tests

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at $40\text{ °C} \pm 2\text{ °C}$ and 85-95 % RH;

1 hour at $23\text{ °C} \pm 5\text{ °C}$ and 60-75 % RH;

15 hours at $-30\text{ °C} \pm 2\text{ °C}$;

1 hour at $23\text{ °C} \pm 5\text{ °C}$ and 60-75 % RH;

3 hours at $80\text{ °C} \pm 2\text{ °C}$;

1 hour at $23\text{ °C} \pm 5\text{ °C}$ and 60-75 % RH.

Before this test, the samples shall be kept at $23\text{ °C} \pm 5\text{ °C}$ and 60-75 % RH for at least four hours.

Note: The periods of one hour at $23\text{ °C} \pm 5\text{ °C}$ shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements

2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam of a passing lamp or a passing/driving lamp (B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

E_{max} route for the driving beam of a driving lamp or a passing/driving lamp;

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10 % including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5 500 K and 6 000 K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2 500 nm. The samples shall be exposed to an energetic illumination of $1\,200\text{ W/m}^2 \pm 200\text{ W/m}^2$ for a period such that the luminous energy that they receive is equal to $4\,500\text{ MJ/m}^2 \pm 200\text{ MJ/m}^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min. The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$, in accordance with the following cycle:

spraying: 5 minutes;
drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1 above and the measurement described in paragraph 2.2.3.1 below have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2 with the mixture defined in paragraph 2.2.2.1 below.

2.2.2.1. Test mixture

The test mixture shall be composed of 61,5 % n-heptane, 12,5 % toluene, 7,5 % ethyl tetrachloride, 12,5 % trichloroethylene and 6 % xylene (volume %).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1 above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm^2 , corresponding to an effort of 100 N applied on a test surface of $14 \times 14\text{ mm}$.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3 (Resistance to detergents) at $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0,2 % impurities at $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and then wiped off with a soft cloth.

2.2.3. Results

2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission $\Delta t = \frac{T_2 - T_3}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,020 ($\Delta t_m \leq 0,020$).

- 2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation $\Delta d = \frac{T_5 - T_4}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,020 ($\Delta d_m \leq 0,020$).

2.3. Resistance to detergents and hydrocarbons

2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to $50\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and then immersed for five minutes in a mixture maintained at $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and composed of 99 parts distilled water containing not more than 0,02 % impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at $50\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$. The surface of the samples shall be cleaned with a moist cloth.

2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70 % n-heptane and 30 % toluene (volume %), and shall then be dried in the open air.

2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission $\Delta t = \frac{T_2 - T_3}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,010 ($\Delta t_m \leq 0,010$).

2.4. Resistance to mechanical deterioration

2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in appendix 3 to this annex.

2.4.2. Results

After this test, the variations:

$$\text{in transmission: } \Delta t = \frac{T_2 - T_3}{T_2}$$

$$\text{and in diffusion: } \Delta d = \frac{T_5 - T_4}{T_2}$$

shall be measured according to the procedure described in appendix 2 in the area specified in paragraph 2.2.4 above. The mean value of the three samples shall be such that: ($\Delta t_m \pm 0,100$); ($\Delta d_m \pm 0,050$).

2.5. Test of adherence of coatings, if any

2.5.1. Preparation of the sample

A surface of $20\text{ mm} \times 20\text{ mm}$ in area of the coating of a lens shall be cut with a razor blade or a needle into a grid of squares approximately $2\text{ mm} \times 2\text{ mm}$. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force of adhesion of $2 \text{ N}/(\text{cm of width}) \pm 20 \%$ measured under the standardised conditions specified in appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of $1,5 \text{ m/s} \pm 0,2 \text{ m/s}$.

2.5.3. Results

There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15 % of the gridded surface.

2.6. Tests of the complete lamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No 1 shall be subjected to the test described in paragraph 2.4.1 above.

2.6.1.2. Results

After the test, the results of photometric measurements carried out on the lamp in accordance with this Regulation shall not exceed by more than 30 % the maximum values prescribed at points B 50 L and HV and not be more than 10 % below the minimum values prescribed at point 75 R (in the case of headlamps intended for left-hand traffic, the points to be considered are B 50 R, HV and 75 L).

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No 2 shall be subjected to the test described in paragraph 2.5 above.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognised as complying with this Regulation if:

3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paragraphs 2.2.2, 2.3.1 and 2.3.2);

3.1.2. After the test described in paragraph 2.6.1.1, the photometric values at the points of measurement considered in paragraph 2.6.1.2 are within the limits prescribed for conformity of production by this Regulation.

3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

APPENDIX 1

CHRONOLOGICAL ORDER OF APPROVAL TESTS

A. Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.4 of this Regulation).

Samples / Tests	Lenses or samples of material						Lenses						
	1	2	3	4	5	6	7	8	9	10	11	12	13
1.1. Limited photometry(para. 2.1.2)										x	x	x	
1.1.1. Temperature change(para. 2.1.1)										x	x	x	
1.1.2. Limited photometry(para. 2.1.2)										x	x	x	
1.2.1. Transmission measurement	x	x	x	x	x	x	x	x	x				
1.2.2. Diffusion measurement	x	x	x				x	x	x				
1.3. Atmospheric agents(para. 2.2.1)	x	x	x										
1.3.1. Transmission measurement	x	x	x										
1.4. Chemicals agents(para. 2.2.2)	x	x	x										
1.4.1. Diffusion measurement	x	x	x										
1.5. Detergents (para. 2.3.1)				x	x	x							
1.6. Hydrocarbons (para. 2.3.2)				x	x	x							
1.6.1. Transmission measurement				x	x	x							
1.7. Deterioration(para. 2.4.1)							x	x	x				
1.7.1. Transmission measurement							x	x	x				
1.7.2. Diffusion measurement							x	x	x				
1.8. Adherence (para. 2.5)													x

B. Tests on complete lamps (supplied pursuant to paragraph 2.2.3 of this Regulation).

Tests	Complete lamp	
	Sample No	
	1	2
2.1. Deterioration (para. 2.6.1.1)	x	
2.2. Photometry (para. 2.6.1.2)	x	
2.3. Adherence (para. 2.6.2)		x

APPENDIX 2

Method of measurement of the diffusion and transmission of light

1. EQUIPMENT (see figure)

The beam of a collimator K with a half divergence $\frac{\beta}{2} = 17,4 \times 10^{-4}$ rad is limited by a diaphragm D_T with an opening of 6 mm against which the sample stand is placed.

A convergent achromatic lens L_2 , corrected for spherical aberrations, links the diaphragm D_T with the receiver R; the diameter of the lens L_2 shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\frac{\beta}{2} = 14^\circ$.

An annular diaphragm D_D with angles $\frac{\alpha_0}{2} = 1^\circ$ and $\frac{\alpha_{\max}}{2} = 12^\circ$ placed in an image focal plane of the lens L_2 .

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

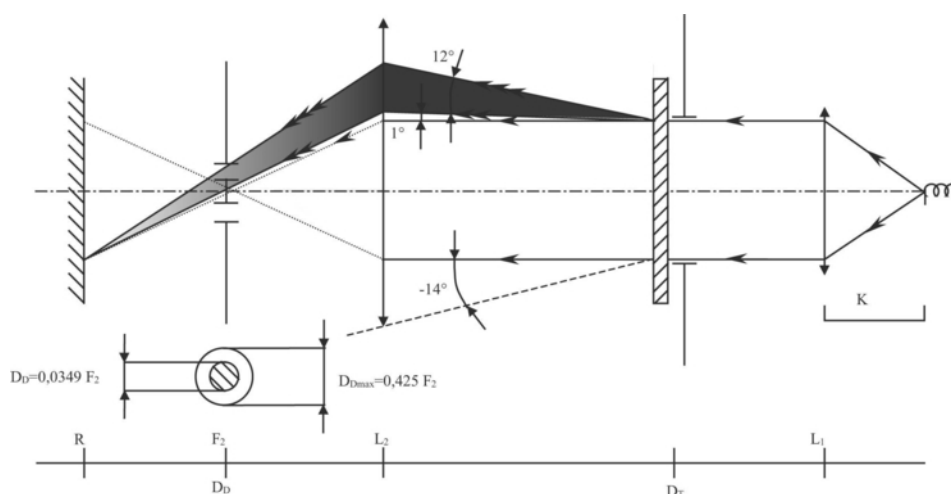
The distance $L_2 D_T$ and the focal length F_2 ⁽¹⁾ of the lens L_2 shall be so chosen that the image of D_T completely covers the receiver R.

When the initial incident flux is referred to 1 000 units, the absolute precision of each reading shall be better than 1 unit.

2. MEASUREMENTS

The following readings shall be taken:

Reading	With sample	With central part of D_D	Quantity represented
T_1	no	no	Incident flux in initial reading
T_2	yes (before test)	no	Flux transmitted by the new material in a field of 24°C
T_3	yes (after test)	no	Flux transmitted by the tested material in a field of 24°C
T_4	yes (before test)	yes	Flux diffused by the new material
T_5	yes (after test)	yes	Flux diffused by the tested material



⁽¹⁾ For L_2 it is recommended to use a focal distance of about 80 mm.

APPENDIX 3

SPRAY TESTING METHOD

1. TEST EQUIPMENT

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1,3 mm in diameter allowing a liquid flow rate of $0,24 \pm 0,02$ l/minute at an operating pressure of 6,0 bars - 0, + 0,5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm $\pm$ 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm $\pm$ 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohr scale, with a grain size between 0 and 0,2 mm and an almost normal distribution, with an angular factor of 1,8 to 2;

Water of hardness not exceeding 205 g/m³ for a mixture comprising 25 g of sand per litre of water.

2. TEST

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or-samples measured by the method described in appendix 2, is such that:

$$\Delta d = \frac{T_5 - T_4}{T_2} = 0,0250 \pm 0,0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

APPENDIX 4

ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows to determine under standard conditions the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

Measurement of the force necessary to unstick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at $23\text{ °C} \pm 5\text{ °C}$ and $65 \pm 15\%$ relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see para. 3 above).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radially at a speed of approximately 300 mm/s, then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight length wise rubbing movement of the finger, without excessive pressure, in such a manner as to leave no air bubble between the tape and the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstick about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece. Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to unstick at a speed of $300\text{ mm/s} \pm 30\text{ mm/s}$ and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newtons per centimetre of width of the tape.

ANNEX 8

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp;

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and Zone III the maximum deviation may be respectively:

B 50 L (or R)	0,2 lx equivalent 20 per cent
	0,3 lx equivalent 30 per cent
Zone III	0,3 lx equivalent 20 per cent
	0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L (or R) (with a tolerance of 0,1 lx), 75 R (or L), 25 R, 25 L, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 E_{max} , a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.6 of this Regulation. The reference mark is disregarded.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left.

1.2.4. If the results of the tests described above do not meet the requirements, tests on the headlamp shall be repeated using another standard filament lamp.

1.2.5. Headlamps with apparent defects are disregarded.

1.2.6. The reference mark is disregarded.

1.3. The chromaticity coordinates shall be complied with.

The photometric performance of a headlamp emitting selective yellow light shall be the values contained in this Regulation multiplied by 0,84.

2. FIRST SAMPLING

In the first sampling four headlamps 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 headlamps shall not be contested if the deviation of the measured values of the headlamps in the unfavourable directions are:

2.1.1.1. sample A

A1	one headlamp	0 per cent
	one headlamp not more than	20 per cent
A2	both headlamps more than	0 per cent
	but not more than	20 per cent
	go to sample B	

2.1.1.2. sample B

B1	both headlamps	0 per cent
----	----------------	------------

2.1.2. or if the conditions of paragraph 1.2.2 for sample A are fulfilled.

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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:

2.2.1.1. sample A

A3	one headlamp not more than	20 per cent
	one headlamp 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 headlamp more than	0 per cent
	but not more than	20 per cent
	one headlamp not more than	20 per cent
B3	In the case of A2	
	one headlamp	0 per cent
	one headlamp more than	20 per cent
	but not more than	30 per cent

2.2.2. or if the conditions of paragraph 1.2.2 for sample A are not fulfilled.

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 headlamps are:

2.3.1. sample A

A4	one headlamp not more than	20 per cent
	one headlamp more than	30 per cent
A5	both headlamps more than	20 per cent

2.3.2. sample B

B4	In the case of A2	
	one headlamp not more than	0 per cent
	but not more than	20 per cent
	one headlamp more than	20 per cent
B5	In the case of A2	
	both headlamps more than	20 per cent
B6	In the case of A2	
	one headlamp	0 per cent
	one headlamp more than	30 per cent

2.3.3. or if the conditions of paragraph 1.2.2 for samples A and B are not fulfilled.

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two headlamps and fourth sample D of two headlamps, 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 headlamps shall not be contested if the deviations of the measured values of the headlamps are:

3.1.1.1. sample C

C1	one headlamp	0 per cent
	one headlamp not more than	20 per cent
C2	both headlamps more than	0 per cent
	but not more than	20 per cent
	go to sample D	

3.1.1.2. sample D

D1	In the case of C2	
	both headlamps	0 per cent

3.1.2. or if the conditions of paragraph 1.2.2 for sample C are fulfilled.

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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:

3.2.1.1. sample D

D2	In the case of C2	
	one headlamp more than	0 per cent
	but not more than	20 per cent
	one headlamp not more than	20 per cent

3.2.1.2. or if the conditions of paragraph 1.2.2 for sample C are not fulfilled:

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 headlamps are:

3.3.1. sample C

C3	one headlamp not more than	20 per cent
	one headlamp more than	20 per cent
C4	both headlamps more than	20 per cent

3.3.2. sample D

D3	In the case of C2	
	one headlamp 0 or more than	0 per cent
	one headlamp more than	20 per cent

3.3.3. or if the conditions of paragraph 1.2.2 for samples C and D are not fulfilled.

4. CHANGE OF THE VERTICAL POSITION OF THE CUT-OFF LINE

With respect to the verification of the change in vertical positions of the cut-off line under the influence of heat, the following procedure shall be applied:

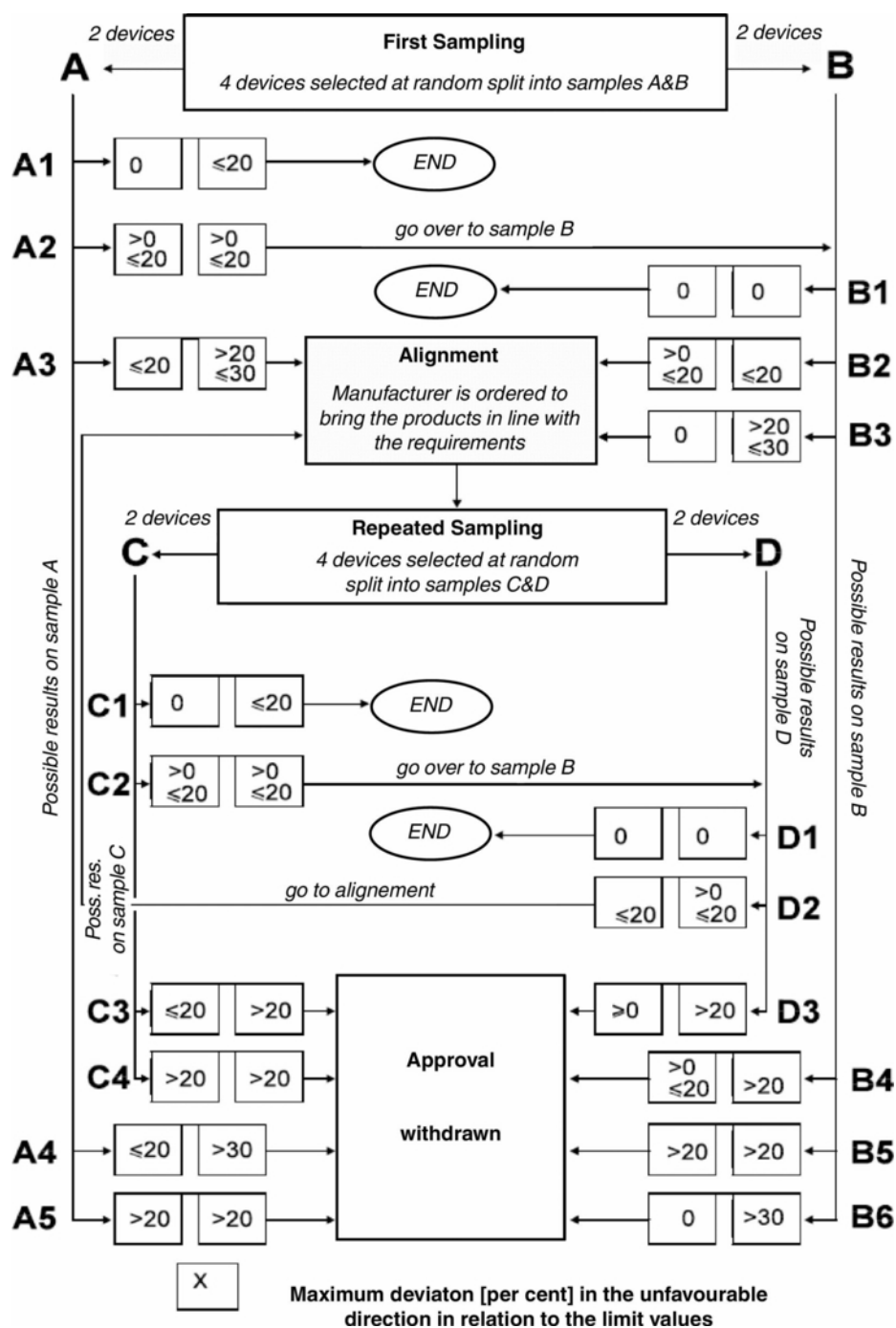
One of the headlamps of sample A after sampling procedure in Figure 1 of this annex shall be tested according to the procedure described in paragraph 2.1 of annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of annex 4.

The headlamp shall be considered as acceptable if Δr does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, the second headlamp of sample A shall be subjected to the test after which the mean of the absolute values recorded in both samples shall not exceed 1,5 mrad.

However, if this value of 1,5 mrad on sample A is not complied with, the two headlamps of sample B shall be subjected to the same procedure and the value of Δr for each of them shall not exceed 1,5 mrad.

Figure 1



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/wp29docsts.html>

Regulation No 6 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers

Incorporating all valid text up to:

Supplement 18 to the 01 series of amendments — Date of entry into force: 24 October 2009

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Supplement 19 to the 01 series of amendments — Date of entry into force: 19 August 2010

CONTENTS

REGULATION

0. Scope
1. Definitions
2. Application for approval
3. Markings
4. Approval
5. General specifications
6. Intensity of light emitted
7. Test procedure
8. Colour of light emitted
9. Modifications of a type of direction indicator for motor vehicles and their trailers and extension of approval
10. Conformity of production
11. Penalties for non-conformity of production
12. Production definitely discontinued
13. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments
14. Transitional provisions

ANNEXES

- Annex 1 — Categories of direction indicators: Minimum angles required for light distribution in space of these categories of direction indicators
- Annex 2 — Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a type of direction indicator pursuant to Regulation No 6
- Annex 3 — Arrangement of the approval mark
- Annex 4 — Photometric measurements
- Annex 5 — Colour of amber lights — Trichromatic coordinates
- Annex 6 — Minimum requirements for conformity of production control procedures
- Annex 7 — Minimum requirements for sampling by an inspector

0. SCOPE

This Regulation applies to direction indicators for vehicles of categories L, M, N, O, and T ⁽¹⁾.

1. DEFINITIONS

For the purposes of this Regulation:

- 1.1. 'Direction indicator' means a device mounted on a motor vehicle or trailer which, when operated by the driver, signals the latter's intention to change the direction in which the vehicle is proceeding. The present Regulation applies solely to fixed-position flashing light devices whose flashing is obtained by the intermittent supply of electric current to the lamp.
- 1.2. The definitions given in Regulation No 48 and its series of amendments in force at the time of application for type approval shall apply to this Regulation.
- 1.3. 'Direction indicators of different types' means lamps which differ in such essential respects as:
 - (a) the trade name or mark;
 - (b) the characteristics of the optical system (levels of intensity, light distribution angles, category of filament lamp, light source module, etc.);
 - (c) the category of direction indicator lamps;
 - (d) the variable intensity control, if any.

A change of the colour of the filament lamp or the colour of any filter does not constitute a change of type.
- 1.4. References made in this Regulation to standard (étalon) filament lamp(s) and to Regulation No 37 shall refer to Regulation No 37 and its series of amendments in force at the time of application for type approval.

2. APPLICATION FOR APPROVAL

- 2.1. The application for approval of a type of direction indicator shall be submitted by the holder of the trade name or mark or by his duly accredited representative. It shall specify to which category or to which of the categories 1, 1a, 1b, 2a, 2b, 5 or 6 according to Annex 1, the direction indicator belongs and, if it belongs to category 2, whether it has steady luminous intensity (category 2a) or whether it has variable luminous intensity (category 2b) and if the direction indicator may also be used in an assembly of two lamps of the same category. At the choice of the applicant, it will also specify that the device may be installed on the vehicle with different inclinations of the reference axis in respect to the vehicle reference planes and to the ground or rotate around its reference axis; these different conditions of installation shall be indicated in the communication form.
- 2.2. For each type of direction indicator the application shall be accompanied by the following:
 - 2.2.1. Drawings, in triplicate, sufficiently detailed to permit identification of the type and category and showing geometrically in what position(s) the direction indicator may be mounted on the vehicle; the axis of observation to be taken as the axis of reference in the tests (horizontal angle $H = 0^\circ$, vertical angle $V = 0^\circ$); and the point to be taken as the centre of reference in the said tests. The drawings shall show the position intended for the approval number and the additional symbols in relation to the circle of the approval mark;

⁽¹⁾ 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).

- 2.2.2. a brief technical description stating in particular, with the exception of lamps with non-replaceable light sources:
- (a) the category or categories of filament lamp(s) prescribed; this filament lamp category shall be one of those contained in Regulation No 37 and its series of amendments in force at the time of application for type approval; and/or
 - (b) the light source module specific identification code.
- 2.2.3. For a direction indicator of category 2b, a concise description of the variable intensity control, an arrangement diagram and a specification of the characteristics of the system ensuring the two levels of intensity;
- 2.2.4. for a direction indicator lamp of categories 1, 1a, 1b, 2a and 2b, information regarding the signal according to paragraph 6.2.2 below.
- 2.2.5. Two samples; if the approval is applied for devices which are not identical but are symmetrical and suitable for mounting one on the left and one on the right side of the vehicle, the two samples submitted may be identical and be suitable for mounting only on the right or only on the left side of the vehicle.

For a direction indicator of category 2b, the application shall also be accompanied by variable intensity control or a generator providing the same signal(s).

3. MARKINGS

Devices submitted for approval shall:

- 3.1. bear the trade name or mark of the applicant; this marking shall be clearly legible and indelible;
- 3.2. with the exception of lamps with non-replaceable light sources, bear a clearly legible and indelible marking indicating:
- (a) the category or categories of filament lamp(s) prescribed; and/or
 - (b) the light source module specific identification code.
- 3.3. comprise a space of sufficient size for the approval marking and the additional symbols prescribed in paragraph 4.2 below; this space shall be shown in the drawings mentioned in paragraph 2.2.1 above;
- 3.4. in case of lamps with an electronic light source control gear or a variable intensity control and/or non-replaceable light sources and/or light source module(s), bear the marking of the rated voltage or range of voltage and rated maximum wattage.
- 3.5. in the case of lamps with light source module(s), the light source module(s) shall bear:
- 3.5.1. the trade name or mark of the applicant; this marking must be clearly legible and indelible;
 - 3.5.2. the specific identification code of the module; this marking must be clearly legible and indelible. This specific identification code shall comprise the starting letters 'MD' for 'MODULE' followed by the approval marking without the circle as prescribed in paragraph 4.2.1.1 below and, in the case several non identical light source modules are used, followed by additional symbols or characters; this specific identification code shall be shown in the drawings mentioned in paragraph 2.2.1 above.

The approval marking does not have to be the same as the one on the lamp in which the module is used, but both markings shall be from the same applicant.

- 3.5.3. the marking of the rated voltage or range of voltage and rated maximum wattage.
- 3.6. An electronic light source control gear or a variable intensity control being part of the lamp but not included into the lamp body shall bear the name of the manufacturer and its identification number.
4. APPROVAL
- 4.1. General
- 4.1.1. If the two devices submitted for approval in pursuance of paragraph 2.2.4 above meet the requirements of this Regulation, approval shall be granted.
- 4.1.2. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations annexed to the 1958 Agreement, a single international approval mark may be applied provided that such lamps are not grouped, combined or reciprocally incorporated with a lamp or lamps not satisfying any one of these Regulations.
- 4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 01, corresponding to the 01 series of amendments which entered into force on 27 June 1987) 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 type of device covered by this Regulation. Direction indicators of different categories may be marked with a single approval number when they form one assembly.
- 4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of device pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement which apply this Regulation, by means of a form conforming to the model in Annex 2 to this Regulation.
- 4.1.5. Every device conforming to a type approved under this Regulation shall bear in the space referred to in paragraph 3.3 above, and in addition to the markings prescribed in paragraphs 3.1 and 3.2 or 3.4 respectively, an approval mark as described in paragraphs 4.2 and 4.3 below.
- 4.2. Composition of the approval mark
- The approval mark shall consist of:
- 4.2.1. an international approval marking, comprising:
- 4.2.1.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽²⁾;
- 4.2.1.2. The approval number prescribed in paragraph 4.1.3 above.

⁽²⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Serbia, 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.

- 4.2.2. The following additional symbol (or symbols):
- 4.2.2.1. One or more of the numbers: 1, 1a, 1b, 2a, 2b, 5 or 6, according to whether the device belongs to one or more categories 1, 1a, 1b, 2a, 2b, 5 or 6 for which approval is sought in accordance with paragraph 2.1;
 - 4.2.2.2. On devices which cannot be mounted on either side of the vehicle indiscriminately, a horizontal arrow showing in which position the device is to be mounted (the arrow shall be directed outwards from the vehicle in the case of devices of categories 1, 1a, 1b, 2a and 2b and towards the front of the vehicle in the case of devices of categories 3, 4, 5 and 6). In addition, for devices of category 6 an indication 'R' or 'L' shall in this case be shown on the device, indicating the right or left side of the vehicle.
 - 4.2.2.3. On devices which may be used as part of an assembly of two lamps, the additional letter 'D' to the right side of the symbol mentioned in paragraph 4.2.2.1;
 - 4.2.2.4. On devices with reduced light distribution in conformity to paragraph 2.1.3 of Annex 4 to this Regulation a vertical arrow starting from a horizontal segment and directed downwards.
 - 4.2.2.5. The two digits of the approval number which indicate the series of amendments in force at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols;
 - 4.2.2.6. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 above shall be clearly legible and be indelible even when the device is fitted in the vehicle.
- 4.3. Arrangement of the approval mark
- 4.3.1. Independent lamps
- Annex 3, Figure 1, to this Regulation gives an example of arrangement of the approval mark with the above-mentioned additional symbols.
- If different types of lamps complying with the requirements of several Regulations, use the same outer lens having the same or different colour, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the lamp, provided that:
- 4.3.1.1. It is visible after their installation.
 - 4.3.1.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and if necessary, the required arrow shall be marked.
 - 4.3.1.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks under which approval has been granted.
 - 4.3.1.4. The main body of the lamp shall include the space described in paragraph 3.3 above and shall bear the approval mark of the actual function(s).
 - 4.3.1.5. Figure 4 in Annex 3 to this Regulation gives examples of an approval mark with the above-mentioned additional symbols.
- 4.3.2. Grouped, combined or reciprocally incorporated lamps
- 4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be applied consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:
 - 4.3.2.1.1. it is visible after the installation of the lamps;

- 4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.
- 4.3.2.2. an identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:
 - 4.3.2.2.1. either on the appropriate light-emitting surface;
 - 4.3.2.2.2. or in a group, in such a way that each lamp of the grouped, combined or reciprocally incorporated lamps may be clearly identified.
- 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.
- 4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.
- 4.3.2.5. Annex 3, Figure 2, to this Regulation gives examples of the arrangement of the approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.
- 4.3.3. Lamps reciprocally incorporated with other lamps, of which the lens may also be used for other types of headlamps

The provisions laid down in paragraph 4.3.2 above are applicable.

- 4.3.3.1. In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.3 above and bears the approval marks of the actual functions.

If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

- 4.3.3.2. Annex 3, Figure 3, to this Regulation gives examples of approval marks for lamps reciprocally incorporated with a headlamp.
- 4.4. The approval marking shall be clearly legible and indelible. It may be placed on an inner or outer part (transparent or not) of the device which cannot be separated from the transparent part of the device emitting the light. In any case the marking shall be visible when the device is fitted on the vehicle or when a movable part such as the hood or boot lid or a door is opened.

5. GENERAL SPECIFICATIONS

- 5.1. Each device supplied shall conform to the specifications set forth in paragraphs 6 and 8 below.
- 5.2. The devices must be so designed and constructed that under normal conditions of use and notwithstanding the vibrations to which they may be subjected in such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Regulation.

- 5.3. In the case of light source modules, it shall be checked that:
- 5.3.1. The design of the light source module(s) shall be such as:
- (a) that each light source module can only be fitted in no other position than the designated and correct one and can only be removed with the use of tool(s);
 - (b) If there are more than one light source module used in the housing for a device, light source modules having different characteristics can not be interchanged within the same lamp housing.
- 5.3.2. The light source module(s) shall be tamperproof.
- 5.4. In case of failure of the variable intensity control of a direction indicator of category 2b emitting more than the maximum value of category 2a, requirements of steady luminous intensity of category 2a shall be fulfilled automatically.
- 5.5. In the case of replaceable filament lamp(s):
- 5.5.1. Any category or categories of filament lamp(s) approved according to Regulation No 37 may be used, provided that no restriction on the use is made in Regulation No 37 and its series of amendments in force at the time of application for type approval.
- 5.5.2. The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one.
- 5.5.3. The filament lamp holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of filament lamp used, applies.

6. INTENSITY OF LIGHT EMITTED

- 6.1. The light emitted by each of the two devices supplied must be in the case of direction indicators of categories 1, 1a, 1b, 2a or 2b in the reference axes, in the case of direction indicators of categories 5 or 6 in direction A according to Annex 1 of not less than the minimum intensity and of not more than the maximum intensity specified below:

Direction indicator of category	Minimum luminous intensity in cd	Maximum luminous intensity in cd when used as	
		Single lamp	Lamp (single) marked 'D' (see paragraph 4.2.2.3)
1	175	1 000	500
1a	250	1 200	600
1b	400	1 200	600
2a (steady)	50	500	250
2b (variable)	50	1 000	500
5	0,6	280	140
6	50	280	140

- 6.1.1. For an assembly of two or more direction indicator lamps the total intensity shall not exceed the maximum value.
- 6.1.2. When an assembly of two or more lamps having the same function is deemed to be a single lamp it shall comply with the requirements for:
- (a) Maximum intensity all lamps together are lit (last column of the table);
 - (b) Minimum intensity if one lamp has failed.

- 6.2. In case of failure of a single lamp of the categories 1, 1a, 1b, 2a and 2b, containing more than one light source the following provisions shall apply:
- 6.2.1. A group of light sources, wired so that the failure of any one of them causes all of them to stop emitting light, shall be considered to be one light source.
- 6.2.2. A signal for activation of the tell-tale prescribed in paragraph 6.5.8 of Regulation No 48 shall be produced if:
- (a) any one light source has failed; or
 - (b) in the case of a lamp designed for only two filament light sources, the intensity in the axis of reference is less than 50 per cent of the minimum intensity; or
 - (c) as a consequence of a failure of one or more light sources, the intensity in one of the following directions as indicated in Annex 4 to this Regulation is less than the minimum intensity required:
 - (i) $H = 0^\circ$, $V = 0$
 - (ii) $H = 20^\circ$ to the outside of the vehicle, $V = + 5^\circ$
 - (iii) $H = 10^\circ$ to the inside of the vehicle, $V = 0^\circ$.
- 6.3. When all light sources are illuminated the maximum intensity specified for a single lamp may be exceeded provided that the single lamp is not marked 'D' and the maximum intensity specified for an assembly of two or more lamps is not exceeded.
- 6.4. Outside the reference axis, within the angular fields specified in the arrangement diagrams in Annex 1 to this Regulation, the intensity of the light emitted by each of the two devices supplied must:
- 6.4.1. In each direction corresponding to the points in the relevant table of luminous-intensity distribution reproduced in Annex 4 to this Regulation, be not less than the minimum specified in paragraph 6.1 above multiplied by the percentage specified in the said table for the direction in question;
- 6.4.1.1. In divergence from paragraphs 6.4 and 6.4.1, for category 5 direction indicators, to the rear, a minimum value of 0,6 cd is required throughout the fields specified in Annex 1;
- 6.4.2. In no direction within the area from which the indicator lamp is visible, exceed the maximum specified in paragraph 6.1 above;
- 6.4.3. Moreover,
- 6.4.3.1. Throughout the fields defined in the diagrams in Annex 1, the intensity of the light emitted must be not less than 0,7 cd for devices of category 1b, not less than 0,3 cd for devices of categories 1, 1a, 2a, 2b and for those of category 2b by day; it shall not be less than 0,07 cd for devices of category 2b by night;
- 6.4.3.2. The provisions of paragraph 2.2 of Annex 4 to this Regulation on local variations of intensity must be observed.
- 6.5. In general the intensities shall be measured with the light source(s) continuously alight.

However, depending on the construction of the device, for example, the use of light-emitting diodes (LED), or the need to take precautions to avoid overheating, it is allowed to measure the lamps in flashing mode.

This must be achieved by switching with a frequency of $f = 1,5 \pm 0,5$ Hz with the pulse width greater than 0,3 s, measured at 95 per cent peak light intensity.

In the case of replaceable filament lamps, the filament lamps shall be operated at reference luminous flux during on time. In all other cases the voltage as required in paragraph 7.1.1 shall be switched with a rise time and fall time shorter than 0,01 s; no overshoot is allowed.

In the case of measurements taken in flashing mode the reported luminous intensity shall be represented by the maximum intensity.

6.6. In the case of devices of category 2b the time that elapses between energising the light source(s) and the light output measured on the reference axis to reach 90 per cent of the value measured in accordance with paragraph 6.3 above shall be measured for the extreme levels of luminous intensity produced by the direction indicator. The time measured to obtain the lowest luminous intensity shall not exceed the time measured to obtain the highest luminous intensity.

6.7. The variable intensity control shall not generate signals which cause luminous intensities:

6.7.1. outside the range specified in paragraph 6.1 above and

6.7.2. exceeding the category 2a maximum specified in paragraph 6.1:

(a) for systems depending only on daytime and night time conditions: under night time conditions;

(b) for other systems: under reference conditions as demonstrated by the manufacturer ⁽³⁾.

6.8. Annex 4, referred to in paragraph 6.2.1 above, gives particulars of the measurement methods to be used.

7. TEST PROCEDURE

7.1. All measurements, photometric and colorimetric, shall be made:

7.1.1. In the case of a lamp with replaceable light source, if not supplied by an electronic light source control gear or a variable intensity control, with an uncoloured or coloured standard filament lamp of the category prescribed for the device, supplied with the voltage necessary to produce the reference luminous flux required for that category of filament lamp,

7.1.2. In the case of a lamp equipped with non-replaceable light sources (filament lamps and other), at 6,75 V, 13,5 V or 28,0 V respectively.

7.1.3. In the case of a system that uses an electronic light source control gear or a variable intensity control, being part of the lamp ⁽⁴⁾ applying at the input terminals of the lamp the voltage declared by the manufacturer or, if not indicated, 6,75 V, 13,5 V or 28,0 V respectively.

7.1.4. In the case of a system that uses an electronic light source control gear or a variable intensity control, not being part of the lamp with the voltage declared by the manufacturer applied to the input terminals of the lamp.

7.2. However in the case of a direction indicator of category 2b operated by a variable intensity control to obtain variable luminous intensity, photometric measurements shall be performed according to the applicant's description.

⁽³⁾ Good visibility (meteorological optical range MOR > 2 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp. 1.9.1/1.9.11, Geneva 1996) and clean lens.

⁽⁴⁾ For the purpose of this Regulation 'being part of the lamp' means to be physically included in the lamp body or to be external, separated or not, but supplied by the lamp manufacturer as part of the lamp system.

7.3. The test laboratory shall require from the manufacturer the light source control gear or a variable intensity control needed to supply the light source and the applicable functions.

7.4. The voltage to be applied to the lamp shall be noted in the communication form in Annex 2 of this Regulation.

7.5. The limits of the apparent surface in the direction of the reference axis of a direction indicator shall be determined. However, in the case of category 5 and 6 direction indicators, the limits of the light emitting surface shall be determined.

8. COLOUR OF LIGHT EMITTED

The colour of the light emitted inside the field of the light distribution grid defined in paragraph 2 of Annex 4 shall be amber. For testing see Annex 5 to this Regulation. Outside this field, no sharp variation of colour shall be observed. These requirements shall also apply within the range of variable luminous intensity produced by direction indicators of category 2b.

9. MODIFICATIONS OF A TYPE OF DIRECTION INDICATOR FOR MOTOR VEHICLES AND THEIR TRAILERS AND EXTENSION OF APPROVAL

9.1. Every modification of a type of direction indicator shall be notified to the administrative department which approved the type. The department may then either:

9.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the device still complies with the requirements; or

9.1.2. Require a further test report from the technical service responsible for conducting the tests.

9.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 above to the Parties to the Agreement applying this Regulation.

9.3. The Competent Authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

10. 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:

10.1. Direction indicators 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 8 above.

10.2. The minimum requirements for conformity of production control procedures set forth in Annex 6 to this Regulation shall be complied with.

10.3. The minimum requirements for sampling by an inspector set forth in Annex 7 to this Regulation shall be complied with.

10.4. 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.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 11.1. The approval granted in respect of a device pursuant to this Regulation may be withdrawn if the foregoing requirements are not met.
- 11.2. If a Contracting 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 communication form conforming to the model in Annex 2 to this Regulation.

12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a device approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

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

The Parties to the 1958 Agreement which apply 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.

14. TRANSITIONAL PROVISIONS

- 14.1. As from the official date of entry into force of Supplement 8 to the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by Supplement 8 to the 01 series of amendments.
- 14.2. As from 24 months after the date of entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only if the type of direction indicator to be approved meets the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments.
- 14.3. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to the preceding series of amendments to this Regulation.
- 14.4. Contracting Parties applying this Regulation shall continue to grant approvals to those types of direction indicators which comply with the requirements of this Regulation as amended by the preceding series of amendments during the 12 months period which follows the date of entry into force of Supplement 8 to the 01 series of amendments.
- 14.5. ECE approvals granted under this Regulation earlier than 12 months after the date of entry into force and all extensions of approvals, including those to a preceding series of amendments to this Regulation granted subsequently, shall remain valid indefinitely. When the type of direction indicator approved to the preceding series of amendments meets the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.
- 14.6. No Contracting Party applying this Regulation shall refuse a type of direction indicator approved to Supplement 8 to the 01 series of amendments to this Regulation.

- 14.7. Until 36 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation, no Contracting Party applying this Regulation shall refuse a type of direction indicator approved to the preceding series of amendments to this Regulation.
 - 14.8. Starting 36 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse the sale of a type of direction indicator which does not meet the requirements of Supplement 8 to the 01 series of amendments to this Regulation unless the direction indicator is intended as a replacement for fitting on vehicles in use.
 - 14.9. Contracting Parties applying this Regulation shall continue to issue approvals for direction indicators on the basis of any previous series of amendments, provided that the direction indicators are intended as replacements for fitting to vehicles in use.
 - 14.10. As from the official date of entry into force of Supplement 8 to the 01 series of amendments, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of a direction indicator approved under this Regulation as amended by Supplement 8 to the 01 series of amendments.
 - 14.11. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of a direction indicator approved to this Regulation as amended by the preceding series of amendments during the 48 months period which follows the date of entry into force of Supplement 8 to the 01 series of amendments.
 - 14.12. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 8 to the 01 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of a direction indicator which does not meet the requirements of this Regulation as amended by Supplement 8 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 date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation.
 - 14.13. Upon the expiration of a period of 60 months after the date of entry into force, Contracting Parties applying this Regulation may prohibit the fitting of a direction indicator which does not meet the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments on a new vehicle first registered more than 60 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation.
 - 14.14. Existing approvals to direction indicator lamps of the categories 3 and 4, approved under this Regulation prior to the introduction of Supplement 16 to the 01 series of amendments, shall remain valid indefinitely.
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ANNEX 1

Categories of direction indicators: minimum angles required for light distribution in space of these categories of direction indicators ⁽¹⁾

In all cases, the minimum vertical angles of light distribution in space of direction indicator lamps are 15° above and 15° below the horizontal except:

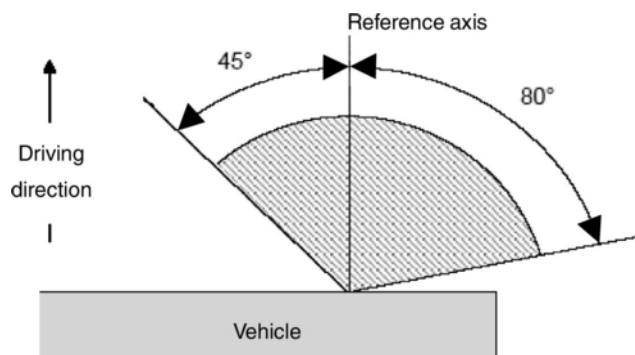
- (a) direction indicator lamps with a mounting height of equal to or less than 750 mm above the ground, for which they are 15° above and 5° below the horizontal;
- (b) direction indicator lamps of Category 6, for which they are 30° above and 5° below the horizontal.

Minimum horizontal visibility angles

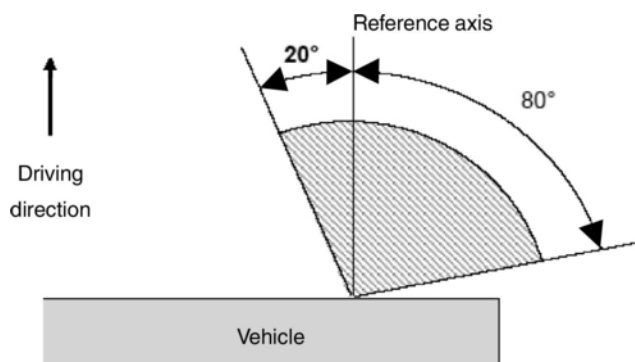
Direction indicators for the front of the vehicle

- Category 1: for use at a distance not less than 40 mm from the headlamp;
- Category 1a: for use at a distance greater than 20 mm but less than 40 mm from the headlamp;
- Category 1b: for use at a distance less than 20 mm from the headlamp.

On and above the H plane for all lamps. Under the H plane for lamps intended for M₂, M₃, N₂ or N₃ category of vehicles



Under the H plane for M₁ and N₁ category of vehicles



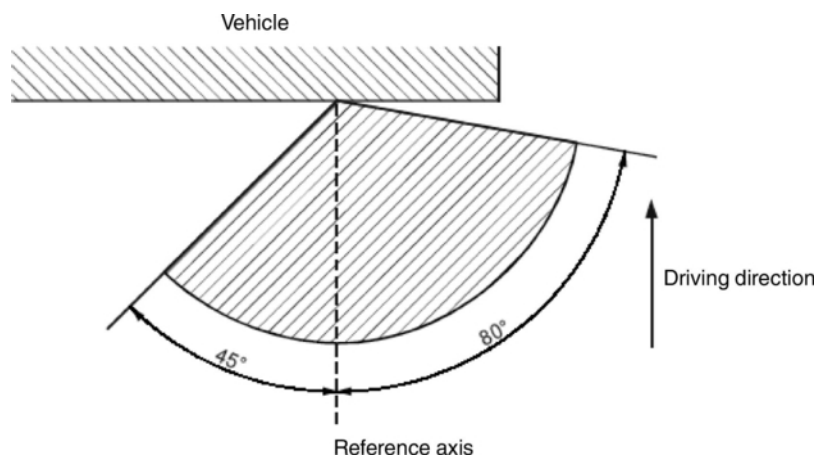
⁽¹⁾ The angles shown in these arrangements are correct for devices to be mounted on the right side of the vehicle. The arrows in these diagrams point towards the front of the vehicle.

H plane: 'horizontal plane going through the reference centre of the lamp'

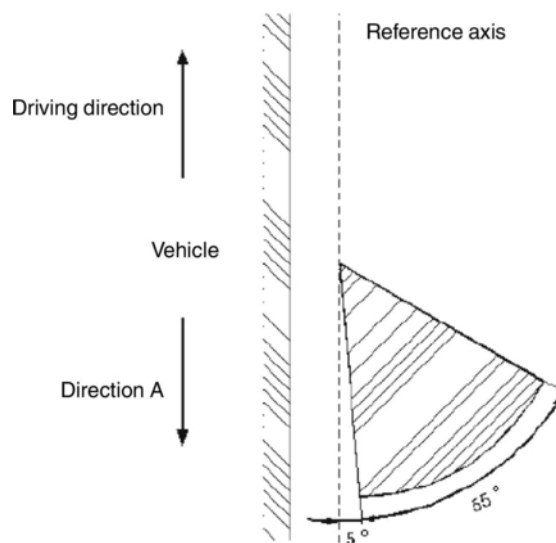
Categories 2a and 2b: direction indicators for the rear of the vehicle

Category 2a: rear direction indicator lamps with steady luminous intensity

Category 2b: rear direction indicator lamps with variable luminous intensity



Categories 5 and 6: Supplementary side direction indicators for use on a vehicle also equipped with categories 1, 1a or 1b and 2a or 2b direction indicators



ANNEX 2

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by:

Name of administration:

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of headlamp pursuant to Regulation No 6

Approval No Extension No

1. Trade name or mark of the device:
2. Manufacturer's name for the type of device:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Submitted for approval on:
6. Technical service responsible for conducting approval tests:
7. Date of test report issued by that service:
8. Number of test report issued by that service:
9. Concise description:

Category: 1, 1a, 1b, 2a, 2b, 5, 6 ⁽²⁾ ⁽³⁾

Number, category and kind of light source(s):

Voltage and wattage:

Light source module specific identification code:

Only for installation on M1 and/or N1 category vehicles: yes/no ⁽²⁾Only for limited mounting height of equal to or less than 750 mm above the ground: yes/no ⁽²⁾

Geometrical conditions of installation and relating variations, if any:

Application of an electronic light source control gear/variable intensity control:

(a) being part of the lamp: yes/no ⁽²⁾

(b) being not part of the lamp: yes/no ⁽²⁾

Input voltage(s) supplied by an electronic light source control gear/variable intensity control:

Electronic light source control gear/variable intensity control manufacturer and identification number (when the light source control gear is part of the lamp but is not included into the lamp body):

Variable luminous intensity: yes/no ⁽²⁾

10. Position of the approval mark:

11. Reason(s) for extension (if applicable):

12. Approval granted/extended/refused/withdrawn ⁽²⁾:

13. Place:

14. Date:

15. Signature:

16. The list of documents deposited with the administrative service which has granted approval is annexed to this communication and may be obtained on request.

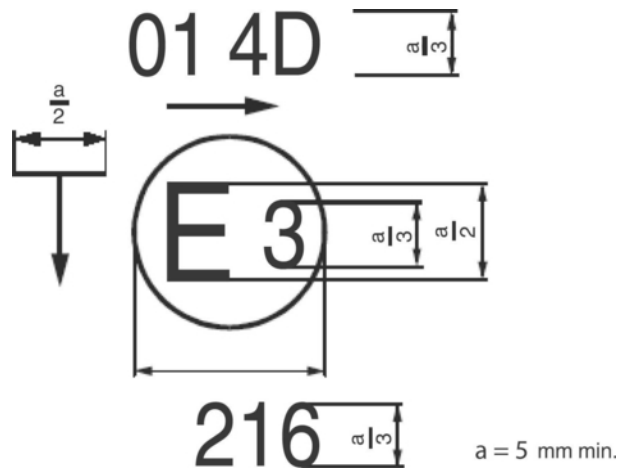
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

⁽³⁾ For direction indicator lamps of categories 1, 1a, 1b, 2a and 2b, information regarding the signal according to paragraph 6.2.2.

ANNEX 3

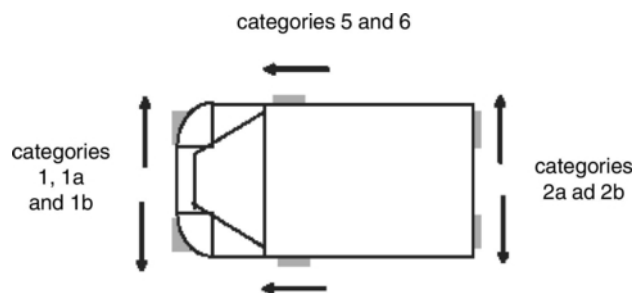
ARRANGEMENT OF THE APPROVAL MARK



The device bearing the approval marking shown above is a category-4 device (front-side direction indicator) approved in Italy (E3) under No 216, which may also be used in an assembly of two lamps. The horizontal arrow shows in what position this device, which cannot be mounted on either side of the vehicle indiscriminately, is to be mounted. The arrow points towards the front of the vehicle. The vertical arrow starting from a horizontal segment and directed downwards indicates a permissible mounting height of equal to or less than 750 mm from the ground for this device.

The number mentioned close to the symbol '4D' indicates that the approval was granted according to the requirements of Regulation No 6 as amended by the 01 series of amendments.

The direction in which the arrows on the approval mark point, according to the category of the device, is shown below:



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

Figure 2

Simplified marking of grouped, combined or reciprocally incorporated lamps when two or more lamps are part of the same assembly

The vertical and horizontal lines schematize the shape of the light-signalling device. These are not part of the approval mark.

MODEL A

	3333 (E4)	IA 02	$\frac{2b}{01}$	$\frac{R2}{01}$
		F2 00	AR 00	S2 01

MODEL B

		IA 02	$\frac{2b}{01}$	$\frac{R2}{01}$	
		F2 00	AR 00	S2 01	
		3333 (E4)			

MODEL C

IA 02	$\frac{2b}{01}$	$\frac{R2}{01}$			
F2 00	AR 00	S2 01			
3333 (E4)					

Note: The three examples of approval marks shown above (models A, B and C) represent three possible variables for the marking of a lighting device when two or more lamps are part of the same assembly of grouped, combined or reciprocally incorporated lamps.

They indicate that the device was approved in the Netherlands (E4) under number 3333 and comprise:

A rear direction indicator lamp with variable luminous intensity (category 2b) approved in accordance with the 01 series of amendments to Regulation No 6,

A red rear position (side) lamp with variable luminous intensity (R2) approved in accordance with the 01 series of amendments to Regulation No 7,

A rear fog lamp with variable luminous intensity (F2) approved in accordance with Regulation No 38 in its original version,

A reversing lamp (AR) approved in accordance with Regulation No 23 in its original version,

A stop-lamp with variable luminous intensity (S2) approved in accordance with the 01 series of amendments to Regulation No 7.

	 01 A 02 HCR		01 1a
	01 A 02 HCR 02 B 01 1a 		
A HCR B 1a 01 02 02 01 			

Note: The three examples shown above correspond to a lighting device bearing an approval mark relating to:

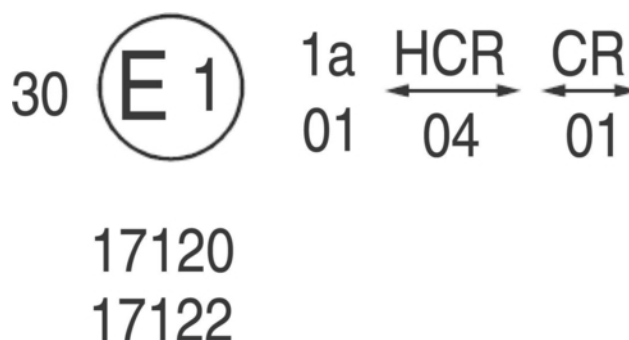
a front position lamp approved in accordance with the 01 series of amendments to Regulation No 7;

a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in accordance with the 02 series of amendments to Regulation No 20;

a front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19;

a front direction indicator lamp of category 1a approved in accordance with the 01 series of amendments to Regulation No 6.

Figure 3

Lamp reciprocally incorporated with a headlamp

The above example corresponds to the marking of a lens intended to be used in different types of headlamps, namely:

- either: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No 8 as amended by the 04 series of amendments; which is reciprocally incorporated with a front direction indicator approved in accordance with the 01 series of amendments to Regulation No 6;
- or: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No 1 as amended by the 01 series of amendments, which is reciprocally incorporated with the same front direction indicator as above;
- or even: either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:

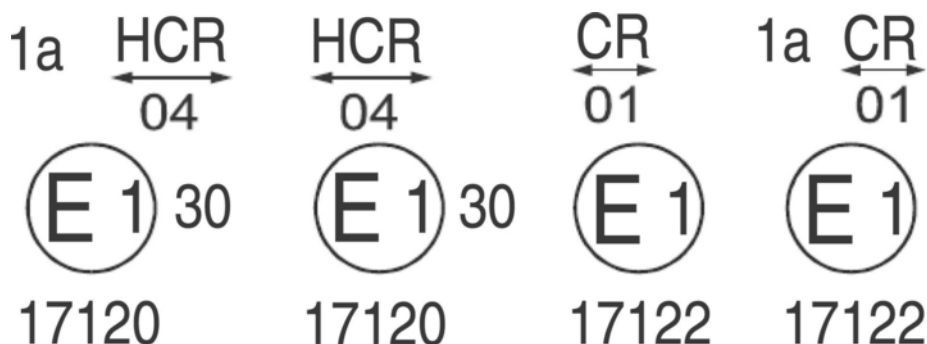
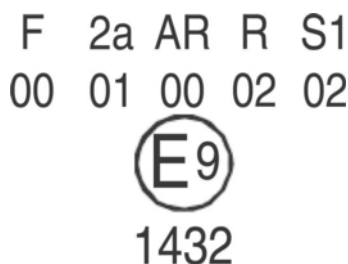


Figure 4

Marking of independent lamps

The above example corresponds to the marking of a lens intended to be used in different types of lamps. The approval marks indicate that the device was approved in Spain (E9) under approval number 1432 and comprises:

A rear fog lamp (F) approved in accordance with Regulation No 38 in its original version,

A rear direction indicator lamp of category 2a approved in accordance with the 01 series of amendments to Regulation No 6,

A reversing lamp (AR) approved in accordance with Regulation No 23 in its original version,

A red rear position (side) lamp (R) approved in accordance with the 02 series of amendments to Regulation No 7,

A stop-lamp with one level of illumination (S1) approved in accordance with the 02 series of amendments to Regulation No 7.

Light source modules

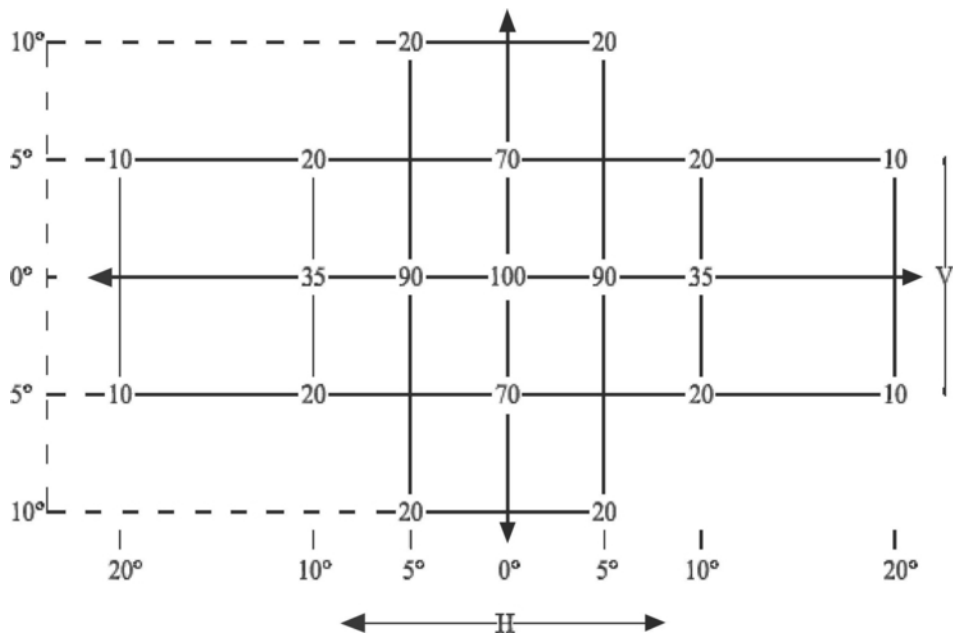
MD E3 17325

The light source module bearing the identification code shown above has been approved together with a lamp approved in Italy (E3) under approval number 17325.

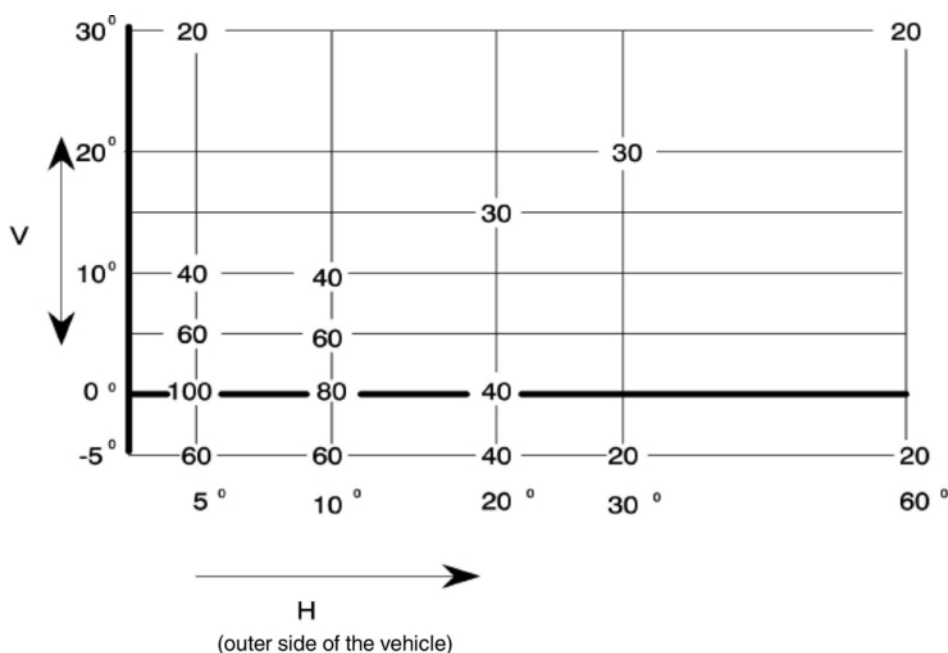
ANNEX 4

PHOTOMETRIC MEASUREMENTS

- 1. Measurement methods
 - 1.1. During photometric measurements, stray reflections shall be avoided by appropriate masking.
 - 1.2. In case the results of measurements should be challenged, measurements shall be carried out in such a way as to meet the following requirements:
 - 1.2.1. The distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;
 - 1.2.2. The measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the light is comprised between 10' and 1 degree;
 - 1.2.3. The intensity requirement for a particular direction of observation shall be deemed to be satisfied if that requirement is met in a direction deviating by not more than one-quarter of a degree from the direction of observation.
 - 1.3. In the case where the device may be installed on the vehicle in more than one or in a field of different positions the photometric measurements shall be repeated for each position or for the extreme positions of the field of the reference axis specified by the manufacturer.
- 2. Table of standard light distribution in space for direction indicator lamps of categories 1, 1a, 1b, 2a and 2b



For direction indicators of category 6



- 2.1. The direction $H = 0^\circ$ and $V = 0^\circ$ corresponds to the reference axis. (On the vehicle, it is horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility.) It passes through the centre of reference. The values shown in the tables give, for the various directions of measurement, the minimum intensities as a percentage of the minimum intensities required in the table in paragraph 6.1:
 - 2.1.1. in the direction $H = 0^\circ$ and $V = 0^\circ$ for categories 1, 1a, 1b, 2a, 2b and in the case of category 5 in the angular area in the direction A as prescribed in Annex 1;
 - 2.1.2. in the direction $H = 5^\circ$ and $V = 0^\circ$ for category 6.
 - 2.1.3. However, in the case where a device is intended to be installed at a mounting height of equal to or less than 750 mm above the ground, the photometric intensity is verified only up to an angle of 5° downwards.
- 2.2. Within the field of light distribution of paragraph 2, schematically shown as a grid, the light pattern should be substantially uniform, i.e. in so far as the light intensity in each direction of a part of the field formed by the grid lines shall meet at least the lowest minimum value being shown on the grid lines surrounding the questioned direction as a percentage.
3. Photometric measurement of lamps

The photometric performance shall be checked:

 - 3.1. For non-replaceable light sources (filament lamps and other):

with the light sources present in the lamp, in accordance with the relevant sub-paragraph of paragraph 7.1 of this Regulation.
 - 3.2. For replaceable filament lamps:

when equipped with filament lamps at 6,75 V, 13,5 V or 28,0 V, the luminous intensity values produced shall be corrected. The correction factor is the ratio between the reference luminous flux and the mean value of the luminous flux found at the voltage applied (6,75 V, 13,5 V or 28,0 V). The actual luminous fluxes of each filament lamp used shall not deviate more than ± 5 per cent from the mean value. Alternatively a standard filament lamp may be used in turn, in each of the individual positions, operated at its reference flux, the individual measurements in each position being added together.
 - 3.3. For any direction indicator lamp except those equipped with filament lamp(s), the luminous intensities measured after one minute and after 30 minutes of operation in flashing mode ($f = 1,5$ Hz, duty factor 50 per cent), shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated by applying at each test point the ratio of luminous intensity measured in HV after one minute and after 30 minutes of operation as described above.

ANNEX 5

COLOUR OF AMBER LIGHTS: CHROMATICITY COORDINATES

For checking the colorimetric characteristics, the test procedure described in paragraph 7 of this Regulation shall be applied.

However, for lamps equipped with non-replaceable light sources (filament lamps and other), the colorimetric characteristics should be verified with the light sources present in the lamp, in accordance with the relevant sub-paragraph of paragraph 7.1 of this Regulation.

ANNEX 6

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 lamps shall not be contested if, when testing photometric performances of any lamp chosen at random according to paragraph 7 of this Regulation:
 - 1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.
 - 1.2.2. If, in the case of a direction indicator equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on direction indicators shall be repeated using another standard filament lamp.
- 1.3. The chromaticity coordinates shall be complied when tested under conditions of paragraph 7 of this Regulation.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of direction indicator 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.

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 direction indicators shall be selected at random from the production of a uniform batch. A uniform batch means a set of direction indicators 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 lamp shall be subjected to photometric measurements for the minimum values at the points listed in Annex 4, and the required chromaticity coordinates.

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 10.1 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 7 (first sampling) would be 0,95.

ANNEX 7

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 performances, the conformity of mass-produced lamps shall not be contested if, when testing photometric performances of any lamp chosen at random according to paragraph 7 of this Regulation:
- 1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.
- 1.2.2. If, in the case of a direction indicator equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on direction indicators shall be repeated using another standard filament lamp.
- 1.2.3. Direction indicators with apparent defects are disregarded.
- 1.3. The chromaticity coordinates shall be complied when tested under conditions of paragraph 7 of this Regulation.

2. FIRST SAMPLING

In the first sampling four direction indicators 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 direction indicators shall not be contested if the deviations of the measured values of the direction indicators in the unfavourable directions are:

2.1.1.1. sample A

A1: one direction indicator	0 per cent
one direction indicator not more than	20 per cent
A2: both direction indicators more than	0 per cent
but not more than	20 per cent
go to sample B	

2.1.1.2. sample B

B1: both direction indicator	0 per cent
------------------------------	------------

- 2.1.2. or if the conditions of paragraph 1.2.2 for sample A are fulfilled.

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 direction indicators shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the direction indicators are:

2.2.1.1. sample A

A3: one direction indicator not more than	20 per cent
one direction indicator 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 direction indicator more than	0 per cent
but not more than	20 per cent
one direction indicator not more than	20 per cent

B3: in the case of A2	
one direction indicator	0 per cent
one direction indicator more than	20 per cent
but not more than	30 per cent

2.2.2. or if the conditions of paragraph 1.2.2 for sample A are not fulfilled.

2.3. Approval withdrawn

Conformity shall be contested and paragraph 1.1 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the direction indicators are:

2.3.1. sample A

A4: one direction indicator not more than	20 per cent
one direction indicator more than	30 per cent

A5: both direction indicators more than	20 per cent
---	-------------

2.3.2. sample B

B4: in the case of A2	
one direction indicator more than	0 per cent
but not more than	20 per cent
one direction indicator more than	20 per cent

B5: in the case of A2	
both direction indicators more than	20 per cent

B6: in the case of A2	
one direction indicator	0 per cent
one direction indicator more than	30 per cent

2.3.3. or if the conditions of paragraph 1.2.2 for samples A and B are not fulfilled.

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two direction indicators and fourth sample D of two direction indicators, 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 direction indicators shall not be contested if the deviations of the measured values of the direction indicators are:

3.1.1.1. sample C

C1: one direction indicator	0 per cent
one direction indicator not more than	20 per cent
C2: both direction indicators more than	0 per cent
but not more than	20 per cent
go to sample D	

3.1.1.2. sample D

D1: in the case of C2	
both direction indicators	0 per cent

3.1.2. or if the conditions of paragraph 1.2.2 for sample C are fulfilled.

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 direction indicators shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the direction indicators are:

3.2.1.1. sample D

D2: in the case of C2	
one direction indicator more than	0 per cent
but not more than	20 per cent
one direction indicator not more than	20 per cent

3.2.1.2. or if the conditions of paragraph 1.2.2 for sample C are not fulfilled.

3.3. Approval withdrawn

Conformity shall be contested and paragraph 11 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the direction indicators are:

3.3.1. sample C

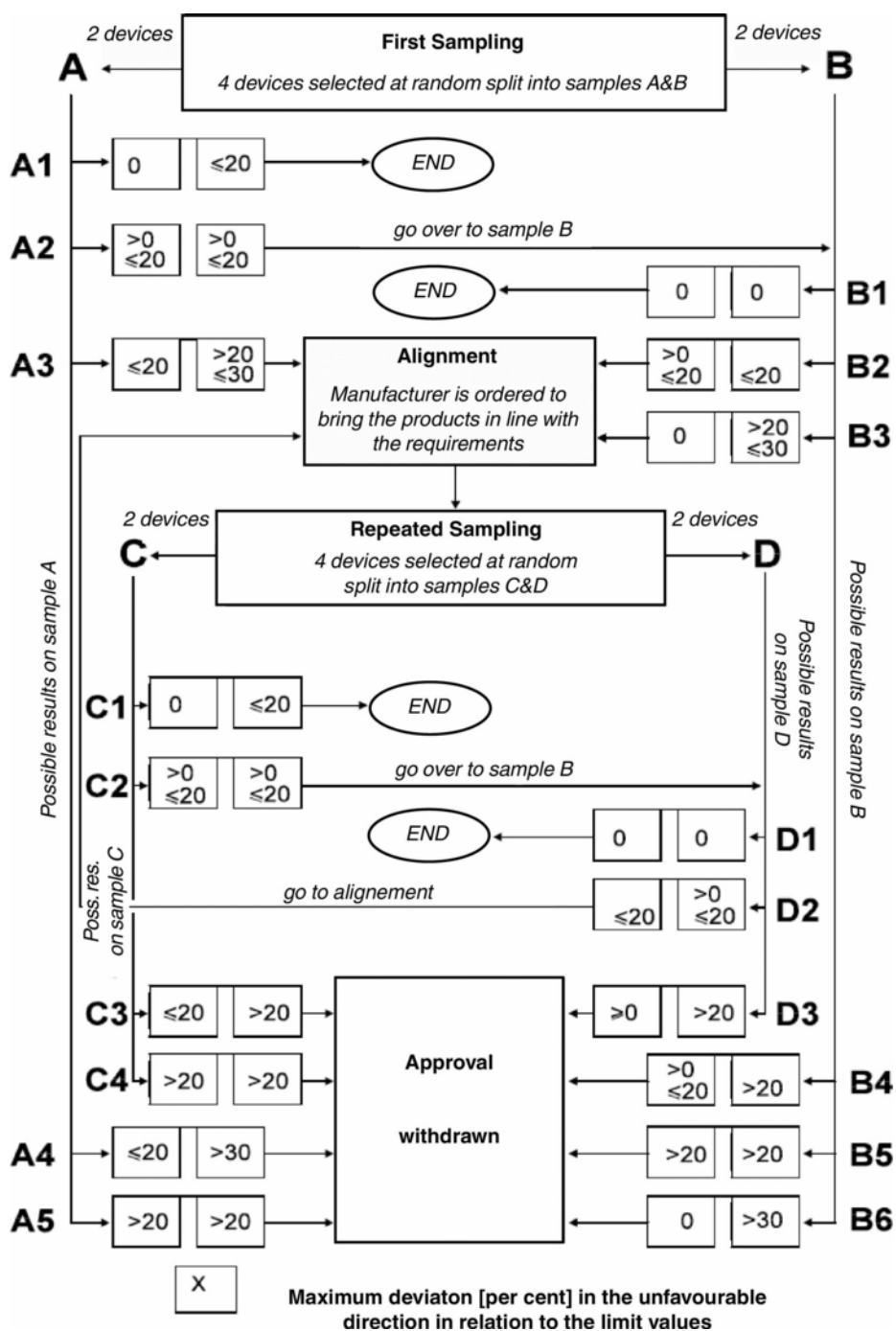
C3:	one direction indicator not more than	20 per cent
	one direction indicator more than	20 per cent
C4:	both direction indicators more than	20 per cent

3.3.2. sample D

D3:	in the case of C2	
	one direction indicator 0 or more than	0 per cent
	one direction indicator more than	20 per cent

3.3.3. or if the conditions of paragraph 1.2.2 for samples C and D are not fulfilled.

Figure 1



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 8 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11)

Revision 4

Incorporating all valid text up to:

05 series of amendments — Date of entry into force: 8 September 2001

Corrigendum 1 to Revision 4 of the Regulation — Date of entry into force: 12 March 2003

CONTENTS

REGULATION

A. ADMINISTRATIVE PROVISIONS

0. Scope
1. Definitions
2. Application for approval of a headlamp
3. Markings
4. Approval

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS

5. General specifications
6. Illumination
7. Requirements concerning coloured lenses and filters
8. Gauging discomfort
9. Standard headlamp
10. Observation concerning colour

C. FURTHER ADMINISTRATIVE PROVISIONS

11. Modifications and extension of approval of a type of headlamp
12. Conformity of production
13. Penalties for non-conformity of production
14. Production definitely discontinued
15. Names and addresses of technical services responsible for conducting approval tests and of administrative departments
16. Transitional provisions

ANNEXES

Annex 1 — Communication

Annex 2 — Verification of conformity of production of headlamps equipped with H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11 filament lamps

Annex 3 — Examples of arrangements of approval marks

Annex 4 — Measuring screens

Annex 5 — Tests for stability of photometric performance of headlamps in operation.

Annex 6 — Requirements for lamps incorporating lenses of plastic material-testing of lens or material samples and of complete lamps.

Annex 7 — Minimum requirements for sampling by an inspector

A. ADMINISTRATIVE PROVISIONS

0. SCOPE ⁽¹⁾

This Regulation applies to motor vehicle headlamps which may incorporate lenses of glass or plastic material.

1. DEFINITIONS

For the purpose of this Regulation,

- 1.1. 'Lens' means the outermost component of the headlamp (unit) which transmits light through the illuminating surface;
- 1.2. 'Coating' means any product or products applied in one or more layers to the outer face of a lens;
- 1.3. 'Headlamps of different types' are headlamps which differ in such essential respects as:
 - 1.3.1. the trade name or mark;
 - 1.3.2. the characteristics of the optical system;
 - 1.3.3. the inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation. However, the fitting or elimination of filters designed solely to change the colour of the beam and not its light distribution shall not constitute a change in the type;
 - 1.3.4. suitability for right-hand or left-hand traffic or for both traffic systems;
 - 1.3.5. the kind of beam produced (passing beam, driving beam or both);
 - 1.3.6. the holder intended to accommodate the filament lamp (or lamps) of one of the categories H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11 ⁽²⁾ ⁽³⁾;

⁽¹⁾ Nothing in this Regulation shall prevent a Party to the Agreement applying this Regulation from prohibiting the combination of a headlamp incorporating a lens of plastic material approved under this Regulation with a mechanical headlamp-cleaning device (with wipers).

⁽²⁾ 'Type of lamp' ('lamp type') should not be confused with 'category of lamp' ('lamp category'). This Regulation concerns headlamps using halogen filament lamps of categories H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H1. These categories of filament lamps differ essentially in their design and, more particularly, in the cap. They are not interchangeable, but within one filament lamp category there may normally be several types.

⁽³⁾ HIR1, and/or H 9 lamp shall only be permitted to produce passing beam in conjunction with the installation of headlamp cleaning device (s) conforming to Regulation No 45. In addition, with respect to vertical inclination, the provision of paragraph 6. 2. 6. 2. 2. of regulation No 48, 01 series of amendments, shall not be applied when these headlamps are installed. This restriction shall apply as long as there was no general agreement on use of levelling devices and headlamps cleaners with respect to the level of the performance of the headlamp.

- 1.3.7. the materials constituting the lenses and coating, if any.
- 2. APPLICATION FOR APPROVAL OF A HEADLAMP (*)
 - 2.1. The application for approval of a headlamp shall be submitted by the owner of the trade name or mark or by his duly accredited representative. It shall specify:
 - 2.1.1. whether the headlamp is intended to provide both a passing beam and driving beam or only one of these beams;
 - 2.1.2. whether, if the headlamp is intended to provide a passing beam, it is designed for both left-hand and right-hand traffic or for either left-hand or right-hand traffic only;
 - 2.1.2.1. if the headlamp is equipped with an adjustable reflector, the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle.
 - 2.1.3. the colour of the beam emitted by the headlamp;
 - 2.2. Every application shall be accompanied by:
 - 2.2.1. drawings in triplicate in sufficient detail to permit identification of the type and representing a frontal view of the headlamp, with details of lens ribbing if any, and the cross-section; the drawings shall indicate the space reserved for the approval mark;
 - 2.2.1.1. if the headlamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle, if the headlamp is for use in that (those) position(s) only;
 - 2.2.2. a brief technical specification;
 - 2.2.3. two samples of the type of headlamp;
 - 2.2.4. for the test of plastic material of which the lenses are made:
 - 2.2.4.1. thirteen lenses:
 - 2.2.4.1.1. six of these lenses may be replaced by six samples of material at least 60 × 80 mm in size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 × 15 mm;
 - 2.2.4.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;
 - 2.2.4.2. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.
 - 2.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.
 - 2.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

(*) Application for approval of a filament lamp: see Regulation No 37.

3. MARKINGS ⁽⁵⁾

3.1. Headlamps submitted for approval shall bear the trade name or mark of the applicant.

3.2. They shall comprise, on the lens and on the main body, ⁽⁶⁾ spaces of sufficient size for the approval mark and the additional symbols referred to in paragraph 4; these spaces shall be indicated on the drawings referred to in paragraph 2.2.1 above.

3.3. Headlamps designed to satisfy the requirements of both right-hand and left-hand traffic shall bear markings indicating the two settings of the optical unit of the vehicle or of the filament lamp on the reflector; these markings shall consist of the letters 'R/D' for the position for right-hand traffic and the letters 'L/G' for the position for left-hand traffic.

4. APPROVAL

4.1. General

4.1.1. If all the samples of a type of headlamp submitted in pursuance of paragraph 2 above meet the requirements of this Regulation, approval shall be granted.

4.1.2. Where grouped, combined or reciprocally incorporated lamps satisfy the requirements of more than one Regulation, a single international approval mark may be affixed provided that each of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it.

This requirement shall not apply to headlamps fitted with a two-filament bulb when a single beam is approved.

4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 04) 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 type of headlamp covered by this Regulation, except if the approval is extended to a device which only differs from the already approved device by the colour of the light emitted.

4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of headlamp pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation by means of a form conforming to the model in annex 1 to this Regulation, with the indications according to paragraph 2.2.1.1.

4.1.5. In addition to the mark prescribed in paragraph 3.1 an approval mark as described in paragraphs 4.2 and 4.3 below shall be affixed in the spaces referred to in paragraph 3.2 above to every headlamp conforming to a type approved under this Regulation.

4.2. Composition of the approval mark

The approval mark shall consist of:

⁽⁵⁾ In the case of headlamps designed to meet the requirements of traffic moving on one side of the road only (either right or left), it is further recommended that the area which can be occulted to prevent discomfort to users in a country where traffic moves on the side of the road opposite to that of the country for which the headlamp was designed should be outlined indelibly on the front lens. This marking is not necessary, however, where the area is clearly apparent from the design.

⁽⁶⁾ If the lens cannot be detached from the main body of the headlamp a space on the lens shall be sufficient.

- 4.2.1. an international approval mark, comprising:
 - 4.2.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval; ⁽⁷⁾
 - 4.2.1.2. the approval number prescribed in paragraph 4.1.3 above.
- 4.2.2. The following additional symbol or symbols:
 - 4.2.2.1. on headlamps meeting left-hand traffic requirements only, a horizontal arrow pointing to the right of an observer facing the headlamp, i.e. to the side of the road on which traffic moves;
 - 4.2.2.2. on headlamps designed to meet the requirements of both traffic systems by means of an appropriate adjustment of the setting of the optical unit or the filament lamp, a horizontal arrow with a head at each end, the heads pointing respectively to the left and to the right;
 - 4.2.2.3. on headlamps meeting the requirements of this Regulation in respect of the passing beam only, the letters 'HC';
 - 4.2.2.4. on headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letters 'HR';
 - 4.2.2.5. on headlamps meeting the requirements of this Regulation in respect of both the passing beam and the driving beam, the letters 'HCR';
 - 4.2.2.6. on headlamps incorporating a lens of plastic material, the group of letters 'PL' to be affixed near the symbols prescribed in paragraphs 4.2.2.3 to 4.2.2.5 above;
 - 4.2.2.7. on headlamps meeting the requirements of this Regulation in respect of the driving beam, an indication of the maximum luminous intensity expressed by a reference mark as defined in paragraph 6.3.2.1.2 below, placed near the circle surrounding the letter 'E'; in the case of reciprocally incorporated headlamps, indication of the maximum luminous intensity of the driving beams as a whole shall be expressed as above.
- 4.2.3. In every case the relevant operating mode used during the test procedure according to paragraph 1.1.1.1 of annex 5 and the allowed voltage(s) according to paragraph 1.1.1.2 of annex 5 shall be stipulated on the approval certificate and on the communication form transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation. In the corresponding cases the device shall be marked as follows:
 - 4.2.3.1. on headlamps meeting the requirements of this Regulation which are so designed that the filament of the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated, an oblique stroke (/) shall be placed behind the passing lamp symbol in the approval mark.
 - 4.2.3.2. on headlamps meeting the requirements of annex 5 to this Regulation only when supplied with a voltage of 6 V or 12 V, a symbol consisting of the number 24 crossed out by an oblique cross (×) shall be placed near the filament lamp holder.

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

- 4.2.4. The two digits of the approval number (at present 04) which indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.
- 4.2.5. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 shall be clearly legible and indelible even when the headlamp is mounted on the vehicle.
- 4.3. Arrangement of the approval mark
- 4.3.1. Independent lamps
- Annex 3, figures 1 - 9, gives examples of arrangements of the approval marks with the above-mentioned additional symbols.
- 4.3.2. Grouped, combined or reciprocally incorporated lamps
- 4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:
- 4.3.2.1.1. it is visible after their installation,
- 4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.
- 4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulations at the time of issue of the approval and, if necessary, the required arrow shall be marked:
- either
- 4.3.2.2.1. on the appropriate light-emitting surface,
- or
- 4.3.2.2.2. in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified (see four examples shown in annex 3).
- 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks under which approval has been granted.
- 4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.
- 4.3.2.5. Annex 3, figure 10, of this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.
- 4.3.3. Lamps, the lens of which is used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps
- The provisions laid down in paragraph 4.3.2 above are applicable.
- 4.3.3.1. In addition where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.2 above and bears the approval marks of the actual functions.

If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

- 4.3.3.2. Annex 3, figure 11, of this Regulation gives examples of arrangements of approval marks corresponding to that case.

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS ⁽⁸⁾

5. GENERAL SPECIFICATIONS

- 5.1. Each sample shall conform to the specifications set forth in paragraphs 6 to 8 below.
- 5.2. Headlamps shall be so made as to retain their prescribed photometric characteristics and to remain in good working order when in normal use, in spite of the vibrations to which they may be subjected.
- 5.2.1. Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicle as to comply with the rules applicable to them. Such a device need not be fitted on components in which the reflector and the lens cannot be separated provided the use of such components is confined to vehicles on which the headlamp setting can be adjusted by other means. Where a headlamp providing a driving beam and a headlamp providing a passing beam, each equipped with its own filament lamp, are assembled to form a composite unit, the adjusting device shall enable each optical system individually to be duly adjusted. However, this shall not apply to headlamp assemblies whose reflectors are indivisible. For this type of assembly, the requirements of paragraph 6 shall apply.
- 5.3. The components by which the filament lamp(s) is/are fixed to the reflector shall be so made that, even in darkness, the filament lamp(s) can be fixed in no other position but the correct one. ⁽⁹⁾

The filament lamp-holder shall conform to the dimensional characteristics as given in the following data sheets of IEC Publication 61-2:

Filament lamps	Holder	Data sheets
H1	P 14,5s	7005-46-3
H2	X 5111	7005-99-2
H3	PK 22s	7005-47-1
HB3	P 20d	7005-31-1
HB4	P 22d	7005-32-1
H7	PX 26d	7005-5-1
H8	PG 17	7005-110-1
HIR1	PX 20d	7005-...-1
HIR2	PX 22d	7005-...-.
H9	PGJ 19-5	7005-110-1
H11	PGJ 19-2	7005-110-1

- 5.4. Headlamps designed to satisfy the requirements of both right-hand and left-hand traffic may be adapted for traffic on a given side of the road either by an appropriate initial setting when fitted on the vehicle or by selective setting by the user. Such initial or selective setting may consist, for example, of fixing either the optical unit at a given angle on the vehicle or the filament lamp at a given angle in relation to the optical unit. In all cases, only two precise setting positions, one for right-hand and one for left-hand traffic, shall be possible, and the design shall preclude inadvertent shifting of the headlamp from one position to the other or its setting in an intermediate position. Where two different setting positions are provided for the filament lamp, the components attaching the filament lamp to the reflector must be so designed and made that, in each of its two settings, the filament lamp will be held in position with the precision required for headlamps intended for traffic on only one side of the road. Conformity with the requirements of this paragraph shall be verified visually and, where necessary, by a test fitting.

⁽⁸⁾ Technical requirements for filament lamps: see Regulation No 37.

⁽⁹⁾ A headlamp is regarded as satisfying the requirements of this paragraph if the filament lamp can easily be fitted into the headlamp and the positioning lugs can be correctly fitted into their slots even in darkness.

- 5.5. On headlamps designed to provide alternately a driving beam and a passing beam, any mechanical, electro-mechanical or other device incorporated in the headlamp for switching from one beam to the other ⁽¹⁰⁾ must be so constructed that:
- 5.5.1. the device is strong enough to be worked 50 000 times without suffering damage despite the vibration to which it may be subjected in normal use;
- 5.5.2. in the case of failure it is possible to obtain the passing beam automatically;
- 5.5.3. either the passing beam or the driving beam can always be obtained without any possibility of the mechanism stopping in between the two positions;
- 5.5.4. the user cannot, with ordinary tools, change the shape or position of the moving parts.
- 5.6. Complementary tests shall be done according to the requirements of annex 5 to ensure that in use there is no excessive change in photometric performance.
- 5.7. If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of annex 6.
6. ILLUMINATION
- 6.1. General provisions
- 6.1.1. Headlamps shall be so made that with suitable H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 and/or H11 filament lamps they provide adequate illumination without dazzle in the case of the passing beam and good illumination in the case of the driving beam.
- 6.1.2. The illumination produced by the headlamp shall be checked on a vertical screen set at a distance of 25 m in front of the headlamp and at right angles to its axis (see annex 4).
- 6.1.3. The headlamps shall be checked by means of (a) standard (reference) filament lamp(s) designed for a rated voltage of 12 V, any selective-yellow filters ⁽¹¹⁾ being replaced by geometrically identical uncoloured filters with a transmission factor of at least 80 per cent. During the checking of the headlamp the voltage at the terminals of the filament lamp must be regulated so as to obtain the following characteristics:

Filament lamps	Approximate supply voltage (in V) for measurement	Light flux (in lumens)
H1	12	1 150
H2	12	1 300
H3	12	1 100
HB3	12	1 300
HB4	12	825
H7	12	1 100
H8	12	600
HIR1	12	1 840
HIR2	12	1 355
H9	12	1 500
H11	12	1 000

The headlamp shall be deemed satisfactory if the photometric requirements are met with at least one standard (reference) 12-volt filament lamp which may be supplied with the headlamp.

⁽¹⁰⁾ These provisions shall not apply to the control switch.

⁽¹¹⁾ These filters shall consist of all the components, including the lens, which are intended to colour the light.

- 6.1.4. The dimensions determining the position of the filament inside the standard filament lamp are shown on the relevant data sheet of Regulation No 37.
- 6.1.5. The bulb of the standard filament lamp must be of such optical shape and quality that it does not cause any reflection or refraction adversely affecting the light distribution. Compliance with this requirement must be checked by measuring the light distribution obtained when a standard headlamp is fitted with the standard (reference) filament lamp.
- 6.2. Provisions regarding passing beams
- 6.2.1. The passing beam must produce a sufficiently sharp 'cut-off' to permit satisfactory adjustment with its aid. The 'cut-off' must be a horizontal straight line on the side opposite to the direction of traffic for which the headlamp is intended; on the other side it must extend neither beyond the broken line HV H1 H4 formed by a straight line HV H1 standing at an angle of 45° to the horizontal and a straight line H1 H4 lying 25 cm above the straight line hh, nor beyond the straight line HV H3, inclined at an angle of 15° above the horizontal (see annex 4). A 'cut-off' extending beyond both line HV H2 and line H2 H4 and resulting from a combination of the above two possibilities shall in no circumstances be permitted.
- 6.2.2. The headlamp shall be so aimed that:
- 6.2.2.1. in the case of headlamps designed to meet the requirements of right-hand traffic, the 'cut-off' on the left half of the screen ⁽¹²⁾ is horizontal and, in the case of headlamps designed to meet the requirements of left-hand traffic, the 'cut-off' on the right half of the screen is horizontal;
- 6.2.2.2. this horizontal part of the 'cut-off' is situated on the screen 25 cm below the line hh (see annex 4);
- 6.2.2.3. the 'elbow' of the 'cut-off' is on line vv ⁽¹³⁾.
- 6.2.3. When so aimed, the headlamp need, if its approval is sought solely for a passing beam ⁽¹⁴⁾, comply only with the requirements referred to in paragraphs 6.2.5 to 6.2.7 below; if it is intended to provide both a passing beam and a driving beam it shall comply with the requirements referred to in paragraphs 6.2.5 to 6.2.7 and 6.3.
- 6.2.4. Where a headlamp so aimed does not meet the requirements referred to in paragraphs 6.2.5 to 6.2.7 and 6.3 its alignment may be changed, provided that the axis of the beam is not laterally displaced by more than 1° (= 44 cm) to the right or left ⁽¹⁵⁾. To facilitate alignment by means of the 'cut-off', the headlamp may be partially occulted in order to sharpen the 'cut-off'.

⁽¹²⁾ The test screen must be sufficiently wide to allow examination of the 'cut-off' over a range of at least 5° each side of the line vv.

⁽¹³⁾ If, in the case of a headlamp designed to satisfy the requirements of this Regulation with respect to the passing beam only, the focal axis diverges appreciably from the general direction of the beam, or if, whatever the type of headlamp (passing only or combined passing and driving), the beam does not have a 'cut-off' with a clear 'elbow', the lateral adjustment shall be affected in the manner which best satisfies the requirements for illumination at points 75 R and 50 R for right-hand traffic and at points 75 L and 50 L for left-hand traffic.

⁽¹⁴⁾ A headlamp designed to emit a passing beam may incorporate a driving beam not complying with this specification.

⁽¹⁵⁾ The limit of re-alignment of 1° towards the right or left is not incompatible with upward or downward vertical re-alignment. The latter is limited only by the requirements of paragraph 6.3.; however, the horizontal part of the 'cut-off' should not extend beyond the line hh (the provisions of paragraph 6.3. are not applicable to headlamps intended to meet the requirements of this Regulation for the passing beam only).

- 6.2.5. The illumination produced on the screen by the passing beam shall meet the following requirements:

Point on measuring screen				Required illumination in lux
Headlamps for right-hand traffic		Headlamps for left-hand traffic		
Point B	50 L	Point B	50 R	≤ 0,4
Point 75	R	Point 75	L	≥ 12
Point 75	L	Point 75	R	≤ 12
Point 50	L	Point 50	R	≤ 15
Point 50	R	Point 50	L	≥ 12
Point 50	V	Point 50	V	≥ 6
Point 25	L	Point 25	R	≥ 2
Point 25	R	Point 25	L	≥ 2
Any point in zone III				≤ 0,7
Any point in zone IV				≥ 3
Any point in zone I ≤ 2 x (E _{50R} or E _{50L}) (*)				

(*) E_{50R} and E_{50L} are the illuminations actually measured.

(*) E_{50R} and E_{50L} are the illuminations actually measured.

- 6.2.6. There shall be no lateral variations detrimental to good visibility in any of the zones I, II, III and IV.

- 6.2.7. The illumination values in zones 'A' and 'B' as shown in figure C in annex 4 shall be checked by the measurement of the photometric values of points 1 to 8 on this figure; these values shall lie within the following limits:

$$1 + 2 + 3 \geq 0,3 \text{ lux, and}$$

$$4 + 5 + 6 \geq 0,6 \text{ lux, and}$$

$$0,7 \text{ lux} \geq 7 \geq 0,1 \text{ lux and}$$

$$0,7 \text{ lux} \geq 8 \geq 0,2 \text{ lux}$$

These new values shall not be required for headlamps which have been approved before the application date of Supplement 4 to the 04 series of amendments to this Regulation (13 January 1993) nor to the extensions of such approvals ⁽¹⁶⁾.

- 6.2.8. Headlamps designed to meet the requirements of both right-hand and left-hand traffic must in each of the two setting positions of the optical unit or of the filament lamp, meet the requirements set forth above for the corresponding direction of traffic.

- 6.3. Provisions regarding driving beams

- 6.3.1. In case of a headlamp designed to provide a driving beam and a passing beam, measurements of the illumination produced on the screen by the driving beam shall be taken with the same headlamp alignment as for measurements under paragraphs 6.2.5 to 6.2.7 above; in the case of a headlamp providing a driving beam only, it shall be so adjusted that the area of maximum illumination is centred on the point of intersection of the lines hh and vv; such a headlamp need meet only the requirements referred to in paragraph 6.3.

- 6.3.2. The illumination produced on the screen by the driving beam shall meet the following requirements:

- 6.3.2.1. the point of intersection (HV) of the lines hh and vv shall be situated within the isolux representing 80 per cent of maximum illumination. This maximum value (EM) shall be not less than 48 lux. The maximum value shall in no case exceed 240 lux; moreover, in the case of a combined passing and driving headlamp, this maximum value shall not be more than 16 times the illumination measured for the passing beam at point 75 R (or 75 L).

⁽¹⁶⁾ Illumination values in any point of zones A and B, which also lies within zone III, shall not exceed 0,7 lux.

- 6.3.2.1.1. the maximum luminous intensity (IM) of the driving beam expressed in thousands of candelas shall be calculated by means of the formula:

$$I_M = 0,625 E_M$$

- 6.3.2.1.2. the reference mark (I'M.) indicating this maximum intensity and referred to in paragraph 4.2.2.7 above shall be obtained by means of the formula:

$$I'_M = \frac{I_M}{3} = 0,208 E_M$$

this value shall be rounded to whichever is the nearest of the following: 7,5, 10, 12,5, 17,5, 20, 25, 27,5, 30, 37,5, 40, 45, 50.

- 6.3.2.2. Starting from point HV, horizontally to the right and left the illumination shall be not less than 24 lux up to a distance of 1,125 m and not less than 6 lux up to a distance of 2,25 m.

- 6.4. In the case of headlamps with an adjustable reflector the requirements of paragraphs 6.2. and 6.3. are applicable for each mounting position indicated according to paragraph 2.1.3. For verification the following procedure shall be used:

- 6.4.1. each applied position is realised on the test goniometer with respect to a line joining the centre of the light source and point HV on the aiming screen. The adjustable reflector is then moved into such a position that the light pattern on the screen corresponds to the aiming prescriptions of paragraphs 6.2.1. to 6.2.2.3 and/or 6.3.1;

- 6.4.2. with the reflector initially fixed according to paragraph 6.4.1, the headlamp must meet the relevant photometric requirements of paragraphs 6.2 and 6.3;

- 6.4.3. additional tests are made after the reflector has been moved vertically ± 2 degrees or at least into the maximum position, if less than 2° , from its initial position by means of the headlamps adjusting device. Having re-aimed the headlamp as a whole (by means of the goniometer for example) in the corresponding opposite direction the light output in the following directions shall be controlled and lie within the required limits: passing beam:

points HV and 75R (75L respectively);

driving beam: IM and point HV (percentage of IM).

- 6.4.4. if the applicant has indicated more than one mounting positions, the procedure of paragraphs 6.4.1 to 6.4.3 shall be repeated for all the other positions;

- 6.4.5. if the applicant has not asked for special mounting positions, the headlamp shall be aimed for measurements of paragraphs 6.2 and 6.3 with the headlamps adjusting device in its mean position. The additional tests of paragraph 6.4.3. shall be made with the reflector moved into its extreme positions (instead of $\pm 2^\circ$) by means of the headlamps adjusting device.

- 6.5. The screen illumination values referred to in paragraphs 6.2.5 to 6.2.7 and 6.3 above shall be measured by means of a photoreceptor, the effective area of which shall be contained within a square of 65 mm side.

7. REQUIREMENTS CONCERNING COLOURED LENSES AND FILTERS

- 7.1. Approval may be obtained for headlamps emitting either white or selective-yellow light with a filament lamp.

Expressed in CIE trichromatic coordinates, the corresponding colorimetric characteristics are as follows:

Selective-yellow filter (screen or lens)

Limit towards red	$y \geq 0,138 + 0,580 x$
Limit towards green	$y \leq 1,29 x - 0,100$
Limit towards white	$y \geq -x + 0,966$
Limit towards spectral value	$y \leq -x + 0,992$

which can also be expressed as follows:

dominant wave-length:	575-585 nm
purity factor:	0,90-0,98

The transmission factor must be $\geq 0,78$ when determined by means of a source of light with a colour temperature of 2 856 K ⁽¹⁷⁾

- 7.2. The filter must be part of the headlamp, and must be attached to it in such a way that the user cannot remove it either inadvertently or, with ordinary tools, intentionally.

8. GAUGING DISCOMFORT

The discomfort caused by the passing beam of headlamps shall be gauged ⁽¹⁸⁾

9. STANDARD HEADLAMP ⁽¹⁹⁾

A headlamp shall be deemed to be a standard (reference) headlamp if it

- 9.1. satisfies the above-mentioned requirements for approval;
- 9.2. has an effective diameter of not less than 160 mm;
- 9.3. provides with a standard filament lamp, at the various points and in the various zones referred to in paragraph 6.2.5, illumination equal to:
 - 9.3.1. not more than 90 per cent of the maximum limits and
 - 9.3.2. not less than 120 per cent of the minimum limits prescribed in the table in paragraph 6.2.5.

10. OBSERVATION CONCERNING COLOUR

Since any approval under this Regulation is granted, pursuant to paragraph 7.1 above, to a type of headlamp emitting either white light or selective-yellow light, article 3 of the Agreement to which the Regulation is annexed shall not prevent the Contracting Parties from prohibiting headlamps emitting a beam of white or selective-yellow light on vehicles registered by them.

C. FURTHER ADMINISTRATIVE PROVISIONS

11. MODIFICATION AND EXTENSION OF APPROVAL OF A TYPE OF HEADLAMP

- 11.1. Every modification of the headlamp type shall be notified to the administrative department which approved the type of headlamp. The department may then either:

⁽¹⁷⁾ Corresponding to illuminant A of the international Commission on illumination (CIE)

⁽¹⁸⁾ This requirement will be the subject of a recommendation for the benefit of administrations.

⁽¹⁹⁾ Different values may be accepted provisionally. In the absence of final specifications, the use of an approved headlamp is recommended.

- 11.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the headlamp still complies with the requirements; or
- 11.1.2. require a further test report from the technical service responsible for conducting the tests.
- 11.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 above to the Parties to the Agreement applying this Regulation.
- 11.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.
- 12. CONFORMITY OF PRODUCTION
- 12.1. Headlamps 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.
- 12.2. In order to verify that the requirements of paragraph 12.1 are met, suitable controls of the production shall be carried out.
- 12.3. The holder of the approval shall in particular:
 - 12.3.1. ensure the existence of procedures for the effective control of the quality of products;
 - 12.3.2. have access to the control equipment necessary for checking the conformity to each approved type;
 - 12.3.3. ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the administrative service;
 - 12.3.4. analyse the results of each type of test in order to verify and ensure the stability of the product characteristics, making allowance for variation of an industrial production;
 - 12.3.5. ensure that for each type of product at least the tests prescribed in annex 2 to this Regulation are carried out;
 - 12.3.6. Ensure that any collecting of samples giving evidence of non conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.
- 12.4. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit.
 - 12.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.
 - 12.4.2. The inspector may take samples at random to be tested in the manufacturer's laboratory. The minimum number of samples may be determined in the light of the results of the manufacturer's own checks.
 - 12.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in the application of paragraph 12.4.2 above, the inspector shall select samples, to be sent to the technical service which has conducted the type approval tests, using the criteria of annex 7.

- 12.4.4. The competent authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with the criteria of annex 7.
- 12.4.5. The competent authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the competent authority and their confidence in arrangements for ensuring effective control of the conformity production. In the case where negative results are recorded, competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly possible.
- 12.5. Headlamps with apparent defects are disregarded.
- 12.6. The reference mark is disregarded.
13. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 13.1. The approval granted in respect of a type of headlamp pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a headlamp bearing the approval mark does not conform to the type approved.
- 13.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1 to this Regulation.
14. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of headlamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.
15. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.
16. TRANSITIONAL PROVISIONS
- 16.1. As from six months after the official date of entry into force of Regulation No 112, Contracting Parties applying this Regulation shall cease to grant ECE approvals according to this Regulation.
- 16.2. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to this and any previous series of amendments of this Regulation.
- 16.3. Approvals granted under this Regulation before the date of entry into force of Regulation No 112 and all extensions of approvals, including those to a preceding series of amendments to this Regulation granted subsequently, shall remain valid indefinitely.

- 16.4. Contracting Parties applying this Regulation shall continue to issue approvals for headlamps on the basis of this and any previous series of amendments to this Regulation, provided that the headlamps are intended as replacements for fitting to vehicles in use.
 - 16.5. As from the official date of entry into force of Regulation No 112, no Contracting Party applying this Regulation shall prohibit the fitting on a new vehicle type of a headlamp approved under Regulation No 112.
 - 16.6. Contracting Parties applying this Regulation shall continue to allow fitting on a vehicle type or vehicle of a headlamp approved to this Regulation.
 - 16.7. Contracting Parties applying this Regulation shall continue to allow fitting or use on a vehicle in use of a headlamp approved to this Regulation as amended by any previous series of amendments, provided that the headlamp is intended for replacement.
-

ANNEX 1

COMMUNICATION

(maximum format: A4 (210 × 297))



issued by: Name of administration

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

concerning ⁽²⁾: APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a type of headlamp pursuant to Regulation No. 8

Approval No. Extension No.

1. Trade name or mark of headlamp:
2. Manufacturer's name for the type of headlamp:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Submitted for approval on:
6. Technical Service responsible for conducting approval tests:
7. Date of report; issued by that service:
8. Number of report; issued by that service:
9. Brief description:
Category as described by the relevant marking ⁽³⁾:
Number and category(ies) of filament lamp or lamps:
Colour of light emitted: white/selective/yellow ⁽²⁾:
10. Position of the approval mark:
11. Reason(s) for extension (if applicable):
12. Approval granted/extended/refused/withdrawn ⁽²⁾:
13. Place:
14. Date:

15. Signature:
16. The list of documents deposited with the Administrative Service which has granted approval is annexed to this communication and may be obtained on request.

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

(2) Strike out what does not apply.

(3) Indicate the appropriate marking selected from the list below:

HC, HC, HC, HR, HR PL, HCR, HCR, HCR,
 $\rightarrow$ $\leftrightarrow$
 HC/R, HC/R, HC/R, HC/, HC/, HC/, HC PL, HC PL, HC PL,
 $\rightarrow$ $\leftrightarrow$ $\rightarrow$ $\leftrightarrow$
 HCR PL, HCR PL, HCR PL, HC/R PL, HC/R PL, HC/R PL,
 $\rightarrow$ $\leftrightarrow$ $\rightarrow$
 HC/PL, HC/PL, HC/PL
 $\rightarrow$ $\leftrightarrow$

ANNEX 2

VERIFICATION OF CONFORMITY OF PRODUCTION OF HEADLAMPS EQUIPPED WITH H1, H2, H3, HB3, HB4, H7, H8, H9, HIR1, HIR2 AND/OR H11 FILAMENT LAMPS

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp:

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L(or R) and zone III, the maximum unfavourable deviation may be respectively:

B 50 L (or R):	0,2 lx equivalent 20 per cent
	0,3 lx equivalent 30 per cent
Zone III:	0,3 lx equivalent 20 per cent
	0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of + 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L(or R) ⁽¹⁾ (with a tolerance of + 0,1 lx), 75 R (or L, 50 v 25 R, 25 L, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 EmaX' a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3.2 of this Regulation.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left ⁽²⁾.

1.2.4. If the results of the tests described above do not meet the requirements, tests on the headlamps shall be repeated using another standard filament lamp.

1.3. With respect to the verification of the change in vertical position of the cut-off line under the influence of heat, the following procedure shall be applied:

One of the sampled headlamps shall be tested according to the procedure described in paragraph 2.1 of annex 5 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of annex 5.

The headlamp shall be considered as acceptable if A_r does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, second headlamp shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 1,5 mrad.

1.4. The chromaticity coordinates shall be complied with when the headlamp is equipped with a filament lamp set to Standard A colour temperature.

The photometric performance of a headlamp emitting selective yellow light when equipped with a colourless filament lamp shall be the values contained in this Regulation multiplied by 0,84.

⁽¹⁾ Letters in brackets refer to headlamps intended for left-hand traffic.

⁽²⁾ See the corresponding footnote in the text of the Regulation.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of headlamp 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 characteristics and the verification of the change in vertical position of the cut-off line under the influence of heat.

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 headlamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of headlamps 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 to get her 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 headlamp shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points $E_{\max}$ HV ⁽³⁾, HL, HR ⁽⁴⁾ in the case of the driving beam, and to points B 50 L (or R), HV, 50 V, 75 R (or L) and 25 L (or R) in the case of the passing beam (see figure in annex 4).

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 12.1 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 7 (first sampling) would be 0,95.

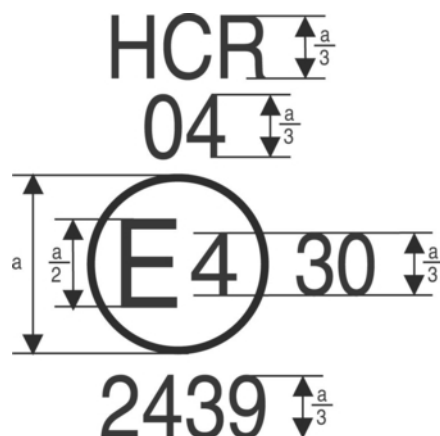
⁽³⁾ When the driving beam is reciprocally incorporated with the passing beam, HV in the case of the driving beam shall be the same measuring point as in the case of the passing beam.

⁽⁴⁾ HL and HR: points on 'hh' located at 1.125 m to the left and to the right of point HV respectively.

ANNEX 3

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS

Figure 1



The device bearing the approval mark shown above is a headlamp approved in the Netherlands (E4), under approval number 2439, meeting the requirements of this Regulation, as amended by the 04 series of amendments (04), in respect of both the passing beam and the driving beam (HCR) and is designed for right-hand traffic only.

The number 30 indicates that the maximum luminous intensity of the driving beam is between 86 250 and 111 250 candelas.

Note: The approval number and additional symbols must be placed close to the circle and either above or below the letter '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 face in the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Figure 2

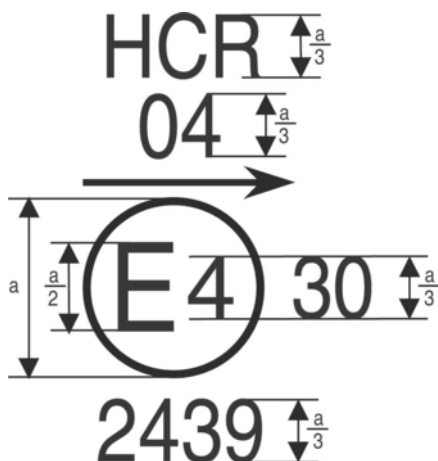


Figure 3a



Figure 3b



The headlamp bearing the above approval mark meets the requirements of this Regulation in respect of both the passing beam and the driving beam and is designed:

For left-hand traffic only.

For both traffic systems by means of an appropriate adjustment of the setting of the optical unit or the filament lamp on the vehicle.

Figure 4



Figure 5



The headlamp bearing the above approval mark is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation in respect of the passing beam only and is designed:

For both traffic systems.

For right-hand traffic only

Figure 6

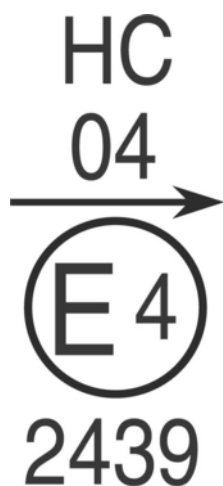
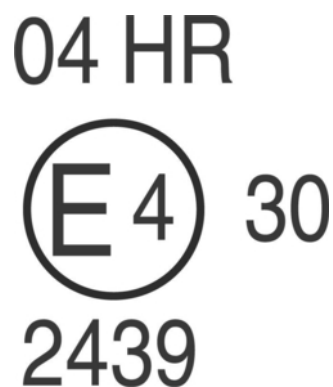


Figure 7



The headlamp bearing the above approval mark is a headlamp meeting the requirements of this Regulation:

In respect of the passing beam only and is designed for left-hand traffic only.

In respect of the driving beam only.

Figure 8



Figure 9



Identification of a headlamp incorporating the lens of plastic material meeting the requirements of Regulation No 8.

With respect to both the passing beam and the
and designed for right-hand traffic only.

With respect to the passing beam only and
designed for right-hand traffic only.

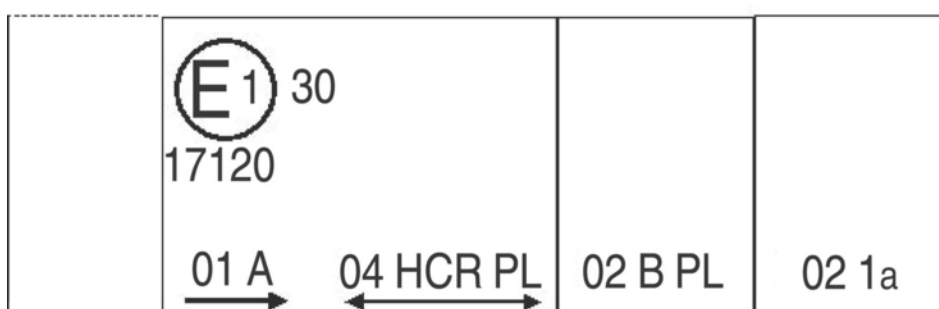
The passing lamp filament shall not be lit simultaneously with the driving lamp filament and/or another reciprocally incorporated headlamp.

Figure 10

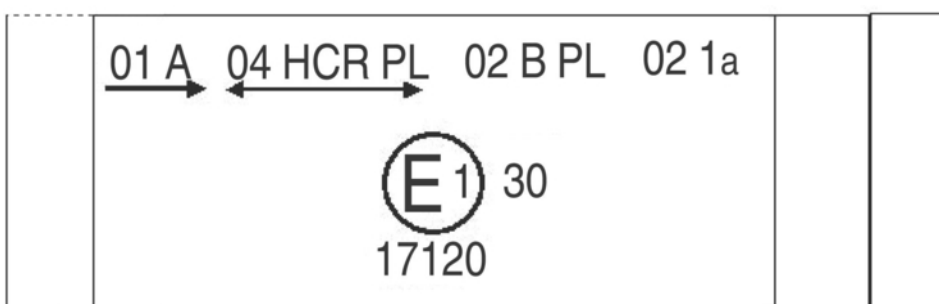
Simplified marking for grouped, combined or reciprocally incorporated lamps

(The vertical and horizontal lines schematise the shape of the light-signalling device.
They are not part of the approval mark.)

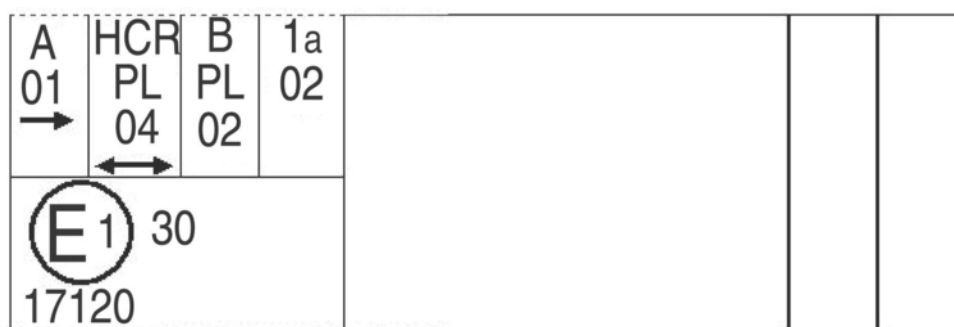
MODEL A



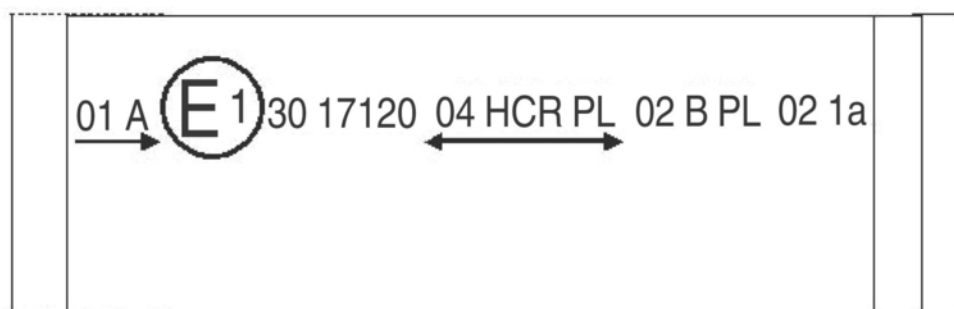
MODEL B



MODEL C



MODEL D



Note: The four examples above correspond to a lighting device bearing an approval mark comprising:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No 7,

A headlamp with a passing beam designed for right- and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 111 250 candelas (as indicated by the number 30), approved in accordance with the 04 series of amendments to Regulation No. and incorporating a lens of plastic material,

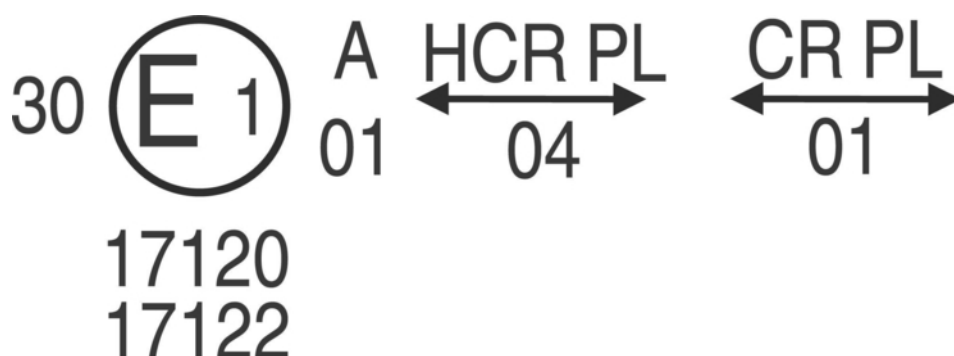
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No. 19 and incorporating a lens of plastic material,

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No 6.

Figure 11

Lamp reciprocally incorporated with a headlamp

Example 1



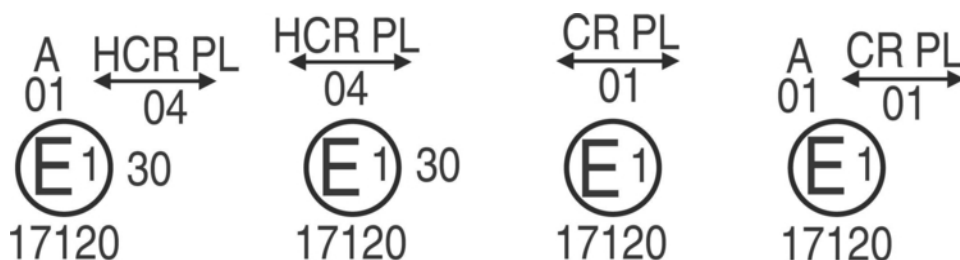
The above example corresponds to the marking of a lens of plastic material intended to be used in different types of headlamps, namely:

Either A headlamp with a passing beam designed for both traffic systems and a driving beam with a maximum luminous intensity comprised between 86 250 and 111 250 candelas (as indicated by the number 30), approved in Germany (E1) in accordance with the requirements of Regulation No 8 as amended by the 04 series of amendments, which is reciprocally incorporated with A front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7;

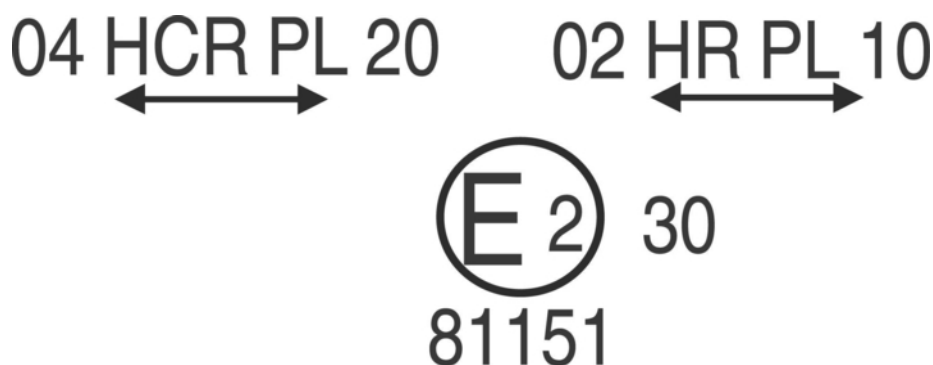
Or A headlamp with a passing beam designed for both traffic systems and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No. 1 as amended by the 01 series of amendments, which is reciprocally incorporated with The same front position lamp as above;

Or even either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:



Example 2



The above example corresponds to the marking of a lens of plastic material used in a unit of two headlamps approved in France (E2) under approval number 81151, consisting of:

A headlamp emitting a passing beam designed for both traffic systems and a driving beam with a maximum luminous intensity between x and y candelas, meeting the requirements of Regulation No 8, and

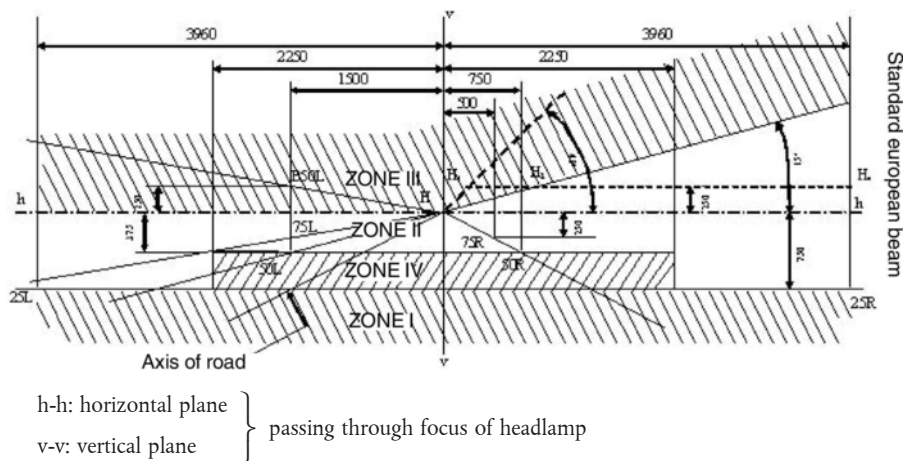
A headlamp emitting a driving beam for both traffic systems with a maximum luminous intensity comprised between w and z candelas, meeting the requirements of Regulation No 20, the maximum luminous intensity of the driving beams as a whole being comprised between 86 250 and 111 250 candelas.

ANNEX 4

MEASURING SCREENS

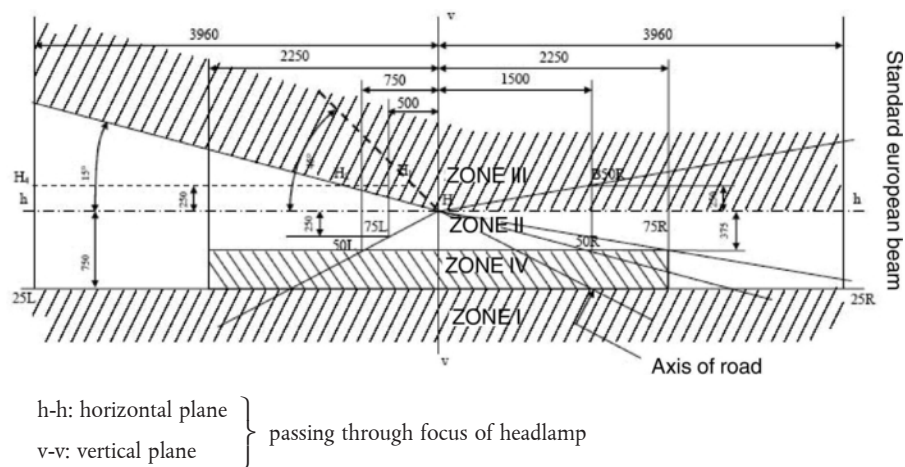
A. Headlamp for right-hand traffic

(dimensions in mm)

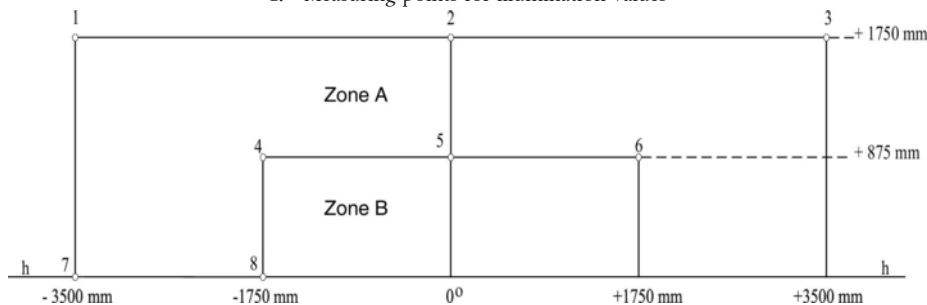


B. Headlamp for left-hand traffic

(dimensions in mm)



C. Measuring points for illumination values



Note: Figure C shows the measuring points for right-hand traffic.

Points 7 and 8 move to their corresponding location at the right-hand side of the picture for left-hand traffic.

ANNEX 5

TESTS FOR STABILITY OF PHOTOMETRIC PERFORMANCE OF HEADLAMPS IN OPERATION**TESTS ON COMPLETE HEADLAMPS**

Once the photometric values have been measured according to the requirements of this Regulation, in points for Emax for driving beam and HV, 50 R, B 50 L for passing beam (or HV, 50 L, B 50 R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. 'Complete headlamp' shall be understood to mean the complete lamp itself including those surrounding body parts and lamps which could influence its thermal dissipation.

1. TEST OF STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clean Headlamp

The headlamp shall be operated for 12 hours as described in subparagraph 1.1.1 and checked as prescribed in subparagraph 1.1.2.

1.1.1. Test procedure

The headlamp shall be operated for a period according to the specified time, so that:

- 1.1.1.1. (a) in the case where only one lighting function (driving or passing beam) is to be approved, the corresponding filament is lit for the prescribed time ⁽¹⁾,
- (b) in the case of a reciprocally incorporated passing lamp and driving lamp (dual filament lamp or two filament lamps):

If the applicant declares that the headlamp is to be used with a single filament lit ⁽²⁾, the test shall be carried out in accordance with this condition, activating ⁽¹⁾ each specified function successively for half the time specified in paragraph 1.1,

In all other cases ⁽¹⁾ ⁽²⁾, the headlamp shall be subjected to the following cycle until the time specified is reached:

15 minutes, passing-beam filament lit

5 minutes, all filaments lit

- (c) in the case of grouped lighting functions all the individual functions shall be lit simultaneously for the time specified for individual lighting functions (a) also taking into account the use of reciprocally incorporated lighting functions (b), according to the manufacturer's specifications.

1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply 90 per cent of the maximum wattage specified in the Regulation for filament lamps. (Regulation No 37). The applied wattage shall in all cases comply with the corresponding value of a filament lamp 12 V rated voltage, except if the applicant for approval specifies that the headlamp may be used at a different voltage. In the latter case, the test shall be carried out with the filament lamp whose wattage is the highest that can be used.

⁽¹⁾ When the tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

⁽²⁾ Should two or more lamp filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the filaments simultaneously.

1.1.2. Test results

1.1.2.1. Visual inspection

Once the headlamp has been stabilised to the ambient temperature, the headlamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually, no distortion, deformation, cracking or change in colour of either the headlamp lens or the external lens, if any, shall be noticeable.

1.1.2.2. Photometric test

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

Passing-beam:

50 R - B 50 L - HV for headlamps designed for right-hand traffic,

50 L - B 50 R - HV for headlamps designed for left-hand traffic.

Driving beam:

Point of $E_{\max}$

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in paragraph 2 of this annex.

A 10 per cent discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty headlamp

After being tested as specified in subparagraph 1.1 above, the headlamp shall be operated for one hour as described in subparagraph 1.1.1, after being prepared as prescribed in subparagraph 1.2.1, and checked as prescribed in subparagraph 1.1.2.

1.2.1. Preparation of the headlamp

1.2.1.1. Test mixture

1.2.1.1.1. For headlamp with the outside lens in glass:

The mixture of water and a polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

1 part by weight of vegetal carbon dust (beechwood) with a particle size of 0-100 μm ,

0,2 parts by weight of NaCMC ⁽³⁾, and

an appropriate quantity of distilled water, with a conductivity of $\leq 1 \text{ mS/m}$.

The mixture must not be more than 14 days old.

1.2.1.1.2. For headlamp with outside lens in plastic material:

The mixture of water and polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

⁽³⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 cP for a 2 per cent solution at 20° C.

1 part by weight of vegetal carbon dust (beechwood) with - particle size of 0-100 µm,

0,2 part by weight of NaCMC ⁽⁴⁾

13 parts by weight of distilled water with a conductivity of ≤ 1 mS/m, and

2 ± 1 parts by weight of surface-actant ⁽⁵⁾

The mixture must not be more than 14 days old.

1.2.1.2. Application of the test mixture to the headlamp

The test mixture shall be uniformly applied to the entire light emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illuminating value has dropped to 15-20 per cent of the values measured for each following point under the conditions described in paragraph 1 above:

Emax in driving beam for a driving/passing lamp,

Emax in driving beam for a driving lamp only,

50 R and 50 V ⁽⁶⁾ for a passing lamp only, designed for right-hand traffic,

50 L and 50 V ⁽⁶⁾ for a passing lamp only, designed for left-hand traffic.

1.2.1.3. Measuring equipment

The measuring equipment shall be equivalent to that used during headlamp approval tests. A standard (reference) filament lamp shall be used for the photometric verification.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp.

The headlamp tested in accordance with paragraph 1 shall be subjected to the test described in paragraph 2.1 without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of 23 °C ± 5 °C.

Using a mass production filament lamp which has been aged for at least one hour the headlamp shall be operated on passing beam without being dismounted from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph 1.1.1.2) The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B 50 R for left-hand traffic or B 50 L for right-hand traffic) shall be verified 3 minutes (r_3) and 60 minutes (r_{60}) respectively after operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

⁽⁴⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 cP for a 2 per cent solution at 20° C.

⁽⁵⁾ The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

⁽⁶⁾ 50 V is situated 375 mm below HV on the vertical line v-v on the screen at 25 m distance.

2.2. Test results

2.2.1. The result expressed in milliradians (mrad) shall be considered as acceptable when the absolute value $\Delta r_I = |r_3 - r_{60}|$ recorded on the headlamp is not more than 1,0 mrad ($\Delta r_I \leq 1,0$ mrad).

2.2.2. However, if this value is more than 1,0 mrad but not more than 1,5 mrad ($1,0 \text{ mrad} < \Delta r_I \leq 1,5 \text{ mrad}$) a second headlamp shall be tested as described in paragraph 2.1 after being subjected three consecutive times to the cycle as described below, in order to stabilise the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing lamp for one hour (the voltage shall be adjusted as specified in paragraph 1.1.1.2).

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values Δr_I measured on the first sample and Δr_{II} measured on the second sample is not more than 1,0 mrad.

$$\Delta \Delta \quad \left(\frac{\Delta r_I + \Delta r_{II}}{2} \leq 1,0 \text{ mrad} \right)$$

ANNEX 6

REQUIREMENTS FOR LAMPS INCORPORATING LENSES OF PLASTIC MATERIAL — TESTING OF LENS OR MATERIAL SAMPLES AND OF COMPLETE LAMPS**1. GENERAL SPECIFICATIONS**

- 1.1. The samples supplied pursuant to paragraph 2.2.4 of this Regulation shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.
- 1.2. The two samples of complete lamps supplied pursuant to paragraph 2.2.3 of this Regulation and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6 below.
- 1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in appendix 1 to this annex.
- 1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1-2.5 below, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in appendix 1, table B, shall be mandatory.

2. TESTS**2.1. Resistance to temperature changes****2.1.1. Tests**

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and 85 - 95 per cent RH;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60 - 75 per cent RH;

15 hours at $-30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60 - 75 per cent RH;

3 hours at $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60 - 75 per cent RH;

Before this test, the samples shall be kept at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH for at least four hours.

Note: The periods of one hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements**2.1.2.1. Method**

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam of a passing lamp or a passing/driving lamp (B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

E_{max} route for the driving beam of a driving lamp or a passing/driving lamp;

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10 per cent including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5 500 K and 6 000 K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2 500 nm. The samples shall be exposed to an energetic illumination of $1\,200\text{ W/m}^2 \pm 200\text{ W/m}^2$ for a period such that the luminous energy that they receive is equal to $4\,500\text{ MJ/m}^2 \pm 200\text{ MJ/m}^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50\text{ °C} \pm 5\text{ °C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min.

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of $23\text{ °C} \pm 5\text{ °C}$, in accordance with the following cycle:

spraying: 5 minutes;

drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1 above and the measurement described in paragraph 2.2.3.1 below have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2 with the mixture defined in paragraph 2.2.2.1 below.

2.2.2.1. Test mixture

The test mixture shall be composed of 61,5 per cent n-heptane, 12,5 per cent toluene, 7,5 per cent ethyl tetra-chloride, 12,5 per cent trichlorethylene and 6 per cent xylene (volume per cent).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1 above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm², corresponding to an effort of 100 N applied on a test surface of 14 × 14 mm.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3 (Resistance to detergents) at $23\text{ °C} \pm 5\text{ °C}$.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0,2 per cent impurities at $23\text{ °C} \pm 5\text{ °C}$ and then wiped off with a soft cloth.

2.2.3. Results

2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission

$\Delta t = \frac{T_2 - T_1}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,020 ($\Delta t_m \leq 0,020$).

- 2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation

$\Delta d = \frac{T_5 - T_4}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,020

($\Delta dm \leq 0,020$).

- 2.3. Resistance to detergents and hydrocarbons

- 2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to $50\text{ °C} \pm 5\text{ °C}$ and then immersed for five minutes in a mixture maintained at $23\text{ °C} \pm 5\text{ °C}$ and composed of 99 parts distilled water containing not more than 0,02 per cent impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at $50\text{ °C} \pm 5\text{ °C}$. The surface of the samples shall be cleaned with a moist cloth.

- 2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70 per cent n-heptane and 30 per cent toluene (volume per cent), and shall then be dried in the open air.

- 2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission

$\Delta t = \frac{T_2 - T_3}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0,010 ($\Delta tm \leq 0,010$).

- 2.4. Resistance to mechanical deterioration

- 2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in appendix 3 to this annex.

- 2.4.2. Results

After this test, the variations:

in transmission: $\Delta t = \frac{T_2 - T_3}{T_2}$

and in diffusion: $\Delta d = \frac{T_5 - T_4}{T_2}$

shall be measured according to the procedure described in appendix 2 in the area specified in paragraph 2.2.4 above. The mean value of the three samples shall be such that: $\Delta tm \leq 0,100$; $\Delta dm \leq 0,050$.

2.5. Test of adherence of coatings, if any

2.5.1. Preparation of the sample

A surface of 20 mm × 20 mm in area of the coating of a lens shall be cut with a razor blade or a needle into a grid of squares approximately 2 mm × 2 mm. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force of adhesion of 2 N/(cm of width) ± 20 per cent measured under the standardised conditions specified in appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1,5 m/s ± 0,2 m/s.

2.5.3. Results

There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15 per cent of the gridded surface.

2.6. Tests of the complete headlamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No 1 shall be subjected to the test described in paragraph 2.4.1 above.

2.6.1.2. Results

After the test, the results of photometric measurements carried out on the headlamp in accordance with this Regulation shall not exceed by more than 30 per cent the maximum values prescribed at points B 50 L and HV and not be more than 10 per cent below the minimum values prescribed at point 75 R (in the case of headlamps intended for left-hand traffic, the points to be considered are B 50 R, HV and 75 L).

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No 2 shall be subjected to the test described in paragraph 2.5 above.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognised as complying with this Regulation if:

3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paragraphs 2.2.2, 2.3.1 and 2.3.2);

3.1.2. After the test described in paragraph 2.6.1.1, the photometric values at the points of measurement considered in paragraph 2.6.1.2 are within the limits prescribed for conformity of production by this Regulation.

3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

APPENDIX 1

CHRONOLOGICAL ORDER OF APPROVAL TESTS

Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.4 of this Regulation).

Table A

Samples Tests		Lenses or samples of material						Lenses						
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.1.	Limited photometry (para. 2.1.2)										x	x	x	
1.1.1.	Temperature change (para. 2.1.1)										x	x	x	
1.1.2.	Limited photometry (para. 2.1.2)										x	x	x	
1.2.1.	Transmission measurement	x	x	x	x	x	x	x	x	x				
1.2.2.	Diffusion measurement	x	x	x				x	x	x				
1.3.	Atmospheric agents (para. 2.2.1)	x	x	x										
1.3.1.	Transmission measurement	x	x	x										
1.4.	Chemical agents (para. 2.2.2)	x	x	x										
1.4.1.	Diffusion measurement	x	x	x										
1.5.	Detergents (para. 2.2.1)				x	x	x							
1.6.	Hydrocarbons (para. 2.3.2)				x	x	x							
1.6.1.	Transmission measurement				x	x	x							
1.7.	Deterioration (para. 2.4.1)							x	x	x				
1.7.1.	Transmission measurement							x	x	x				
1.7.2.	Diffusion measurement							x	x	x				
1.8.	Adherence (para. 2.5)													x

Tests on complete lamps (supplied pursuant to paragraph 2.2.3 of this Regulation).

Table B

	Complete headlamp	
	Sample No	
	1	2
2.1. Deterioration (para. 2.6.1.1)	x	
2.2. Photometry (para. 2.6.1.2)	x	
2.3. Adherence (para. 2.6.2)		x

APPENDIX 2

Method of measurement of the diffusion and transmission of light

1. EQUIPMENT (see figure)

The beam of a collimator K with a half divergence $\frac{\beta}{2} = 17,4 \times 10^{-4}$ rd

is limited by a diaphragm DT with an opening of 6 mm against which the sample stand is placed.

A convergent achromatic lens L2, corrected for spherical aberrations, links the diaphragm DT with the receiver R; the diameter of the lens L2 shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\beta/2 = 14^\circ$.

An annular diaphragm DD with angles $\alpha/2= 1^\circ$ and $\alpha \text{ max}/2 = 12^\circ$ is placed in an image focal plane of the lens L2.

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

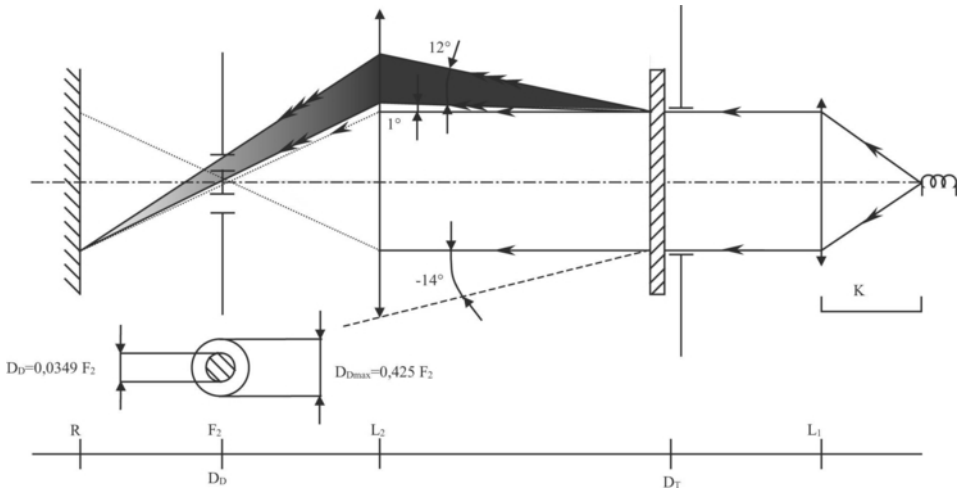
The distance L2 DT and the focal length F2 (¹⁾) of the lens L2 shall be so chosen that the image of DT completely covers the receiver R.

When the initial incident flux is referred to 1 000 units, the absolute precision of each reading shall be better than 1 unit.

2. MEASUREMENTS

The following readings shall be taken:

Reading	With sample	With central part of DD	Quantity represented
T1	no	no	Incident flux in initial reading
T2	yes (before test)	no	Flux transmitted by the new material in a field of 24° C
T3	yes (after test)	no	Flux transmitted by the tested material in a field of 24° C
T4	yes (before test)	yes	Flux diffused by the new material
T5	yes (after test)	yes	Flux diffused by the tested material



(¹) For L₂ it is recommended to use a focal distance of about 80 mm.

APPENDIX 3

SPRAY TESTING METHOD

1. TEST EQUIPMENT

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1,3 mm in diameter allowing a liquid flow rate of $0,24 \pm 0,02$ l/minute at an operating pressure of 6,0 bars - 0, + 0,5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm $\pm$ 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm $\pm$ 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohr scale, with a grain size between 0 and 0,2 mm and an almost normal distribution, with an angular factor of 1,8 to 2;

Water of hardness not exceeding 205 g/m³ for a mixture comprising 25 g of sand per litre of water.

2. TEST

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method described in appendix 2, is such that:

$$\Delta d = \frac{T_5 - T_4}{T_2} = 0,0250 \pm 0,0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

APPENDIX 4

ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows to determine under standard conditions the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

Measurement of the force necessary to unstick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at $23\text{ °C} \pm 5\text{ °C}$ and 65 ± 15 per cent relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see para. 3 above).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radically at a speed of approximately 300 mm/s, then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight length wise rubbing movement of the finger, without excessive pressure, in such a manner as to leave no air bubble between the tape and the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstick about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece.

Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to unstick at a speed of $300\text{ mm/s} \pm 30\text{ mm/s}$ and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newtons per centimetre of width of the tape.

ANNEX 7

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp;

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and Zone III the maximum deviation may be respectively:

B 50 L (or R):	0,2 lx equivalent 20 per cent
	0,3 lx equivalent 30 per cent
Zone III:	0,3 lx equivalent 20 per cent
	0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L(or R) ⁽¹⁾ (with a tolerance of 0,1 lx), 75 R (or L), 50 V, 25 R, 25 L, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 EmaX, a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3.2 of this Regulation. The reference mark is disregarded.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left.

1.2.4. If the results of the tests described above do not meet the requirements, tests on the headlamps shall be repeated using another standard filament lamp.

1.2.5. Headlamps with apparent defects are disregarded.

1.2.6. The reference mark is disregarded.

1.3. The chromaticity coordinates shall be complied with when the headlamp is equipped with a filament lamp set to Standard A colour temperature.

The photometric performance of a headlamp emitting selective yellow light when equipped with a colourless filament lamp shall be the values contained in this Regulation multiplied by 0,84.

2. FIRST SAMPLING

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

⁽¹⁾ Letters in brackets refer to headlamp intended for left-hand traffic.

- 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 headlamps shall not be contested if the deviation of the measured values of the headlamps in the unfavourable directions are:
 - 2.1.1.1. sample A
 - A1: one head lamp 0 per cent
one headlamp not more than 20 per cent
 - A2: both headlamps more than 0 per cent
but not more than 20 per cent
go to sample B
 - 2.1.1.2. sample B
 - B1: both headlamps 0 per cent
 - 2.1.2. or if the conditions of paragraph 1.2.2 for sample A are fulfilled.
- 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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:
 - 2.2.1.1. sample A
 - A3: one headlamp not more than 20 per cent
one headlamp 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 headlamp more than 0 per cent
but not more than 20 per cent
one headlamp not more than 20 per cent
 - B3: in the case of A2
one head lamp 0 per cent
one headlamp more than 20 per cent
but not more than 30 per cent
 - 2.2.2. or if the conditions of paragraph 1.2.2. for sample A are not fulfilled.
- 2.3. Approval withdrawn

Conformity shall be contested and paragraph 13 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the headlamps are:

 - 2.3.1. sample A
 - A4: one headlamp not more than 20 per cent
one headlamp more than 30 per cent
 - A5: both headlamps more than 20 per cent

2.3.2. sample B

- B4: in the case of A2
one headlamp more than 0 per cent
but not more than 20 per cent
one headlamp more than 20 per cent
- B5: in the case of A2
both headlamps more than more than 20 per cent
- B6: in the case of A2
one headlamp 0 per cent
one headlamp more than 30 per cent

2.3.3. or if the conditions of paragraph 1.2.2 for samples A and B are not fulfilled.

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two headlamps and fourth sample D of two headlamps, 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 headlamps shall not be contested if the deviations of the measured values of the headlamps are:

3.1.1.1. sample C

- C1: one head lamp 0 per cent
one headlamp not more than 20 per cent
- C2: both headlamps more than 0 per cent
but not more than 20 per cent
go to sample D

3.1.1.2. sample D

- D1: in the case of C2
both headlamps 0 per cent

3.1.2. or if the conditions of paragraph 1.2.2 for sample C are fulfilled.

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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:

3.2.1.1. sample D

- D2: in the case of C2
one headlamp more than 0 per cent
but not more than 20 per cent
one headlamp not more than 20 per cent

3.2.1.2. or if the conditions of paragraph 1.2.2 for sample C are not fulfilled:

3.3. Approval withdrawn

Conformity shall be contested and paragraph 13 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the headlamps are:

3.3.1. sample C

C3: one headlamp not more than 20 per cent

one headlamp more than 20 per cent

C4: both headlamps more than 20 per cent

3.3.2. sample D

D3: in the case of C2

one headlamp 0 or more than 0 per cent

one headlamp more than 20 per cent

3.3.3. or if the conditions of paragraph 1.2.2 for samples C and D are not fulfilled.

4. CHANGE OF THE VERTICAL POSITION OF THE CUT-OFF LINE

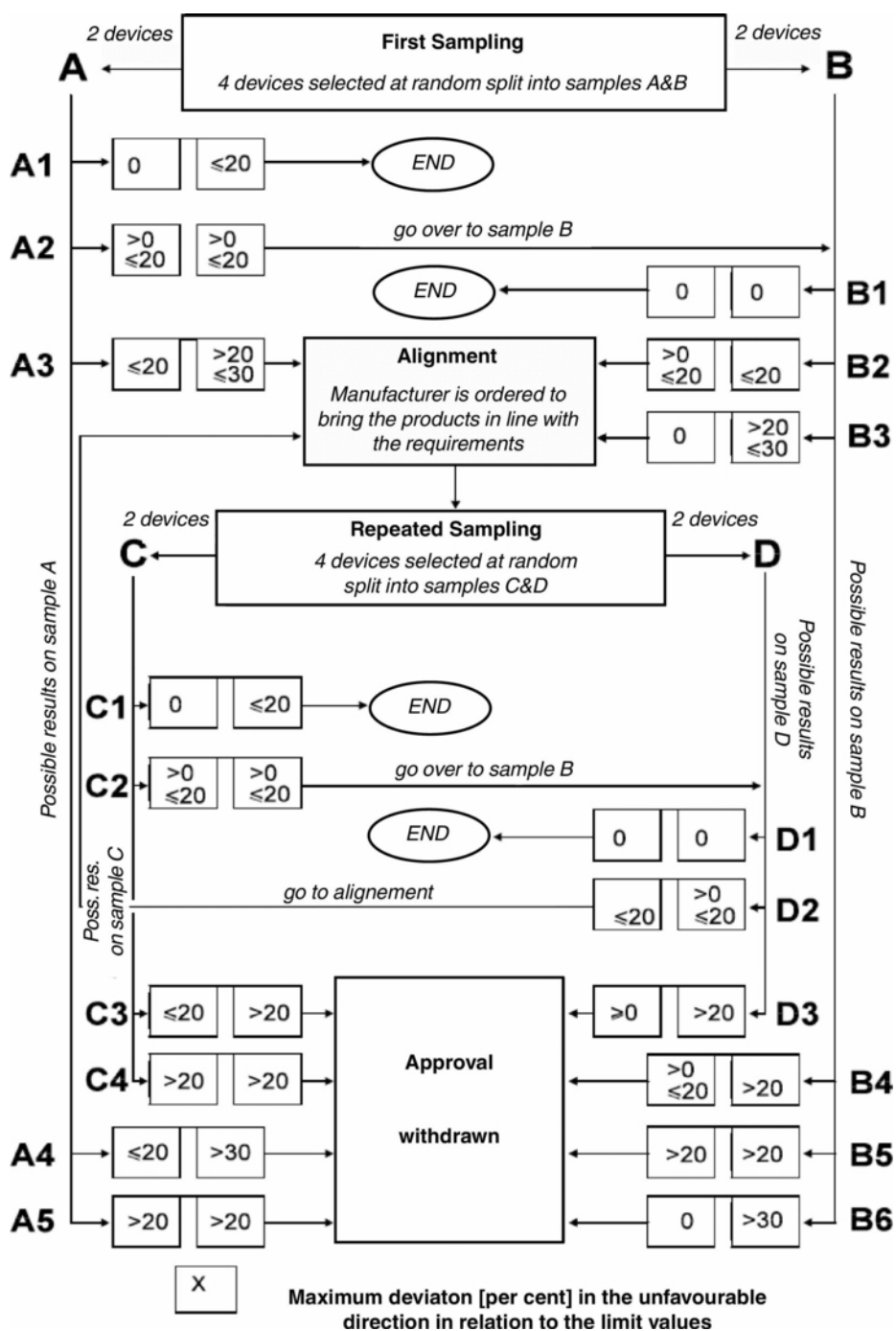
With respect to the verification of the change in vertical positions of the cut-off line under the influence of heat, the following procedure shall be applied:

One of the headlamps of sample A after sampling procedure in Figure 1 of this annex shall be tested according to the procedure described in paragraph 2.1 of annex 5 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of annex 5.

The headlamp shall be considered as acceptable if Δr does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, the second headlamp of sample A shall be subjected to the test after which the mean of the absolute values recorded in both samples shall not exceed 1,5 mrad. However, if this value of 1,5 mrad on sample A is not complied with, the two headlamps of sample B shall be subjected to the same procedure and the value of Δr for each of them shall not exceed 1,5 mrad.

Figure 1



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/wp29docstts.html>

Regulation No 19 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of power-driven vehicle front fog lamps

Incorporating all valid text up to:

Supplement 2 to the 03 series of amendments — Date of entry into force: 19 August 2010

CONTENTS

REGULATION

Introduction

0. Scope
1. Definitions
2. Application for approval
3. Markings
4. Approval
5. General specifications
6. Illumination
7. Colour
8. Determination of discomfort (dazzle)
9. Modifications of the type of front fog lamp and extension of approval
10. Conformity of production
11. Penalties for non-conformity of production
12. Production definitely discontinued
13. Names and addresses of Technical Services responsible for conducting approval tests, and of Administrative Departments
14. Transitional provisions

ANNEXES

- | | |
|------------|---|
| Annex 1 — | Communication form |
| Annex 2 — | Tolerance requirements for conformity of production control procedure |
| Annex 3 — | Examples of arrangements of approval marks for front fog lamps of class B and class F3 |
| Annex 4 — | Measuring screen geometry and measuring grid |
| Annex 5 — | Tests for stability of photometric performance of front fog lamps in operation |
| Annex 6 — | Requirements for front fog lamps incorporating lenses of plastic material |
| Annex 7 — | Minimum requirements for conformity of production control procedure |
| Annex 8 — | Minimum requirements for sampling by an inspector |
| Annex 9 — | Definition and sharpness of the cut-off line for front fog lamps and aiming procedure by means of this cut-off line |
| Annex 10 — | Overview of operational periods concerning tests for the stability of photometric performance |
| Annex 11 — | Centre of reference |
| Annex 12 — | Requirements in case of use of LED module(s) or of light-generators |

INTRODUCTION

This Regulation ⁽¹⁾ applies to front fog lamps, which may incorporate lenses of glass or plastic material. It incorporates two distinct classes.

The original front fog lamp, class 'B' since inception, has been updated to incorporate the angular coordinate system with an amendment to the values in the relevant photometric table. With this class, only light sources as specified in Regulation No 37 are allowed.

The class 'F3' is designed to increase photometric performance. In particular the beam width and the minimum luminous intensities below the H-H line (paragraph 6.4.3) have been increased whilst controls on the maximum intensity in the foreground are introduced. Above the H-H line, the intensity of the veiling light is reduced to improve visibility. Additionally this class may provide adaptive beam patterns where the performance is varied according to the visibility conditions.

The introduction of the class 'F3' provides for requirements that are amended to be similar to those of a headlamp as follows:

- (a) The photometric values are specified as luminous intensities using the angular coordinate system.
- (b) Light sources can be selected according to the provisions of Regulation No 37 (Incandescent filament light sources) and Regulation No 99 (gas discharge light sources). Light emitting diode (LED) modules and distributed lighting systems may also be used.
- (c) The cut-off and the gradient definitions.
- (d) The photometric requirements permit the use of asymmetrical beam distributions.

0. SCOPE

This Regulation applies to front fog lamps for vehicles of categories L3, L4, L5, L7, M, N, and T ⁽²⁾.

1. DEFINITIONS

For the purpose of this Regulation,

- 1.1. The definitions given in Regulation No 48 and its series of amendments in force at the time of application for type approval shall apply to this Regulation.
- 1.2. 'Lens' means the outermost component of the front fog lamp (unit), which transmits light through the illuminating surface;
- 1.3. 'Coating' means any product or products applied in one or more layers to the outer face of a lens;
- 1.4. 'Front fog lamps of different types' are front fog lamps that differ in such essential respects as:
 - 1.4.1. the trade name or mark;
 - 1.4.2. different 'Classes' (B or F3) identified by particular photometric provisions;
 - 1.4.3. the characteristics of the optical system; (basic optical design, type/category of light source, LED module, DLS etc.),
 - 1.4.4. the inclusion of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation and the variable intensity control, if any;

⁽¹⁾ Nothing in this Regulation shall prevent a Party to the Agreement applying this Regulation from prohibiting the combination of a front fog lamp incorporating a plastic lens, approved under this Regulation, with a mechanical headlamp-cleaning device (with wipers).

⁽²⁾ 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).

- 1.4.5. the category of filament lamp(s) used, as listed in Regulation No 37, Regulation No 99 and/or the LED module or light generator specific identification code(s) (if applicable).
- 1.4.6. the materials constituting the lenses and coating, if any.
- 1.4.7. However, a device intended for the installation on the left side of the vehicle and the corresponding device intended for the installation of the right side of the vehicle shall be considered to be of the same type.
- 1.5. 'Colour of the light emitted from the device.' The definitions of the colour of the light emitted, given in Regulation No 48 and its series of amendments in force at the time of application for type approval, shall apply to this Regulation.
- 1.6. References made in this Regulation to standard (étalon) light sources and to Regulations No 37 and No 99 shall refer to Regulations No 37 and No 99 and their series of amendments in force at the time of application for type approval.
- 2. APPLICATION FOR APPROVAL
 - 2.1. The application for approval shall be submitted by the holder of the trade name or mark or by his duly accredited representative.
 - 2.2. The application relating to each type of front fog lamp shall be accompanied by:
 - 2.2.1. drawings in triplicate in sufficient detail to permit identification of the type and representing a frontal view of the front fog lamp, with the relevant details of the optical components if any, and the cross-section; the drawings shall indicate the space reserved for the approval mark.
 - 2.2.1.1. if the front fog lamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the front fog lamp in relation to the ground and the longitudinal median plane of the vehicle, if the front fog lamp is for use in that (those) position(s) only;
 - 2.2.2. for the test of plastic material of which the lenses are made:
 - 2.2.2.1. thirteen lenses;
 - 2.2.2.1.1. six of these lenses may be replaced by six samples of material at least 60 × 80 mm size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 × 15 mm);
 - 2.2.2.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;
 - 2.2.2.1.3. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.
 - 2.2.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.
 - 2.3. In case of Class B front fog lamps:
 - 2.3.1. a brief technical specification including the category of filament lamp used as listed in Regulation No 37 and its series of amendments in force at the time of application for type approval, even if the filament lamp cannot be replaced;
 - 2.3.2. Two samples of each type of front fog lamp, one sample intended for the installation on the left side of the vehicle and one sample intended for the installation of the right side of the vehicle.
 - 2.4. In case of Class F3 front fog lamps:
 - 2.4.1. a brief technical specification including the category of the light source(s) used; this (these) light source category(ies) shall be listed in regulation no 37 or regulation no. 99 and their series of amendments in force at the time of application for type approval, even if the light source cannot be replaced;

- 2.4.2. in the case of LED module(s) or a light generator, the specific identification code of the module shall be stated. The drawing shall contain sufficient details to identify it and the position intended for the specific identification code and the trademark of the applicant.
- 2.4.3. the make and types of the ballast(s) and/or the light source control gear, where applicable, shall be specified:
 - 2.4.3.1. in the case of an adaptive front fog lamp, a concise description of the variable intensity control.
 - 2.4.3.2. in case of the use of a light source control gear not being part of the device, the voltage(s) with tolerances or the total voltage range at the terminals to that light source control gear.
- 2.4.4. If the front fog lamp is fitted with LED module(s) or a distributed lighting system, a brief technical specification shall be provided. This information shall include the part number assigned by the light source manufacturer, a drawing with dimensions and the basic electrical and photometric values, an indication whether the light source complies with the UV-radiation requirements of paragraph 4.6 of Annex 12 of this Regulation, an official test report related to paragraph 5.9 of this Regulation and the objective luminous flux.
- 2.4.5. In the case, that a distributed lighting system is used, which part(s) is (are) to be intended to provide the front fog beam by this system. In addition, a brief technical specification including the list of the light-guide(s) and related optical components and information describing the light-generator(s) sufficient to permit identification. This information shall include the part number assigned by the light-generator manufacturer, a drawing with dimensions and the basic electrical and photometric values and an official test report related to paragraph 5.9 of this Regulation.
- 2.4.6. In the case where a gas discharge light source is used:
 - 2.4.6.1. One ballast, which may be totally or partly integrated in the front fog lamp.
 - 2.4.6.2. For approval of a distributed lighting system using a non-replaceable gas-discharge light source not approved under Regulation No 99, two samples of the system including the light-generator and one ballast of each type to be used, where applicable.
- 2.4.7. In the case of LED module(s) or a distributed lighting system and if no provisions are taken to shield the relevant front fog lamp or distributed lighting system components made of plastic material from UV-radiation of (gas-discharge) light sources, e.g. by UV-retaining glass filters:

One sample of each of the relevant materials. This shall have similar geometry to that of the front fog lamp or distributed lighting system being tested. Each material sample shall have the same appearance and surface treatment, if any, as intended for use in the front fog lamp to be approved.
- 2.4.8. In the case of an approval of a front fog lamp according to paragraph 2.4.8 and/or according to paragraph 5.9 containing plastic lenses and/or having inner optical parts made from plastic, which have already been tested:

The materials making up the lenses, coatings or optical inner parts, if any, shall be accompanied by the test report(s) on material testing against UV-radiation.
- 2.4.9. Two samples of each type of front fog lamp, one sample intended for the installation on the left side of the vehicle and one sample intended for the installation on the right side of the vehicle; or a matched pair of front fog lamps.
- 2.4.10. One light source control gear, if applicable.
- 2.4.11. One variable intensity control or a generator providing the same signals, if applicable.

- 2.5. The Competent Authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.
3. MARKINGS
- 3.1. The samples of a type of front fog lamp or distributed lighting system which are submitted for approval shall clearly, legibly and indelibly bear:
- (a) the trade name or mark of the applicant,
 - (b) marking indicating the class of the front fog lamp,
- and in case of Class F3 front fog lamps:
- (a) the LED module or light generator specific identification code, if any.
- 3.2. They shall comprise, on the lens and on the main body ⁽³⁾, spaces of sufficient size for the approval mark and the additional symbols referred to in paragraph 3; these spaces shall be indicated on the drawings referred to in paragraph 2.2.1.
- 3.3. The approval marking shall be placed on an inner or outer part (transparent or not) of the device which can not be separated from the transparent part of the device emitting light; in the case of a distributed lighting system with outer lens built in the light-guide, this condition is deemed satisfied if the approval marking is placed at least on the light-generator and on the light-guide or on its protective shield. In any case the marking shall be visible when the device is fitted on the vehicle, at least when a movable part such as the hood or boot lid or a door is opened.
- 3.4. In case of Class F3 front fog lamps:
- 3.4.1. In case of a distributed lighting system, the light-generator(s) shall bear the marking of the rated voltage and wattage and in the case that the electronic control gear is not part of the device the light-generator(s) shall bear the trade name or mark of its manufacturer and the part number.
 - 3.4.2. In case of lamps with LED module(s) the lamp shall bear the marking of the rated voltage, rated wattage and the light source module specific identification code.
- 3.5. The LED module(s) submitted along with the application for approval of the lamp:
- 3.5.1. shall bear the trade name or mark of the applicant; this marking must be clearly legible and indelible;
 - 3.5.2. shall bear the specific identification code of the module; this marking must be clearly legible and indelible.
- The specific identification code shall comprise the starting letters 'MD' for 'Module' followed by the approval marking without the circle as prescribed in paragraph 4.2.1; this specific identification code shall be shown in the drawings mentioned in paragraph 2.2.1 and in the case where several non identical LED modules are used, followed by additional symbols or characters. The approval marking does not have to be the same as the one on the lamp in which the module is used, but both markings shall be from the same applicant.
- 3.6. If a light source control gear is used, which is not part of the LED module it shall be marked with its specific identification code(s), the rated input voltage and wattage.
4. APPROVAL
- 4.1. General
- 4.1.1. If all the samples of a type of front fog lamp submitted in pursuance of paragraph 2 satisfy the provisions of this Regulation, approval shall be granted.

⁽³⁾ If the lens cannot be detached from the main body of the front fog lamp, a space on the lens or body shall be sufficient.

- 4.1.2. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be applied provided that each of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it.
- 4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 03) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of front fog lamp covered by this Regulation except in the case of an extension of the approval to a device differing only in the colour of the light emitted.
- 4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of front fog lamp pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation by means of a form conforming to the model in Annex 1 to this Regulation, with the indications according to paragraph 2.2 of this Regulation.
- 4.1.5. In addition to the mark prescribed in paragraph 3.1 an approval mark as described in paragraphs 4.2 and 4.3 shall be affixed in the spaces referred to in paragraph 3.2 to every fog lamp conforming to a type approved under this Regulation.
- 4.2. Composition of the approval mark
- The approval mark shall consist of:
- 4.2.1. an international approval marking, comprising of:
- 4.2.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽⁴⁾ and;
- 4.2.1.2. the approval number prescribed in paragraph 4.1.3.
- 4.2.2. the following additional symbol (or symbols):
- 4.2.2.1. on front fog lamps meeting the requirements of this Regulation, in the case of:
- (a) Class B; the letter 'B'
- (b) Class F3; the symbol 'F3'
- 4.2.2.2. on front fog lamps incorporating a lens of plastic material the group of letters 'PL' to be affixed near the symbols prescribed in paragraph 4.2.2.1;
- 4.2.2.3. In every case the relevant operating mode used during the test procedure according to paragraph 1.1.1 of Annex 5 and the permitted voltages according to paragraph 1.1.2 of Annex 5 shall be stipulated on the approval forms and on the communication forms transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation.

In the corresponding cases the device shall be marked as follows:

⁽⁴⁾ 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.

- 4.2.2.3.1. on units meeting the requirements of this Regulation which are so designed that the filament(s) of one function shall not be lit simultaneously with that of any function with which it may be reciprocally incorporated, an oblique stroke (/) shall be placed behind the symbol in the approval mark of such function.
- 4.2.2.3.2. However, if only the front fog lamp and the passing lamp shall not be lit simultaneously, the oblique stroke shall be placed behind the fog lamp symbol, this symbol being placed either separately or at the end of a combination of symbols.
- 4.2.2.3.3. On units meeting the requirements of Annex 5 to this Regulation only when supplied with a voltage of 6 V or 12 V, a symbol consisting of the number 24 crossed out by an oblique cross (×) shall be placed near the filament lamp holder.
- 4.2.2.4. The reciprocal lamp incorporation of passing beam lamp and front fog lamp is possible if it is in compliance with Regulation No 48;
- 4.2.2.5. Front fog lamps of Class F3 having asymmetric light distribution and which must not be indiscriminately mounted on either side of the vehicle, shall bear an arrow pointing to the outside of the vehicle.
- 4.2.2.6. The two digits of the approval number (at present 03) which indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval may be marked close to the above additional symbols;
- 4.2.2.7. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 shall be clearly legible and be indelible even when the front fog lamp is fitted in the vehicle.
- 4.3. Arrangement of the approval mark
 - 4.3.1. Independent lamps

Annex 3, to this Regulation gives examples of arrangements of the approval mark with the above-mentioned additional symbols.
 - 4.3.2. Grouped, combined or reciprocally incorporated lamps
 - 4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be provided, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:
 - 4.3.2.1.1. it is visible after their installation;
 - 4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.
 - 4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:
 - 4.3.2.2.1. either on the appropriate light-emitting surface;
 - 4.3.2.2.2. or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified.
 - 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.
 - 4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.

4.3.2.5. Annex 3, Figure 3, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.

4.3.3. In the case of lamps, the lens of which are used for different types of front fog lamps and which may be reciprocally incorporated or grouped with other lamps, the provisions in paragraph 4.3.2 are applicable.

4.3.3.1. In addition, where the same lens is used for different types of lamps, it may bear the different approval marks relating to the different types of front fog lamps or units of lamps, provided that the main body of the front fog lamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.2 and bears the approval marks of the actual functions.

If different types of front fog lamps comprise the same main body, the latter may bear the different approval marks.

4.3.3.2. Annex 3, Figure 4, to this Regulation gives examples of arrangements of approval marks relating to the above case.

5. GENERAL SPECIFICATIONS

5.1. Each sample of front fog lamp submitted in conformity with paragraph 2.2 shall meet the specifications set forth in paragraphs 6 and 7 of this Regulation.

5.2. The front fog lamps shall be so designed and constructed that in normal use, despite the vibrations to which they may then be subjected, their satisfactory operation continues to be ensured and they retain the characteristics prescribed by this Regulation. The correct position of the lens shall be clearly marked and the lens and reflector shall be so secured as to prevent any rotation during use. Conformity with the requirements of this paragraph shall be verified by visual inspection and, where necessary, by a trial fitting.

5.2.1. Front fog lamps shall be fitted with a device enabling them to be so adjusted on the vehicles as to comply with the rules applicable to them. Such a device need not be fitted on units in which the reflector and the lens cannot be separated, provided the use of such units is confined to vehicles on which the front fog lamp setting can be adjusted by other means. Where a front fog lamp and another front lamp, each equipped with its own light source, are assembled to form a composite unit, the adjusting device shall enable each optical system to be individually adjusted.

5.2.2. These provisions shall not apply to front lamp assemblies whose reflectors are indivisible. For this type of assembly the requirements of paragraph 6.3.4 or 6.4.3 (as appropriate) shall apply.

5.3. Complementary tests shall be carried out according to the requirements of Annex 5 to ensure that in use there is no excessive change in photometric performance.

5.4. If the lens of the front fog lamp is of plastic material, tests shall be carried out according to the requirements of Annex 6.

5.5. In the case of the use of replaceable light sources:

(a) the light source's holder shall conform to the characteristics given in IEC Publication No 60061. The holder data sheet relevant to the category of light sources used applies;

(b) the light source shall fit easily into the front fog lamp;

(c) the design of the device shall be such that the light source(s) can be fixed in no other position but the correct one.

5.6. In the case of Class B, the front fog lamp shall be equipped with one filament lamp approved according to Regulation No 37 even if the filament lamp cannot be replaced. Any Regulation No 37 filament lamp may be used, provided that no restriction on the use is made in Regulation No 37 and its series of amendments in force at the time of application for type approval.

- 5.6.1. Even if this filament lamp cannot be replaced it shall comply with the requirements in paragraph 5.6.
- 5.7. In the case of Class F3, the light sources shall be:
- 5.7.1. one or more replaceable light sources approved according to Regulation No 37 or Regulation No 99 and their associated series of amendments in force at the time of application for type approval.
- 5.7.2. and/or, one or more LED modules where the requirements of Annex 12 to this Regulation shall apply. The compliance with the requirements shall be tested.
- 5.7.3. and/or light generators where the requirements of Annex 12 to this Regulation shall apply. The compliance with the requirements shall be tested.
- 5.8. Even if these light sources cannot be replaced they shall comply with the requirements in paragraph 5.7.
- 5.9. In the case of LED module or light generator it shall be checked, that:
- 5.9.1. the design of the LED module(s) or light generator(s) shall be such that they can be fitted in no position other than the correct one.
- 5.9.2. non-identical light source modules, if any, shall be non-interchangeable within the same lamp housing.
- 5.9.3. the LED module(s) or light generator(s) shall be tamperproof.
- 5.10. In case of front fog lamps with light source(s) having a total objective luminous flux that exceeds 2 000 lumen, a reference shall be made in paragraph 10 of the communication form in Annex 1.
- 5.11. If the lens of the front fog lamp is made of plastic material tests shall be done according to the requirements in Annex 6.
- 5.11.1. The UV resistance of light transmitting components located inside the front fog lamp and made of plastic material shall be tested according to Annex 6, paragraph 2.7.
- 5.11.2. The test in paragraph 5.11.1 is not necessary if low-UV type light sources as specified in Regulation No 99 or in Annex 12 of this Regulation are used, or if provisions are taken, to shield the relevant lamp components from UV radiation, e.g. by glass filters.
- 5.12. The front fog lamp and its ballast system or light source control gear shall not generate radiated or power line disturbances, which cause a malfunction of other electric/electronic systems of the vehicle ⁽⁵⁾.
- 5.13. Front fog lamps, designed to operate permanently with an additional system to control the intensity of the light emitted, or which are reciprocally incorporated with another function, using a common light source, and designed to operate permanently with an additional system to control the intensity of the light emitted, are permitted.
- 5.14. In the case of Class F3 the sharpness and linearity of the cut-off shall be tested according to the requirements of Annex 9.
6. ILLUMINATION
- 6.1. Front fog lamps shall be so designed as to provide illumination with limited dazzle.
- 6.2. The luminous intensity produced by the front fog lamp shall be measured at 25 m distance by means of a photoelectric cell having a useful area comprised within a square of 65 mm side.

⁽⁵⁾ Compliance with the requirements for electromagnetic compatibility is relevant to the vehicle type.

The point HV is the centre-point of the coordinate system with a vertical polar axis. Line h is the horizontal through HV (see Annex 4 to this Regulation).

- 6.3. In the case of Class B front fog lamps:
- 6.3.1. A colourless standard (etalon) filament lamp as specified in Regulation No 37, of the category specified by the manufacturer, which may be supplied by the manufacturer or applicant, shall be used.
- 6.3.1.1. During the testing of the front fog lamp the power supply for this filament lamp shall be regulated so as to obtain the reference luminous flux as indicated in the relevant data sheet of Regulation No 37.
- 6.3.1.2. During the testing of a front fog lamp where the filament lamp cannot be replaced, the voltage at the terminals of the front fog lamp shall be regulated at 12,0 V.
- 6.3.2. The front fog lamp shall be deemed satisfactory if the photometric requirements are met with at least one standard filament lamp.
- 6.3.3. The aiming screen for visual adjustment (see Annex 4 to this Regulation) shall be positioned at either a distance of 10 m or a distance of 25 m in front of the front fog lamp.
- 6.3.3.1. The beam shall produce on this aiming screen, over a width of not less than 5,0° on both sides of the line v, a symmetrical and substantially horizontal cut-off to enable visual vertical adjustment.
- 6.3.3.2. The front fog lamp shall be so adjusted that the cut-off on the aiming-screen is 1,15° below the line h.
- 6.3.4. When so adjusted, the front fog lamp shall meet the requirements in paragraph 6.3.5.
- 6.3.5. The illumination (see Annex 4, paragraph 2.1) shall meet the following requirements:

Designated lines or zones	Vertical position (°)	Horizontal position (°)	Luminous intensity	To comply
Line 1	15° U to 60°U	0°	100 cd max	All line
Zone A	0° to 1,75°U	5° L to 5°R	62 cd min	Whole zone
Zone B	0° to 3,5°U	26°L to 26°R	400 cd max	Whole zone
Zone C	3,5°U to 15°U	26°L to 26°R	250 cd max	Whole zone
Zone D	1,75°D to 3,5°D	12°L to 12°R	1 250 cd min 8 000 cd max	At least one point on each vertical line
Zone E	1,75°D to 3,5°D	12°L to 22°L and 12°R to 22°R	600 cd min 8 000 cd max	At least one point on each vertical line

(°) The co-ordinates are specified in degrees for an angular web with a vertical polar axis.

The illumination shall be measured in either white or selective yellow light as prescribed by the manufacturer for use of the front fog lamp in normal service.

Variations detrimental to satisfactory visibility in either of the Zones B and C are not permitted.

- 6.3.6. In the light-distribution as specified in the table in paragraph 6.3.5, single narrow spots or stripes inside the area above 15° with not more than 160 cd are allowed, if not extending beyond a conical angle of 2° aperture or a width of 1°. If multiple spots or stripes are present they shall be separated by a minimum angle of 10°.

6.4. In the case of Class F3 front fog lamps

6.4.1. Depending on the light source, the following conditions shall apply.

6.4.1.1. In the case of replaceable filament light sources:

- 6.4.1.1.1. The front fog lamp shall comply with the requirements of paragraph 6.4.3 of this Regulation with at least one complete set of appropriate standard (etalon) lamps, which may be supplied by the manufacturer or applicant.

In the case of filament lamps operating directly under vehicle voltage system conditions:

The front fog lamp shall be checked by means of colourless standard (etalon) filament lamps as specified in Regulation No 37.

During the testing of the front fog lamp, the power supply to the filament lamp(s) shall be regulated so as to obtain the reference luminous flux as indicated on the relevant data sheet of Regulation No 37.

- 6.4.1.1.2. In the case of a system that uses a light source control gear being part of the lamp, the voltage declared by the applicant shall be applied to the input terminals of that lamp. The measured photometric value shall be multiplied by a factor of 0,7 prior to checking for compliance.

- 6.4.1.1.3. In the case of a system that uses a light source control gear not being part of the lamp the voltage declared by the applicant shall be applied to the input terminals of that light source control gear. The test laboratory shall require from the applicant the special light source control gear needed to supply the light source and the applicable functions. The identification of that light source control gear if applicable and/or the voltage applied including the tolerances shall be noted in the communication form in Annex 1 of this Regulation. The measured photometric value shall be multiplied by a factor of 0,7 prior to checking for compliance.

6.4.1.2. In the case of a gas-discharge light source:

A standard light source shall be used as specified in Regulation No 99, which has been aged during at least 15 cycles, in accordance with Annex 4, paragraph 4. of Regulation No 99.

During testing of the front fog lamp the voltage at the terminals of the ballast shall be regulated to maintain 13,5 V for a 12 V system, or at the vehicle voltage as specified by the applicant, with a tolerance of $\pm 0,1$ V.

The measured luminous intensity values shall be multiplied by a factor of 0,7 prior to the check for compliance.

The objective luminous flux of the gas-discharge light source may differ from that specified in Regulation No 99. In this case, the luminous intensity values shall be corrected accordingly.

6.4.1.3. In the case of non-replaceable light sources:

All measurements on front fog lamps equipped with non-replaceable light sources shall be made at 6,3 V, 13,2 V or 28,0 V or at other vehicle voltage as specified by the applicant. The test laboratory may require from the applicant the special power supply needed to supply the light sources. The test voltages shall be applied to the input terminals of the lamp. The measured luminous intensity values shall be multiplied by a factor of 0,7 prior to checking for compliance.

6.4.1.4. In the case of LED modules:

All measurements on front fog lamps equipped with LED module(s) shall be made at 6,3 V, 13,2 V or 28,0 V respectively, if not otherwise specified within this Regulation. LED modules operated by an electronic light source control gear shall be measured as specified by the applicant.

The measured luminous intensity values shall be multiplied by a factor 0,7 prior to the check for compliance.

6.4.1.5. Compliance with the requirement in paragraph 5.9.1 shall be verified at least with respect to the values in line 3 and 4 of table in paragraph 6.4.3.

6.4.2. Photometric adjustment and measuring conditions:

6.4.2.1. The aiming screen for visual adjustment (see Annex 4 paragraph 2.2) shall be positioned at either a distance of 10 m or a distance of 25 m in front of the front fog lamp.

6.4.2.2. The beam shall produce on this aiming screen, over a width of not less than 5,0° on both sides of the line v, a symmetrical and substantially horizontal cut-off to enable visual vertical adjustment. In the case that visual aim leads to problems or ambiguous positions, the instrumental method as specified in paragraph 5 of Annex 9 shall be applied following a confirmation of the cut-off quality as described in paragraph 6.4.2.3.

6.4.2.3. The sharpness of the cut-off shall be tested according to the requirements in paragraph 4.1.2 of Annex 9. The value of G shall not be less than 0,08.

The linearity of the cut-off shall be tested according to the requirements in paragraph 4.1.3 of Annex 9 and the part of the cut-off line serving for vertical adjustment shall be horizontal from 3° left to 3° right of the v-v line. The linearity is considered to be satisfactory if the vertical positions of the inflection points determined according to the method described in paragraph 3.2 of Annex 9 at 3° left and right of the v-v line do not deviate by more than $\pm 0,20^\circ$.

6.4.2.4. The front fog lamp shall be adjusted so that the cut-off on the screen is 1° below the line h according to the requirements in paragraph 2 of Annex 9.

6.4.3. Photometric requirements

When so adjusted, the front fog lamp shall meet the photometric requirements in the table below (refer also to Annex 4, paragraph 2.2 of this Regulation):

Designated lines or zones	Vertical position (°) above h + below h –	Horizontal position (°) left of v: – right of v: +	Luminous intensity (in cd)	To comply
Point 1, 2 (**)	+ 60°	$\pm 45^\circ$	60 max	All points
Point 3, 4 (**)	+ 40°	$\pm 30^\circ$		
Point 5, 6 (**)	+ 30°	$\pm 60^\circ$		
Point 7, 10 (**)	+ 20°	$\pm 40^\circ$		
Point 8, 9 (**)	+ 20°	$\pm 15^\circ$		
Line 1 (**)	+ 8°	– 26° to + 26°	90 max	All line
Line 2 (**)	+ 4°	– 26° to + 26°	105 max	All line
Line 3	+ 2°	– 26° to + 26°	170 max	All line
Line 4	+ 1°	– 26° to + 26°	250 max	All line
Line 5	0°	– 10° to + 10°	340 max	All line
Line 6 (***)	– 2,5°	from 5° inwards to 10° outwards	2 000 min	All line
Line 7 (***)	– 6,0°	from 5° inwards to 10° outwards	< 50 per cent of max. on line 6	All line
Line 8L and R (****)	– 1,5° to – 3,5°	– 22° and + 22°	800 min	One or more points
Line 9L and R (****)	– 1,5° to – 4,5°	– 35° and + 35°	320 min	One or more points
Zone D	– 1,5° to – 3,5°	– 10° to + 10°	8 400 max	Whole zone

(°) The co-ordinates are specified in degrees for an angular web with a vertical polar axis.

(**) See paragraph 6.4.3.4.

(***) See paragraph 6.4.3.2.

- 6.4.3.1. The illumination shall be measured either with white light or coloured light as prescribed by the applicant for use of the fog lamp in normal service. Variations in homogeneity detrimental to satisfactory visibility in the zone above the line 5 from 10 degrees left to 10 degrees right are not permitted.
- 6.4.3.2. At the request of the applicant, two front fog lamps constituting a matched pair corresponding to paragraph 4.2.2.5 may be tested separately. In this case the specified requirements for lines 6, 7, 8, 9 and the Zone D in the table in paragraph 6.4.3 apply to half the sum of readings of the right-hand and left-hand side front fog lamp. However each of the two front fog lamps shall meet at least 50 per cent of the minimum value required for line 6.
- 6.4.3.3. Inside the field between lines 1 to 5 in Figure 3 of Annex 4, the beam pattern should be substantially uniform. Discontinuities in intensities detrimental to satisfactory visibility between the lines 6, 7, 8 and 9 are not permitted.
- 6.4.3.4. In the light-distribution as specified in the table in paragraph 6.4.3, single narrow spots or stripes inside the area including the measuring points 1 to 10 and line 1 or inside the area of line 1 and line 2 with not more than 120 cd are allowed, if not extending beyond a conical angle of 2° aperture or a width of 1°. If multiple spots or stripes are present they shall be separated by a minimum angle of 10°.
- 6.4.3.5. If the specified luminous intensity requirements are not met, a re-aim of the cut-off position within $\pm 0,5^\circ$ vertical and/or $\pm 2^\circ$ horizontal is allowed. In the re-aimed position all photometric requirements shall be met.
- 6.4.4. Other photometric requirements
- 6.4.4.1. In the case of front fog lamps equipped with gas-discharge light sources the luminous intensity shall exceed 800 cd in the measuring point at 0° horizontal and 2° D vertical, four seconds after activation of the fog lamp which has not been operated for 30 minutes or more.
- 6.4.4.2. To adapt to dense fog or similar conditions of reduced visibility, it is permitted to automatically vary the luminous intensities provided that:
- (a) an active electronic light source control gear is incorporated into the front fog lamp function system.
 - (b) all intensities are varied proportionately.
- The system, when checked for compliance according to the provisions of paragraph 6.4.1.1.2, is considered acceptable if the luminous intensities remain within 60 per cent and 100 per cent of the values specified in the table in paragraph 6.4.3.
- 6.4.4.2.1. An indication shall be inserted in the communication form (Annex 1, paragraph 10).
- 6.4.4.2.2. The Technical Service responsible for type approval shall verify that the system provides automatic modifications, such that good road illumination is achieved and no discomfort is caused to the driver or to other road users.
- 6.4.4.2.3. Photometric measurements shall be performed according to the applicant's description.

7. COLOUR

The colour of the light emitted by the front fog lamp shall be either white or selective yellow by choice of the applicant. The selective yellow colour, if any, of the beam may be obtained either by the colour of the light source or by the lens of the front foglamp or by any other suitable means.

- 7.1. The colorimetric characteristics of the front fog lamp shall be measured with voltages as defined in paragraphs 6.3 and 6.4.

8. DETERMINATION OF DISCOMFORT (DAZZLE)

The discomfort dazzle caused by the front fog lamp shall be determined ⁽⁶⁾.

9. MODIFICATIONS OF THE TYPE OF FRONT FOG LAMP AND EXTENSION OF APPROVAL

9.1. Every modification of the type of front fog lamp shall be notified to the administrative department which approved the type of front fog lamp. 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 front fog lamp still complies with the requirements;

or

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

9.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 to the Parties to the Agreement which apply this Regulation.

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

10. CONFORMITY OF PRODUCTION

10.1. Front fog lamps 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 of this Regulation and in Annex 7.

10.2. In order to verify that the requirements of paragraph 10.1 are met, suitable controls of the production shall be carried out.

10.3. The holder of the approval shall in particular:

10.3.1. ensure the existence of procedures for the effective control of the quality of products;

10.3.2. have access to the control equipment necessary for checking the conformity to each approved type;

10.3.3. ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the Administrative Service;

10.3.4. analyse the results of each type of test in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production;

10.3.5. ensure that for each type of product at least the tests prescribed in Annex 6 to this Regulation with the tolerances as prescribed in Annex 2 to this Regulation are carried out;

10.3.6. ensure that any collecting of samples giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

10.4. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit.

10.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.

⁽⁶⁾ This determination will be the subject of a recommendation to Administrations.

- 10.4.2. The inspector may take samples at random to be tested in the manufacturer's laboratory. The minimum number of samples may be determined in the light of the results of the manufacturer's own checks.
- 10.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in the application of paragraph 10.4.2, the inspector shall select samples, to be sent to the technical service that has conducted the type approval tests, using the criteria of Annex 7 to this Regulation with the tolerances as prescribed in Annex 2 to this Regulation.
- 10.4.4. The Competent Authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with the criteria of Annex 7 to this Regulation with the tolerances as prescribed in Annex 2 to this Regulation.
- 10.4.5. The Competent Authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the competent authority and their confidence in the arrangements for ensuring effective control of the conformity of production. In the case where negative results are recorded, the competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.
- 10.5. Front fog lamps with apparent defects are disregarded.
11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 11.1. The approval granted in respect of a type of front fog lamp pursuant to this Regulation may be withdrawn if the requirements set forth above are not met, or if a front fog lamp bearing the approval mark does not conform to the type approved.
- 11.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in Annex 1 to this Regulation.
12. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a front fog lamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Parties to the 1958 Agreement which apply this Regulation, by means of a communication form conforming to the model in Annex 1 to this Regulation.
13. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.
14. TRANSITIONAL PROVISIONS
- 14.1. In the case of Class B front fog lamps:
- 14.1.1. From the date of entry into force of the 03 series of amendments to this Regulation no Contracting Party applying it shall refuse to grant approvals under this Regulation as amended by the 03 series of amendments.

- 14.1.2. As from 24 months after the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if Class B front fog lamps meet the requirements of this Regulation as amended by the 03 series of amendments.
 - 14.1.3. As from 36 months after the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation shall grant approvals for a new type of front fog lamp only if front fog lamps meet the requirements of Class F3 of this Regulation as amended by the 03 series of amendments.
 - 14.1.4. Existing approvals for front fog lamps already granted under this Regulation before the date of entry into force of the 03 series of amendments shall remain valid. However, after the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of front fog lamps equipped with filament lamps unless they satisfy the requirements of Regulation No 37.
 - 14.1.5. Contracting Parties applying this Regulation may prohibit the fitting of devices, which do not meet the requirements of this Regulation:
 - 14.1.5.1. on vehicles for which type approval or individual approval is granted more than 24 months after the date of entry into force mentioned in paragraph 14.1.1.
 - 14.1.5.2. on vehicles first registered more than 60 months after the date of entry into force mentioned in paragraph 14.1.1.
 - 14.1.6. As from 60 month after the date of entry into force of the 03 series of amendments, Contracting Parties applying this Regulation shall refuse to grant any extensions of approvals if the front fog lamps do not meet the requirements of Class F3 of this Regulation as amended by the 03 series of amendments.
 - 14.1.6.1. Contracting Parties applying this Regulation shall continue to issue approvals for front fog lamps on the basis of the 03 series and the 02 series of amendments to this Regulation, provided that the fog lamps are intended as replacements for fitting to vehicles in use.
 - 14.2. In the case of Class F3 front fog lamps:
 - 14.2.1. None.
-

ANNEX 1

COMMUNICATION FORM

(Maximum format: A4 (210 × 297 mm))



Issued by: Name of administration:

.....

.....

.....

Concerning: ⁽²⁾ APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of front fog lamp pursuant to Regulation No 19

Approval No

Extension No

1. Trade name or mark of the device:
2. Type of the device:
3. Manufacturer's name for the type of device:
4. Manufacturer's name and address:
5. If applicable, name and address of the manufacturer's representative:
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. Concise description:

- 10.1. Class as described by the relevant marking:
 B, B/, BPL, B/PL, F3, F3, F3/, F3PL, F3/PL
- 10.2. Number and category(ies) of filament lamp(s):
- 10.3. LED module: yes/no ⁽²⁾
- 10.4. Light generator: yes/no ⁽²⁾
- 10.5. LED module or light generator specific identification code:
- 10.6. Application of electronic light source control gear ⁽³⁾: yes/no ⁽²⁾
 Supply to the light source:
 Specification of the light source control gear:

Input voltage:

In the case of an electronic light source control gear not being part of the lamp:

Output signal specification:

10.7. Colour of light emitted: white/selective yellow ⁽²⁾

10.8. Luminous flux of the light source (see paragraph 5.10)
greater than 2 000 lumen: yes/no ⁽²⁾

10.9. Luminous intensity is variable: yes/no ⁽²⁾

10.10. The determination of the cut-off gradient (if measured)
was carried out at 10 m/25 m ⁽²⁾

11. Position of the approval mark:

12. Reason(s) for extension (if applicable):

13. Approval granted/extended/refused/withdrawn ⁽²⁾

14. Place:

15. Date:

16. Signature:

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

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

⁽²⁾ Strike out what does not apply.

⁽³⁾ The voltage specifications shall include the tolerances or voltage range as specified by the manufacturer and verified by this approval.

ANNEX 2

Tolerance requirements for conformity of production control procedure

1. In the case of class B front fog lamps:
 - 1.1. When testing photometric performances of any front fog lamp chosen at random and equipped with a standard filament lamp, no measured value may deviate unfavourably by more than 20 per cent from the value prescribed in this Regulation.
 - 1.2. For the periodic records, the reading is limited to point B50 ⁽¹⁾ and left and right bottom corners of zone D (see Figure 2 in Annex 4).
2. In the case of class F3 front fog lamps:
 - 2.1. when testing the photometric performances of any front fog lamp chosen at random according to paragraph 6.4 of this Regulation, no measured value of the luminous intensity may deviate unfavourably by more than 20 per cent.
 - 2.2. for the measured values in the table according to paragraph 6.4.3 of this Regulation the respective maximum deviations may be:

Designated lines or zones	Vertical position (°) above h + below h –	Horizontal position (°) left of v: – right of v: +	Luminous intensity candela		To comply
			Equivalent 20 per cent	Equivalent 30 per cent	
Point 1, 2 (**)	+ 60°	± 45°	80 max	90 max	All points
Point 3, 4 (**)	+ 40°	± 30°			
Point 5, 6 (**)	+ 30°	± 60°			
Point 7, 10 (**)	+ 20°	± 40°			
Point 8, 9 (**)	+ 20°	± 15°			
Line 1 (**)	+ 8°	– 26° to + 26°	110 max	120 max	All line
Line 2 (**)	+ 4°	– 26° to + 26°	130 max	140 max	All line
Line 3	+ 2°	– 26° to + 26°	205 max	220 max	All line
Line 4	+ 1°	– 26° to + 26°	300 max	325 max	All line
Line 5	0°	– 10° to + 10°	410 max	445 max	All line
Line 6	– 2,5°	– 10° to + 10°	1 600 min	1 400 min	All line
Line 8 L and R (***)	– 1,5° to – 3,5°	– 22° and + 22°	640 min	560 min	One or more points
Line 9 L and R (***)	– 1,5° to – 4,5°	– 35° and + 35°	250 min	225 min	One or more points
Zone D	– 1° to – 3 °	– 10° to + 10°	10 000 max	10 900 max	Whole zone

(°) The co-ordinates are specified in degrees for an angular web with a vertical polar axis.

(**) See paragraph 6.4.3.4 of this Regulation.

(***) See paragraph 6.4.3.2 of this Regulation.

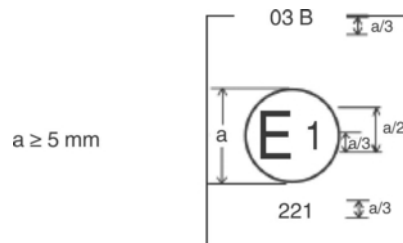
- 2.3. For the periodic records, the photometric measurements for verification of conformity shall at least yield data for the points 8 and 9, the maximum value on lines 1, 5, and the minimum value on line 6, 8 and 9 as specified in paragraph 6.4.3 of this Regulation.

⁽¹⁾ The point B 50 corresponds to the coordinates horizontal 0°, vertical 0,86°U.

ANNEX 3

Examples of arrangements of approval marks for front fog lamps of class B

Figure 1



The device bearing the above approval marking is a fog lamp of Class 'B' approved in the Germany (E1) under number 221, in accordance with Regulation No 19.

The number mentioned close to the symbol 'B' indicates that the approval was granted in accordance with the requirements of Regulation No 19 as amended by the 03 series of amendments.

Figure 1 indicates that the device is a front fog lamp, which can be lit simultaneously with any other lamp with which it may be reciprocally incorporated.

Figure 2a

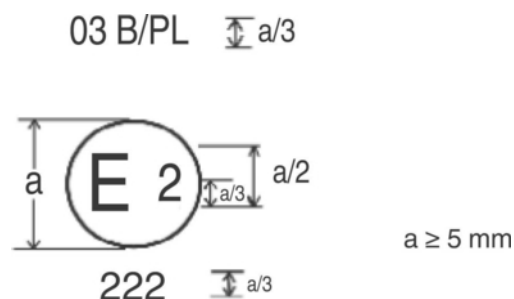
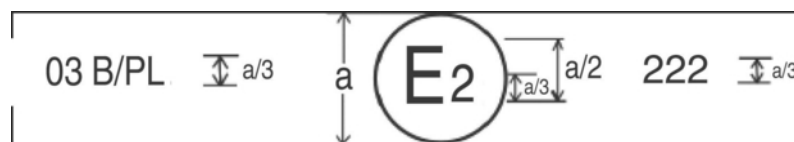


Figure 2b



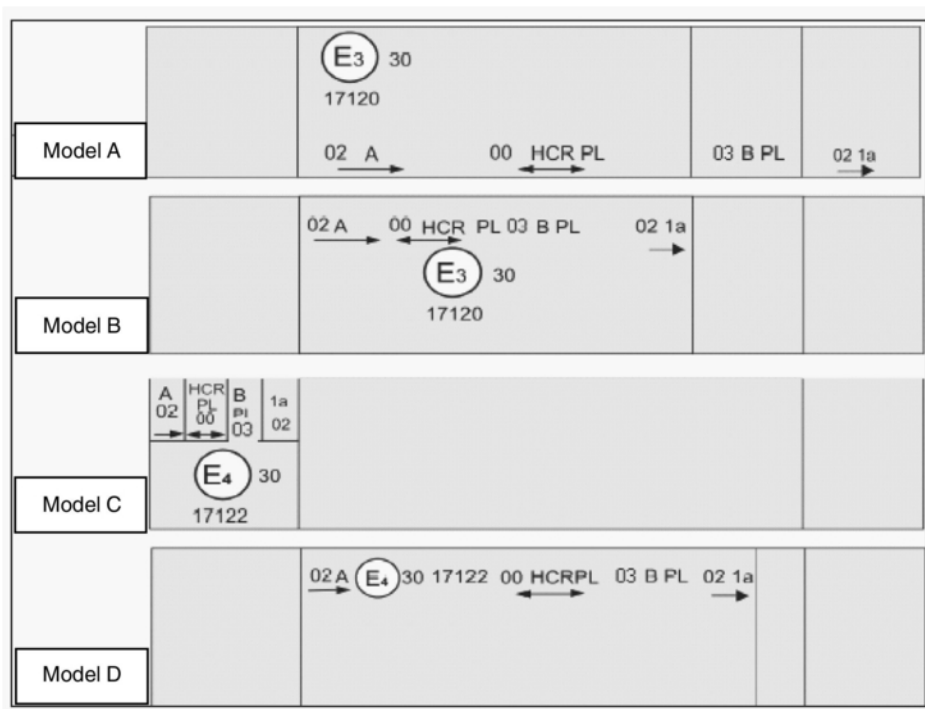
Figures 2a and 2b indicate that the device is a front fog lamp approved in the France (E2) under number 222, in accordance with Regulation No 19 incorporating a lens of plastic material and that it cannot be lit simultaneously with any other lamp with which it may be reciprocally incorporated.

Note:

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

Examples of possible markings for grouped, combined or reciprocally incorporated lamps situated on the front of a vehicle

Figure 3



The vertical and horizontal lines indicate a schematic view of the shape of the light-signalling device. These are not part of the approval mark.

The devices shown in Model A and Model B of Figure 3 bear the approval markings for a fog lamp approved in Italy (E3) under number 17120, in accordance with Regulation No 19.

The devices shown in Model C and Model D of Figure 3 bear the approval markings for a fog lamp approved in the Netherlands (E4) under number 17122, in accordance with Regulation No 19.

Note: The four examples shown in Figure 3 correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 02 series of amendments to Regulation No 7;

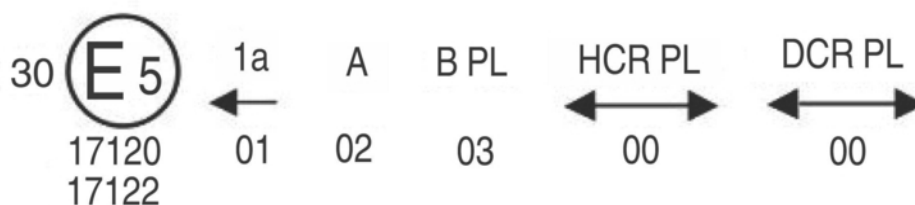
A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas (as indicated by the number 30) approved in accordance with the 00 series of amendments to Regulation No 112 and incorporating a lens of plastic material;

A front fog lamp approved in accordance with the 03 series of amendments to Regulation No 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No 6.

Lamp reciprocally incorporated with a headlamp

Figure 4



The example in Figure 4 corresponds to the marking of a lens of plastic material intended for use in different types of headlamps, namely:

either:

a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Sweden (E5) in accordance with the requirements of Regulation No 112 as amended by the 00 series of amendments, which is reciprocally incorporated with a front fog lamp approved in accordance with the 03 series of amendments to Regulation No 19;

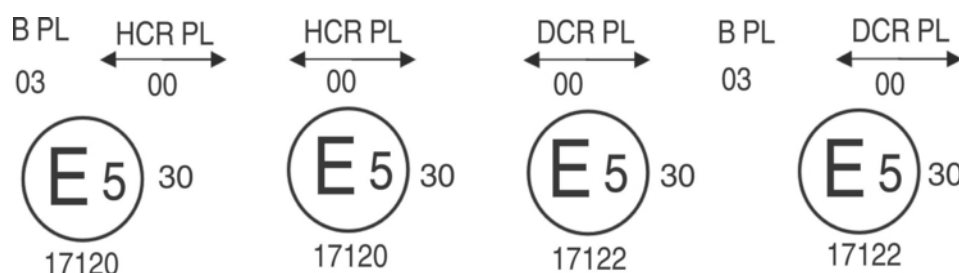
or:

a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Sweden (E5) in accordance with the requirements of Regulation No 98 as amended by the 00 series of amendments, which is reciprocally incorporated with the same front fog lamp as above;

or even: either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear only the valid approval number. Examples of such valid markings are shown in Figure 5.

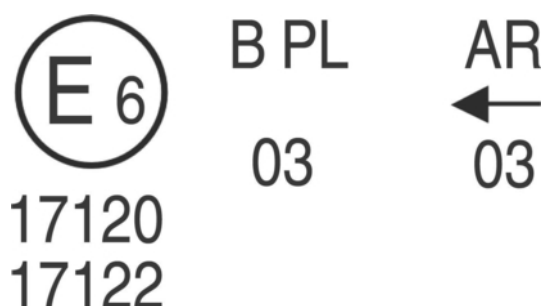
Figure 5



Lighting device used either as front fog lamp or as reversing lamp

The device bearing the approval marking in Figure 6 is a lamp approved in Belgium (E6) under number 17120 and 17122, in accordance with Regulation No 19 and, in accordance with Regulation No 23 (reversing lamps):

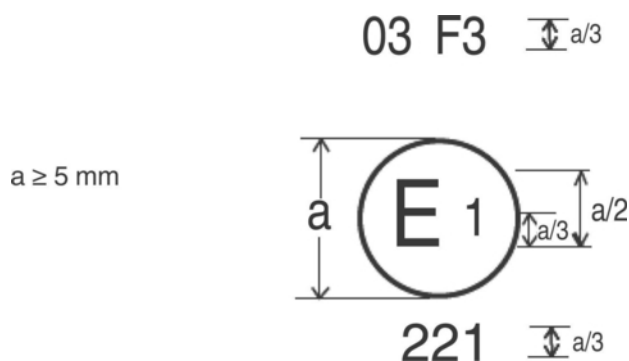
Figure 6



One of the above-mentioned lamps approved as a single lamp can be used only as a front fog lamp or as a reversing lamp.

Examples of arrangements of approval marks for front fog lamps of class 'F3'

Figure 7



The device bearing the approval marking shown in Figure 7 is a fog lamp of Class 'F3' approved in Germany (E1) under number 221, in accordance with Regulation No 19.

The number mentioned close to the symbol 'F3' indicates that the approval was granted in accordance with the requirements of Regulation No 19 as amended by the 03 series of amendments.

The marking in Figure 7 indicates that the device is a front fog lamp, which can be lit simultaneously with any other lamp with which it may be reciprocally incorporated.

Figure 8a

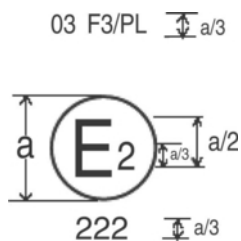
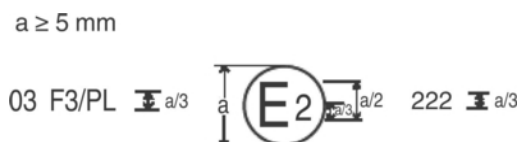


Figure 8b



The device bearing the approval marking shown in Figures 8a and 8b is a fog lamp of Class 'F3', having a plastic lens and approved in France (E2) under number 222, in accordance with Regulation No 19. The number mentioned close to the symbol 'F3' indicates that the approval was granted in accordance with the requirements of Regulation No 19 as amended by the 03 series of amendments.

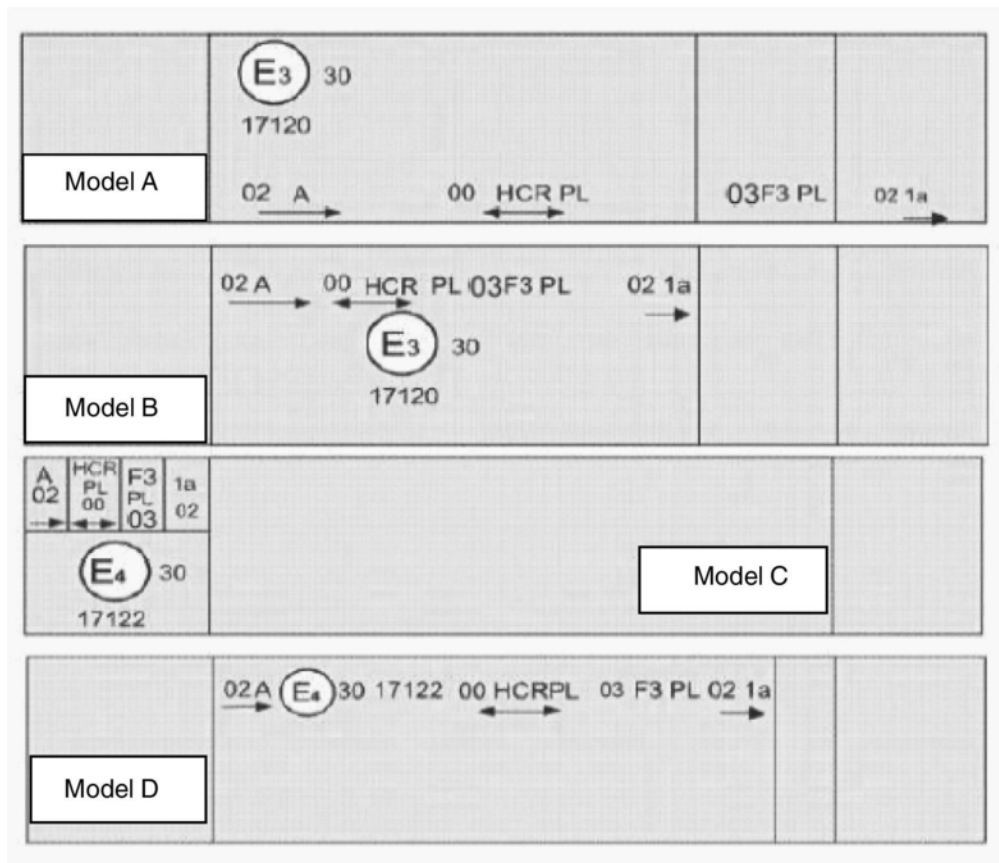
Figures 8a and 8b indicate that the device is a front fog lamp incorporating a lens of plastic material and that it cannot be lit simultaneously with any other lamp with which it may be reciprocally incorporated.

Note:

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

Examples of possible markings for grouped, combined or reciprocally incorporated lamps situated on the front of a vehicle

Figure 9



The vertical and horizontal lines indicate a schematic view of the shape of the light-signalling device. These are not part of the approval mark.

The device bearing the approval marking shown in Models A and B in Figure 9 is a fog lamp approved in Italy (E3) under number 17120 and comprising:

A front position lamp approved in accordance with the 02 series of amendments to Regulation No 7;

A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas (as indicated by the number 30) approved in accordance with the 00 series of amendments to Regulation No 112 and incorporating a lens of plastic material;

A front fog lamp approved in accordance with the 03 series of amendments to Regulation No 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No 6.

The device bearing the approval marking in Models C and D in Figure 9 is a device approved in the Netherlands (E4) under number 17122, in accordance with Regulation used and shows a slightly different arrangement to that shown in Models A and B.

Lighting device used either as front fog lamp or as reversing lamp

The device bearing the approval marking shown in Figure 10 is a lamp approved in Sweden (E5) under number 17120 and 17122, in accordance with Regulation No 19 and, in accordance with Regulation No 23 (reversing lamps):

Figure 10

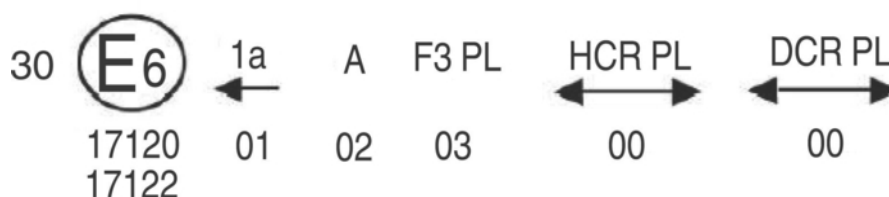


One of the above-mentioned lamps approved as a single lamp can be used only as a front fog lamp or as a reversing lamp.

Front fog lamp reciprocally incorporated with a headlamp

The devices bearing the approval marking shown in Figure 11 have been approved in Belgium (E6) under number 17120 or 17122, in accordance with the relevant Regulations.

Figure 11



The above example corresponds to the marking of a lens of plastic material to be used in different types of headlamps, namely:

either:

a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Belgium (E6) in accordance with the requirements of Regulation No 112 (Table B) as amended by the 00 series of amendments, which is reciprocally incorporated with a front fog lamp approved in accordance with the 03 series of amendments to Regulation No 19;

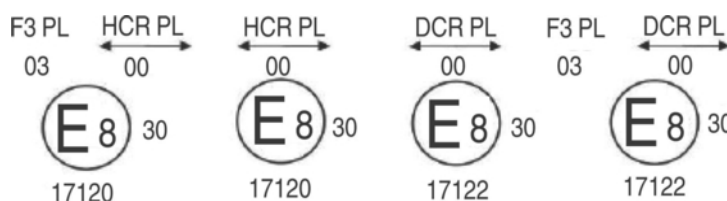
or:

a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Belgium (E6) in accordance with the requirements of Regulation No 98 as amended by the 00 series of amendments, which is reciprocally incorporated with the same front fog lamp as above;

or even: either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear only the valid approval number. Examples of such valid markings are shown in Figure 12.

Figure 12



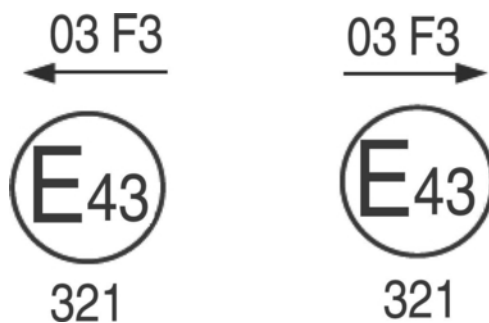
The above example corresponds to devices approved in Czech Republic (E8).

Led modules*Figure 13***MD E8 17325**

The LED module bearing the identification code shown in Figure 13 has been approved together with a lamp approved in Czech Republic (E8) under approval number 17325.

Front fog lamps as a matched pair

The approval marking shown below identifies a front fog lamp carried out as a matched pair and meeting the requirements of this Regulation. The device bearing the approval marking shown in Figure 14 is a front fog lamp approved in Japan (E43) under number 321.

Figure 14

ANNEX 4

MEASURING SCREEN GEOMETRY AND MEASURING GRID

1. MEASURING SCREEN

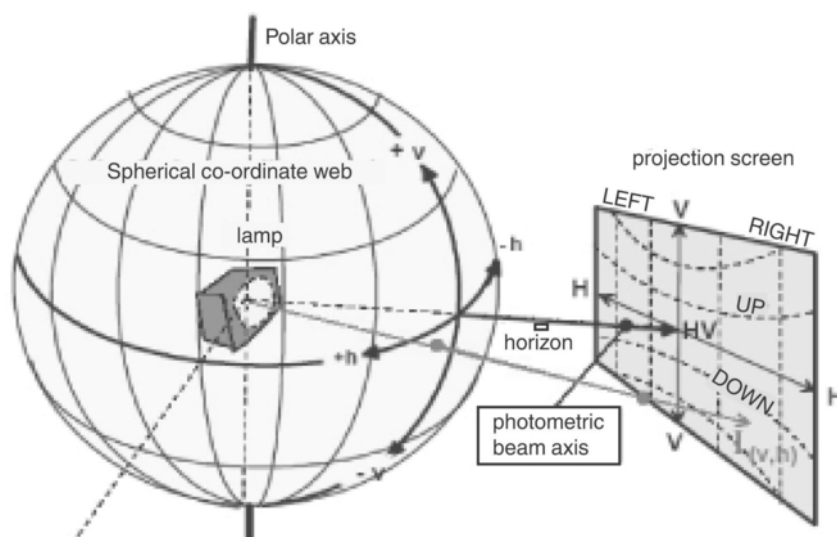
The co-ordinates are specified in degrees for spherical angles in a web with a vertical polar axis (see Figure 1).

Figure 1

According to CIE standards:

h: longitudinal planes around the polar axis

v: latitudinal planes perpendicular to the polar axis



Key:

Polar axis =

Spherical co-ordinate web =

Lamp =

Projection screen =

Horizon =

Photometric beam axis =

Left =

Right =

Up =

Down =

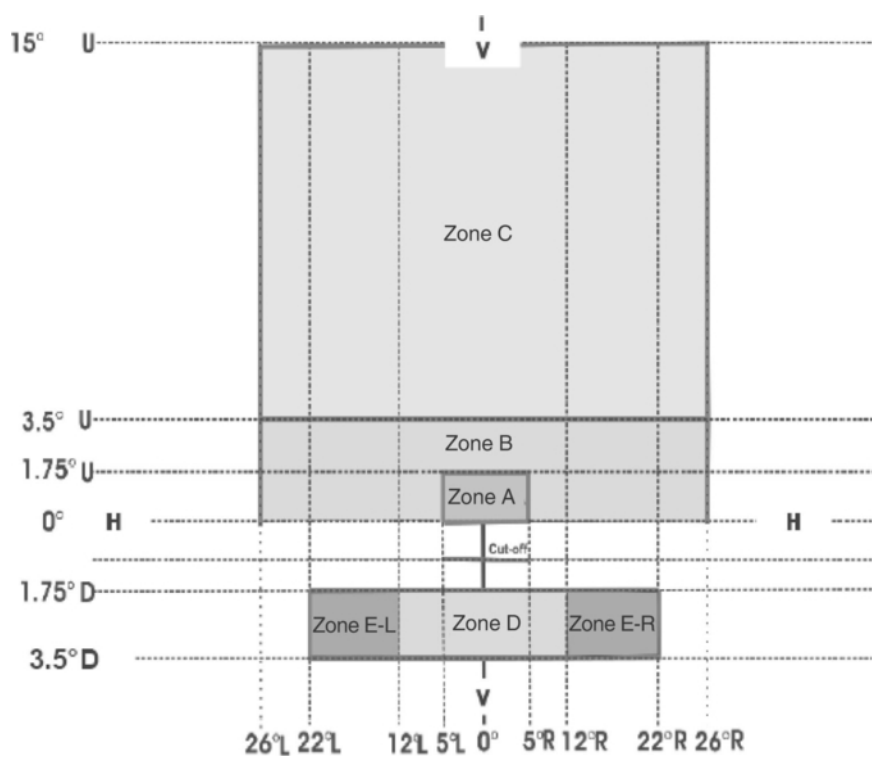
2. MEASURING GRID (see Figure 2)

The measuring grid is symmetrical about the v-v line (see table in paragraph 6.4.3 of this Regulation). For simplicity the angular web is shown in the form of a rectangular grid.

2.1. In the case of front fog lamps of Class B, the measuring grid is shown in Figure 2.

Figure 2

Light distribution of the Class B front fog lamp



Key:

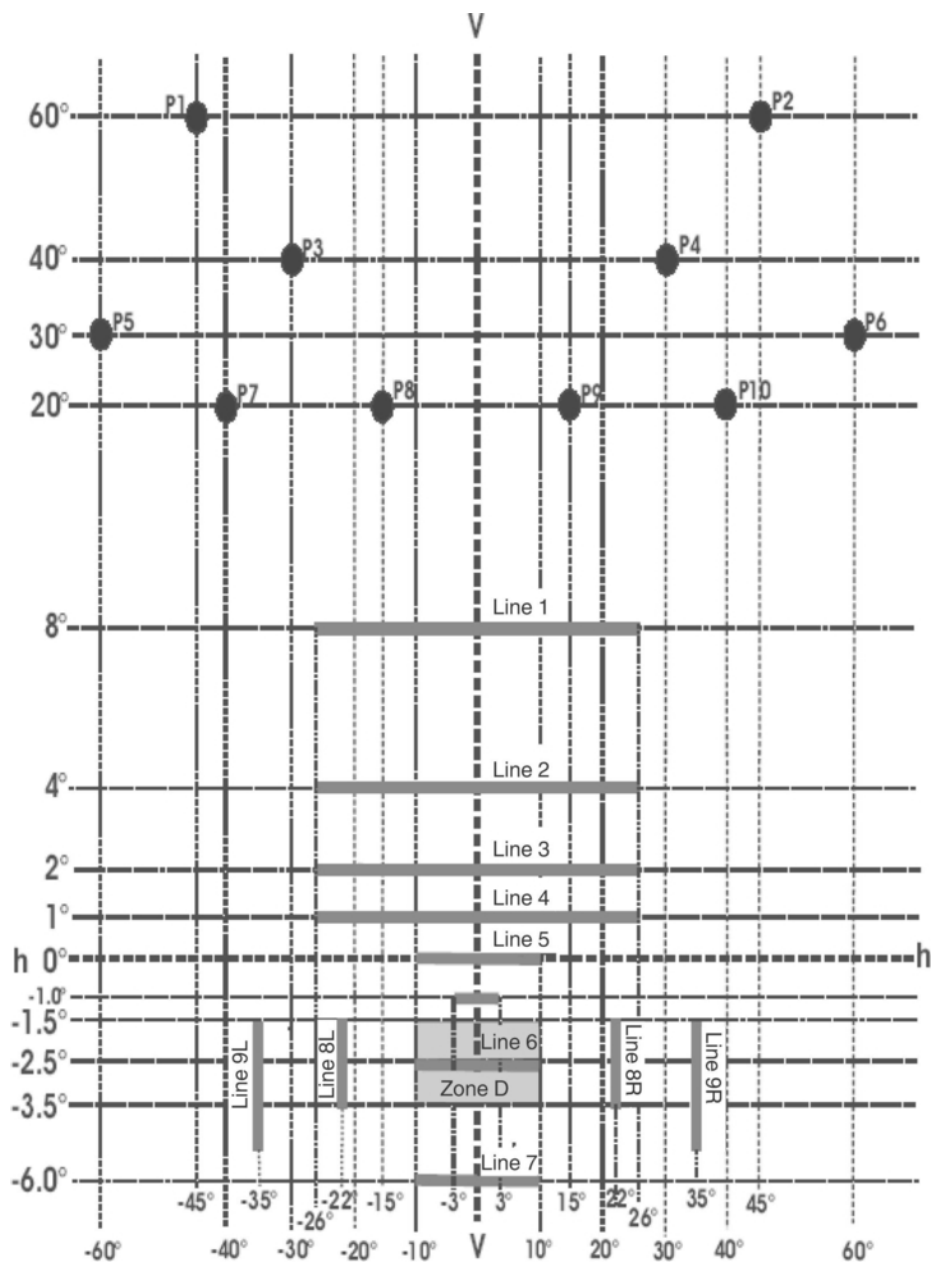
Zone =

Cut-off =

2.2. In the case of front fog lamps of Class F3, the measuring grid is shown in Figure 3.

Figure 3

Light distribution of the Class F3 front fog lamp



Key:

Line =

Zone =

Cut-off =

ANNEX 5

**Tests for stability of photometric performance of front fog lamps in operation
(tests on complete front fog lamps)**

Once the photometric values have been measured according to the prescriptions of this Regulation, in the point of maximum illumination in zone D ($E_{\max}$) and in the point HV, a complete front fog lamp sample shall be tested for stability of photometric performance in operation. 'Complete front fog lamp' is the complete lamp itself including those surrounding body parts and lamps, which could influence its thermal dissipation.

The tests shall be carried out:

- (a) in a dry and still atmosphere at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$, the test sample being mounted on a base representing the correct installation on the vehicle;
- (b) in case of replaceable light sources: using mass production filament light sources, which have been aged for at least one hour, or mass production gas-discharge light sources, which have been aged for at least 15 hours or mass production LED modules which has been aged for at least 48 hours and cooled down to ambient temperature before starting the tests as specified in this Regulation. The LED modules supplied by the applicant shall be used.

The measuring equipment shall be equivalent to that used during headlamp type approval tests.

The test sample shall be operated without being dismounted from or readjusted in relation to its test fixture. The light source used shall be a light source of the category specified for that front fog lamp.

1. TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$, the complete front fog lamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clean front fog lamp

The front fog lamp shall be operated for 12 hours as described in paragraph 1.1.1 and checked as prescribed in paragraph 1.1.2.

1.1.1. Test procedure

The front fog lamp shall be operated as follows:

- 1.1.1.1. in the case where only one lighting function (front fog lamp) is to be approved, the corresponding light source is lit for the prescribed time ⁽¹⁾,
- 1.1.1.2. in the case of more than one lighting function (e.g. a headlamp with one or more driving beams and/or a front fog lamp): the headlamp shall be subjected to the following cycle until the prescribed time is reached:
 - (a) 15 minutes, front fog lamp lit;
 - (b) 5 minutes, all filaments lit.

If the applicant declares that only one lighting function is to be used at a time (e.g. only the passing beam lit or only the driving beam(s) lit or only the front fog lamp lit ⁽¹⁾), the test shall be carried out in accordance with this condition, successively activating the front fog lamp half of the time and one of the other lighting functions for half the time specified in paragraph 1.1.

⁽¹⁾ When the tested front fog lamp includes signalling lamps, the latter shall be lit for the duration of the test, except for a daytime running lamp. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

1.1.1.3. In the case of front fog lamp with a passing beam and one or more lighting functions (one of them is a front fog lamp):

- (a) the front fog lamp shall be subjected to the following cycle until the time specified is reached:
 - (i) 15 minutes, passing-beam light source(s) lit;
 - (ii) 5 minutes, all light source(s) lit.
- (b) if the applicant declares that the front fog lamp is to be used with only the passing beam lit or only the front fog lamp ⁽²⁾ lit at a time, the test shall be carried out in accordance with this condition, successively activating ⁽³⁾ the passing beam half of the time and the front fog lamp for half of the time specified in paragraph 1.1. The driving beam(s) is (are) subjected to a cycle of 15 minutes off and 5 minutes lit for half of the time and during the operation of the passing beam;
- (c) if the applicant declares that the front fog lamp can be used with only the passing beam or only the driving beam(s) ⁽²⁾ lit or only the front fog lamp ⁽²⁾ lit at a time, the test shall be carried out in accordance with this condition, successively activating ⁽²⁾ the passing beam one third of the time, the driving beam(s) one third of the time and the front fog lamp for one third of the time specified in paragraph 1.1.

1.1.2. Test voltage

The voltage shall be applied to the terminals of the test sample as follows:

- (a) In case of replaceable filament light source(s) operated directly under vehicle voltage system conditions: The test shall be performed at 6,3 V, 13,2 V or 28,0 V as applicable except if the applicant specifies that the test sample may be used at a different voltage. In this case, the test shall be carried out with the filament light source operated at the highest voltage that can be used.
- (b) In case of replaceable gas discharge light source(s): the test voltage for the electronic light source control-gear is 13,2 ± 0,1 volts for 12 V vehicle voltage system, or otherwise specified in the application for approval.
- (c) In the case of non-replaceable light source operated directly under vehicle voltage system conditions: all measurements on lighting units equipped with non-replaceable light sources (filament light sources and/or others) shall be made at 6,3 V, 13,2 V or 28,0 V or at other voltages according to the vehicle voltage system as specified by the applicant respectively.
- (d) In the case of light sources, replaceable or non-replaceable, being operated independently from vehicle supply voltage and fully controlled by the system, or, in the case of light sources supplied by a supply and operating device, the test voltages as specified above shall be applied to the input terminals of that device. The test laboratory may require from the manufacturer the supply and operating device or a special power supply needed to supply the light source(s).
- (e) LED module(s) shall be measured at 6,75 V, 13,2 V or 28,0 V respectively, if not otherwise specified within this Regulation. LED module(s) operated by an electronic light source control gear, shall be measured as specified by the applicant.
- (f) Where signalling lamps are grouped, combined or reciprocally incorporated into the test sample and operating at voltages other than the nominal rated voltages of 6 V, 12 V or 24 V respectively, the voltage shall be adjusted as declared by the manufacturer for the correct photometric functioning of that lamp.

1.1.3. Test results

1.1.3.1. Visual inspection

Once the front fog lamp has been stabilised to the ambient temperature, the front fog lamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually; no distortion, deformation, cracking or change in colour of either the front fog lamp lens or the external lens, if any, shall be noticeable.

⁽²⁾ Should two or more lamp filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the filaments simultaneously.

⁽³⁾ When the tested headlamp includes signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing mode with an on/off time of approximately one to one.

1.1.3.2. Photometric test

To comply with the requirements of this Regulation, the following photometric values shall be verified in the following points:

In case of Class 'B' front fog lamps: at point HV and the point of I_{max} in zone D.

In case of Class 'F3' front fog lamps: on line 5 at point $h = 0$ and the point of I_{max} in zone D.

Another aiming may be carried out to allow for any deformation of the front fog lamp base due to heat (the change of the position of the cut-off line is covered in paragraph 2).

A 10 per cent discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty front fog lamp

The front fog lamp, having been tested as specified in paragraph 1.1, shall be operated for one hour as described in paragraph 1.1.1. Following preparation as prescribed in paragraph 1.2.1 it shall be checked as prescribed in paragraph 1.1.2.

1.2.1. Preparation of the front fog lamp

1.2.1.1. Test mixture

1.2.1.1.1. For front fog lamps with the outside lens in glass:

The mixture of water and a polluting agent to be applied to the front fog lamp shall be composed of:

- (a) 9 parts by weight of silica sand with a particle size of 0-100 μm ;
- (b) 1 part by weight of vegetal carbon dust (beech wood) with a particle size of 0-100 μm ;
- (c) 0,2 part by weight of NaCMC ⁽⁴⁾, and
- (d) an appropriate quantity of distilled water, with a conductivity of $S < 1 \mu\text{S/m}$.

The mixture must not be more than 14 days old.

1.2.1.1.2. For front fog lamp with outside lens in plastic material:

The mixture of water and polluting agent to be applied to the front fog lamp shall be composed of:

- (a) 9 parts by weight of silica sand with a particle size of 0-100 μm ,
- (b) 1 part by weight of vegetal carbon dust (beech wood) with a particle size of 0-100 μm ,
- (c) 0,2 part by weight of NaCMC ⁽⁴⁾,
- (d) 13 parts by weight of distilled water with a conductivity of $S < 1 \mu\text{S/m}$, and
- (e) ± 1 part by weight of surfactant. ⁽⁵⁾

The mixture must not be more than 14 days old.

1.2.1.2. Application of the test mixture to the front fog lamp

The test mixture shall be uniformly applied to the entire light emitting surface of the front fog lamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20 per cent of the values measured for the following point under the conditions described in this annex:

point of E_{max} in zone D.

⁽⁴⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 μP for a 2 per cent solution at 20 °C.

⁽⁵⁾ The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed the specified value for an operating front fog lamp.

The front fog lamp tested in accordance with paragraph 1, shall be subjected to the test described in paragraph 2.1, without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$.

Using a mass production light source, which has been aged for at least one hour, the front fog lamp shall be operated without being dismantled from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph 1.1.2). The position of the cut-off line between a point situated 3,0 degrees left and a point situated 3,0 degrees right of the line VV (see Annex 4 of the Regulation) shall be verified after three minutes (r_3) and 60 minutes (r_{60}) respectively of operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

2.2. Test results

2.2.1. The result expressed in milliradians (mrad) shall be considered acceptable when the absolute value $\Delta r_I = |r_3 - r_{60}|$ recorded on this front fog lamp is not more than 2 mrad ($\Delta r_I \leq 2\text{ mrad}$).

2.2.2. However, if this value is more than 2 mrad but not more than 3 mrad ($2\text{ mrad} < \Delta r_I \leq 3\text{ mrad}$) a second front fog lamp shall be tested as described in paragraph 2.1. This shall be done after the front fog lamp has been subjected to three consecutive cycles as described below, in order to stabilise the position of the mechanical parts of the front fog lamp that is mounted on a base representative of the correct installation on the vehicle:

(a) Operation of the front fog lamp for one hour. (The voltage shall be adjusted as specified in paragraph 1.1.2).

(b) Period of rest for one hour.

2.2.3. The front fog lamp type shall be considered acceptable if the mean value of the absolute values Δr_I measured on the first sample and Δr_{II} measured on the second sample is not more than 2 mrad.

$$(\Delta r_I + \Delta r_{II}) / 2 \leq 2\text{ mrad}.$$

ANNEX 6

Requirements for lamps incorporating lenses of plastic material - testing of lens or material samples and of complete lamps

1. GENERAL SPECIFICATIONS

- 1.1. The samples supplied pursuant to paragraph 2.2.2 of this Regulation shall satisfy the specifications indicated in paragraphs 2.1 to 2.5.
- 1.2. The two samples of complete lamps supplied pursuant to paragraph 2.3 of this Regulation (or paragraph 2.4 of this Regulation as applicable) and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6.
- 1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in Appendix 1 to this annex.

However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1 to 2.5, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in Appendix 1, table B, shall be mandatory.

2. TESTS

2.1. Resistance to temperature changes

2.1.1. Tests

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and 85-95 per cent RH;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH;

15 hours at $-30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH;

3 hours at $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH;

Before this test, the samples shall be kept at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH for at least four hours.

Note: The periods of one hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements

2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test. These measurements shall be made under the conditions as specified in paragraph 6.3. or 6.4 of this Regulation, at the following points:

In the case of Class 'B' front fog lamps:

- (a) at point HV and
- (b) point $h = 0$, $v = 2^{\circ}$ D in zone D.

In the case of Class 'F3' front fog lamps:

- (a) intersection VV line with line 6 and
- (b) intersection VV line with line 4.

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10 per cent including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5 500 K and 6 000 K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wavelengths smaller than 295 nm and greater than 2 500 nm. The samples shall be exposed to an energetic illumination of $1\,200\text{ W/m}^2 \pm 200\text{ W/m}^2$ for a period such that the luminous energy that they receive is equal to $4\,500\text{ MJ/m}^2 \pm 200\text{ MJ/m}^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50\text{ °C} \pm 5\text{ °C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min.

The samples shall be sprayed with distilled water of conductivity lower than $1\text{ }\mu\text{S/m}$ at a temperature of $23\text{ °C} \pm 5\text{ °C}$, in accordance with the following cycle:

spraying: 5 minutes;
drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1 and the measurement described in paragraph 2.2.3.1 have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2 with the mixture defined in paragraph 2.2.2.1.

2.2.2.1. Test mixture

The test mixture shall be composed of 61,5 per cent n-heptane, 12,5 per cent toluene, 7,5 per cent ethyl tetrachloride, 12,5 per cent trichlorethylene and 6 per cent xylene (volume per cent).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1 and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm^2 , corresponding to a force of 100 N applied on a test surface of $14 \times 14\text{ mm}$.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3 (resistance to detergents) at $23\text{ °C} \pm 5\text{ °C}$.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0,2 per cent impurities at $23\text{ °C} \pm 5\text{ °C}$ and then wiped off with a soft cloth.

2.2.3. Results

- 2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission

$$\Delta t = (T_2 - T_3) / T_2,$$

measured on the three samples according to the procedure described in Appendix 2 to this annex shall not exceed 0,020 ($\Delta t_m \leq 0,020$).

- 2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation

$$\Delta d = (T_5 - T_4) / T_2,$$

measured on the three samples according to the procedure described in Appendix 2 to this annex shall not exceed 0,020 ($\Delta d_m \leq 0,020$).

2.3. Resistance to detergents and hydrocarbons

2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to $50\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and then immersed for five minutes in a mixture maintained at $23\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and composed of 99 parts distilled water containing not more than 0,02 per cent impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at $50\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$. The surface of the samples shall be cleaned with a moist cloth.

2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70 per cent n-heptane and 30 per cent toluene (volume per cent), and shall then be dried in the open air.

2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission:

$$\Delta t = (T_2 - T_3) / T_2,$$

measured on the three samples according to the procedure described in Appendix 2 to this annex shall not exceed 0,010 ($\Delta t_m \leq 0,010$).

2.4. Resistance to mechanical deterioration

2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in Appendix 3 to this annex.

2.4.2. Results

After this test, the variations:

in transmission: $\Delta t = (T_2 - T_3) / T_2$

and in diffusion: $\Delta d = (T_5 - T_4) / T_2$

shall be measured according to the procedure described in Appendix 2 in the area specified in paragraph 2.2.4.1.1. The mean value of the three samples shall be such that:

$$\Delta t_m \leq 0,010;$$

$$\Delta d_m \leq 0,050.$$

2.5. Test of adherence of coatings, if any

2.5.1. Preparation of the sample

A surface of 20 mm × 20 mm in area of the coating of a lens shall be grated with a razor blade or a needle into a grid of squares approximately 2 mm × 2 mm. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force of adhesion of 2 N/(cm of width) ± 20 per cent measured under the standardized conditions specified in Appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that a force perpendicular to that surface balances the force of adhesion to the surface considered. At this stage, the tape shall be torn off at a constant speed of 1,5 m/s ± 0,2 m/s.

2.5.3. Results

There shall be no appreciable impairment of the grated area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15 per cent of the grated surface.

2.6. Tests of the complete lamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No 1 shall be subjected to the test described in paragraph 2.4.1.

2.6.1.2. Results

After the test, the results of photometric measurements prescribed in zones A and B for Class B front fog lamp, and lines 2 and 5 for Class F3 front fog lamp shall not exceed the maximum values prescribed by more than 30 per cent.

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No 2 shall be subjected to the test described in paragraph 2.5.

2.7. Resistance to light source radiation

2.7.1. In the case of gas-discharge light sources: for testing the resistance of light transmitting components made of plastic materials against UV radiation inside the front fog lamp:

2.7.1.1. Flat samples of each light transmitting plastic component of the front fog lamps are exposed to the light of the gas-discharge light source. The parameters such as angles and distances of these samples shall be the same as in the front fog lamp.

2.7.1.2. After 1 500 hours of continuous exposure, the colorimetric specifications of the transmitted light must be met with a new standard gas-discharge light source, and the surface of the samples shall be free of cracks, scratches, scaling or deformation.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

- 3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognized as complying with this Regulation if:
- 3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paragraphs 2.2.2, 2.3.1 and 2.3.2);
- 3.1.2. After the test described in paragraph 2.6.1.1, the photometric values at the points of measurement considered in paragraph 2.6.1.2 are within the limits prescribed for conformity of production by this Regulation.
- 3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of front fog lamps selected at random.
-

APPENDIX 1

CHRONOLOGICAL ORDER OF APPROVAL TESTS

A. Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.2 of this Regulation).

Tests		Lenses or samples of material						Lenses						
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.1	Limited photometry (para. 2.1.2)										X	X	X	
1.1.1.	Temperature change (para. 2.1.1)										X	X	X	
1.1.2.	Limited photometry (para. 2.1.2)										X	X	X	
1.2.	Transmission measurement	X	X	X	X	X	X	X	X	X				
1.2.2.	Diffusion measurement	X	X	X				X	X	X				
1.3.	Atmospheric agents (para. 2.2.1)	X	X	X										
1.3.1.	Transmission measurement	X	X	X										
1.4.	Chemical agents (para. 2.2.2)	X	X	X										
1.4.1.	Diffusion measurement	X	X	X										
1.5.	Detergents (para. 2.3.1)				X	X	X							
1.6.	Hydrocarbons (para. 2.3.2)				X	X	X							
1.6.1.	Transmission measurement				X	X	X							
1.7.	Deterioration (para. 2.4.1)							X	X	X				
1.7.1.	Transmission measurement							X	X	X				
1.7.2.	Diffusion measurement							X	X	X				
1.8.	Adherence (para. 2.5)													X

B. Tests on complete front fog lamps (supplied pursuant to paragraph 2.3.2 of this Regulation).

Tests		Complete headlamp	
		Sample No	
		1	2
2.1.	Deterioration (para. 2.6.1.1)	X	
2.2.	Photometry (para. 2.6.1.2)	X	
2.3.	Adherence (para. 2.6.2)		X

APPENDIX 2

Method of measurement of the diffusion and transmission of light**1. EQUIPMENT (SEE FIGURE)**

The beam of a collimator K with a half divergence $\beta/2 = 17,4 \times 10^{-4}$ rd is limited by a diaphragm D_T with an opening of 6 mm against which the sample stand is placed.

A convergent achromatic lens L_2 , corrected for spherical aberrations, links the diaphragm D_T with the receiver R; the diameter of the lens L_2 shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\beta/2 = 14^\circ$.

An annular diaphragm D_D with angles $a/2 = 1^\circ$ and $a_{\max}/2 = 12^\circ$ is placed in an image focal plane of the lens L_2 .

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

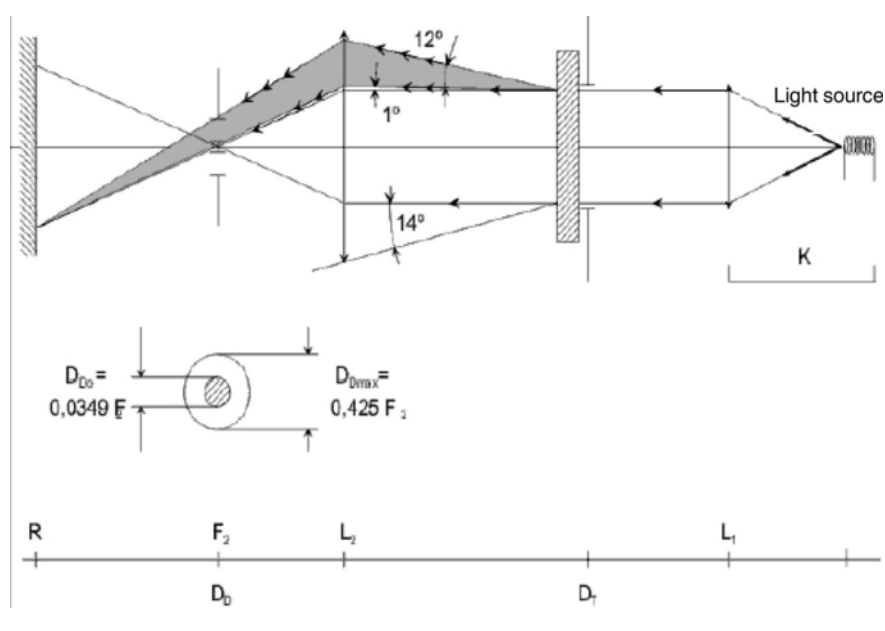
The distance $L_2 D_T$ and the focal length F_2 ⁽¹⁾ of the lens L_2 shall be so chosen that the image of D_T completely covers the receiver R.

When the initial incident flux is referred to 1 000 units, the absolute precision of each reading shall be better than 1 unit.

2. MEASUREMENTS

The following readings shall be taken:

Reading	With sample	With central part of D_D	Quantity represented
T_1	no	no	Incident flux in initial reading
T_2	yes (before test)	no	Flux transmitted by the new material in a field of 24 degrees
T_3	yes (after test)	no	Flux transmitted by the tested material in a field of 24 degrees
T_4	yes (before test)	yes	Flux diffused by the new material
T_5	yes (after test)	yes	Flux diffused by the tested material



⁽¹⁾ For L_2 the use a focal distance of about 80 mm is recommended.

APPENDIX 3

SPRAY TESTING METHOD

1. TEST EQUIPMENT

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1,3 mm in diameter allowing a liquid flow rate of $0,24 \pm 0,02$ l/minute at an operating pressure of 6,0 bars – 0, + 0,5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm $\pm$ 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm $\pm$ 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohs scale, with a grain size between 0 and 0,2 mm and an almost normal distribution, with an angular factor of 1,8 to 2;

Water of hardness not exceeding 205 g/m³ for a mixture comprising 25 g of sand per litre of water.

2. TEST

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method described in Appendix 2, is such that:

$$\Delta d = (T_5 - T_4) / T_2 \leq 0,0250 \pm 0,0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

APPENDIX 4

ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows the determination under standard conditions of the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

To measure the force necessary to un-stick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at $23\text{ °C} \pm 5\text{ °C}$ and 65 ± 15 per cent relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see paragraph 3.).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be carried out under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radially at a speed of approximately 300 mm/s and then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight longitudinal rubbing movement of the finger, without excessive pressure to the tape and to the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstuck about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece.

Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to un-stick the tape at a speed of $300\text{ mm/s} \pm 30\text{ mm/s}$ and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newton per centimetre of width of the tape.

ANNEX 7

Minimum requirements for conformity of production control procedure

1. GENERAL

- 1.1. The conformity requirements shall be considered to be 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 front fog lamps shall not be contested if the photometric performances according to the requirements in Annex 2 to this Regulation depending on the prevailing class of front fog lamps are satisfied.

If the results of the tests described above do not meet the requirements, tests on the front fog lamp shall be repeated using light sources as specified in paragraphs 6.3 or 6.4 of this Regulation, as appropriate.

- 1.2.1. If the results of the tests described above do not meet the requirements, the alignment of the front fog lamp may be changed, provided that the axis of the beam is not displaced laterally by more than $0,5^{\circ}$ to the right or left and not by more than $0,2^{\circ}$ up or down. In the re-aimed position all photometric requirements shall be met.
- 1.3. With respect to the verification of the change in vertical position of the cut-off line under the influence of heat, the following procedure shall be applied:
 - 1.3.1. One of the sampled front fog lamps shall be tested according to the procedure described in paragraph 2.1 of Annex 5 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of Annex 5.
 - 1.3.2. The front fog lamp shall be considered as acceptable if Δr does not exceed 3,0 mrad. If this value exceeds 3,0 mrad but is not more than 4,0 mrad, a second front fog lamp shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 3,0 mrad.
- 1.4. The chromaticity coordinates shall comply with paragraph 7. of this Regulation. The photometric performance of a front fog lamp emitting an enlarged selective yellow light when equipped with a colourless light source shall be the values contained in this Regulation multiplied by 0,84.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of front fog lamp 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 characteristics and the verification of the change in vertical position of the cut-off line under the influence of heat.

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 front fog lamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of front fog lamps 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 front fog lamp shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points listed in Annex 2 to this Regulation depending on the prevailing class of front fog lamps.

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 10.1 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 8 (first sampling) would be 0,95.

ANNEX 8

MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR

1. GENERAL

1.1. The conformity requirements shall be considered to be 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 front fog lamps shall not be contested if the photometric performances according to the requirements in Annex 2 to this Regulation depending on the prevailing class of front fog lamps are satisfied.

If the results of the tests described above do not meet the requirements, tests on the front fog lamp shall be repeated using light sources as specified in paragraphs 6.3 or 6.4 of this Regulation, as appropriate.

1.2.1. If the results of the tests described above do not meet the requirements, the alignment of the front fog lamp may be changed, provided that the axis of the beam is not displaced laterally by more than $0,5^{\circ}$ to the right or left and not by more than $0,2^{\circ}$ up or down. In the re-aimed position all photometric requirements shall be met.

If the specified luminous intensity requirements are not met, a re-aim of the cut-off position within $\pm 0,5^{\circ}$ vertical and/or $\pm 2^{\circ}$ horizontal is allowed. In the re-aimed position all photometric requirements shall be met.

If vertical adjustment cannot be performed repeatedly to the required position within the allowed tolerances, the instrumental method as specified in Annex 9 to this Regulation shall be applied and the quality of cut-off be tested on one sample.

1.2.2. Front fog lamps with obvious defects are disregarded.

1.3. The chromaticity coordinates shall comply with paragraph 7 of this Regulation. The photometric performance of a front fog lamp emitting an enlarged selective yellow light when equipped with a colourless light source shall be the values contained in this Regulation multiplied by 0,84.

2. FIRST SAMPLING

In the first sampling four front fog lamps shall be selected at random. The first sample of two is marked A, the second sample of two is marked B.

2.1. Conformity is not contested

2.1.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced front fog lamps shall not be contested if the deviation of the measured values of the front fog lamps in the unfavourable directions are:

2.1.1.1. sample A

A1:	one front fog lamp		0 per cent
	one front fog lamp	not more than	20 per cent
A2:	both front fog lamps	more than	0 per cent
	but	not more than	20 per cent
	go to sample B		

2.1.1.2. sample B

B1:	both front fog lamps	0 per cent
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2.2. Conformity is contested

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

2.2.1.1. sample A

A3: one front fog lamp	not more than	20 per cent
one front fog lamp	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 front fog lamp	more than	0 per cent
but	not more than	20 per cent
one front fog lamp	not more than	20 per cent
B3: in the case of A2		
one front fog lamp		0 per cent
one front fog lamp	more than	20 per cent
but	not more than	30 per cent

2.3. Approval withdrawn

Conformity shall be contested and paragraph 11 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the front fog lamps are:

2.3.1. sample A

A4: one front fog lamp	not more than	20 per cent
one front fog lamp	more than	30 per cent
A5: both front fog lamps	more than	20 per cent

2.3.2. sample B

B4: in the case of A2		
one front fog lamp	more than	0 per cent
but	not more than	20 per cent
one front fog lamp	more than	20 per cent
B5: in the case of A2		
both front fog lamps	more than	20 per cent
B6: in the case of A2		
one front fog lamp		0 per cent
one front fog lamp	more than	30 per cent

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two front fog lamps and fourth sample D of two front fog lamps, selected from stock manufactured after alignment, is necessary within two months time after the notification.

3.1. Conformity is not contested

3.1.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced front fog lamps shall not be contested if the deviations of the measured values of the front fog lamps are:

3.1.1.1. sample C

C1:	one front fog lamp		0 per cent
	one front fog lamp	not more than	20 per cent
C2:	both front fog lamps	more than	0 per cent
	but	not more than	20 per cent
	go to sample D		

3.1.1.2. sample D

D1:	in the case of C2		
	both front fog lamps		0 per cent

3.2. Conformity is contested

3.2.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced front fog lamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the front fog lamps are:

sample D

D2:	in the case of C2		
	one front fog lamp	more than	0 per cent
	but	not more than	20 per cent
	one front fog lamp	not more than	20 per cent

3.3. Approval withdrawn

Conformity shall be contested and paragraph 12 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the front fog lamps are:

3.3.1. sample C

C3:	one front fog lamp	not more than	20 per cent
	one front fog lamp	more than	20 per cent
C4:	both front fog lamps	not more than	20 per cent

3.3.2. sample D

D3:	in the case of C2		
	one front fog lamp	0 or more than	0 per cent
	one front fog lamp	more than	20 per cent

4. CHANGE OF THE VERTICAL POSITION OF THE CUT-OFF LINE

With respect to the verification of the change in vertical positions of the cut-off line under the influence of heat, the following procedure shall be applied:

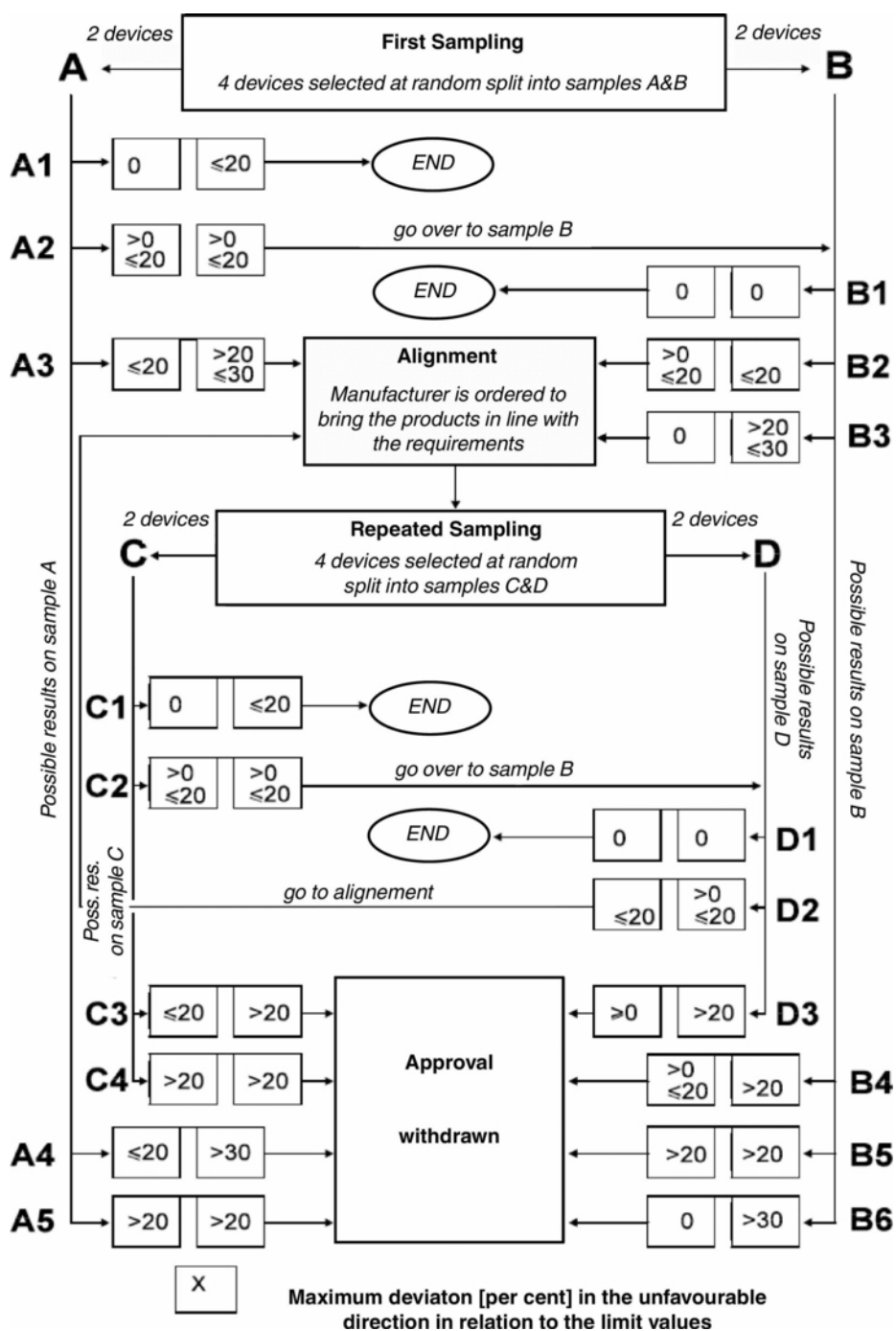
One of the front fog lamps of sample A after sampling procedure in Figure 1 of this annex shall be tested according to the procedure described in paragraph 2.1 of Annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of Annex 5.

The front fog lamp shall be considered as acceptable if Δr does not exceed 3,0 mrad.

If this value exceeds 3,0 mrad but is not more than 4,0 mrad, the second front fog lamp of sample A shall be subjected to the test after which the mean of the absolute values recorded in both samples shall not exceed 3,0 mrad.

However, if this value of 3,0 mrad on sample A is not complied with, the two front fog lamps of sample B shall be subjected to the same procedure and the value of Δr for each of them shall not exceed 3,0 mrad.

Figure 1



ANNEX 9

Definition and sharpness of the cut-off line and aiming procedure by means of this cut-off line for class F3 front fog lamps

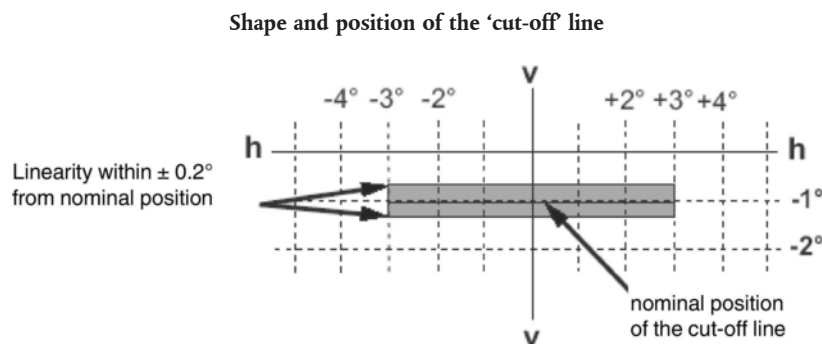
1. GENERAL

The luminous intensity distribution of the front fog lamp shall incorporate a cut-off line that enables the front fog lamp to be adjusted correctly for the photometric measurements and for the aiming on the vehicle. The characteristics of the cut-off line shall comply with the requirements set out in paragraphs 2 to 4.

2. SHAPE OF THE CUT-OFF LINE

For visual adjustment of the front fog beam the cut-off line shall provide: a horizontal line for vertical adjustment of the front fog lamp extending to 4° either side of the v-v line (see Figure 1).

Figure 1



3. ADJUSTMENT OF THE FRONT FOG LAMP

3.1. Horizontal adjustment

The cut-off line shall be so positioned that the projected beam pattern appears approximately symmetrical to the v-v line. When the front fog lamp is designed for use in pairs or has otherwise an asymmetric beam pattern, it shall be horizontally aligned according to the specification of the applicant, or otherwise in such a way that the cut-off line appears symmetrical to the v-v line.

3.2. Vertical adjustment

After horizontal adjustment of the front fog beam according to paragraph 3.1, the vertical adjustment shall be performed in such a way that the cut-off line is moved upwards from the lower position until it is situated on the v v line at 1° below the h-h line. If the horizontal part is not straight but slightly curved or inclined, the cut-off line shall not exceed the vertical range formed by two horizontal lines which are situated between 3° left and right of the v-v line at 0,2° above and below the nominal position of the cut-off (see Figure 1).

- 3.2.1. When the vertical positions of three attempts to adjust the cut-off differ by more than 0,2°, the horizontal part of the cut-off line is assumed not to provide sufficient linearity or sharpness for performing visual adjustment. In this case the quality of cut-off shall be tested instrumentally for compliance with requirements as follows.

4. MEASUREMENT OF THE QUALITY OF CUT-OFF

- 4.1. Measurements shall be performed by vertically scanning through the horizontal part of the cut-off line in angular steps not exceeding 0,05°

At either a measurement distance of 10 m and a detector with a diameter of approximately 10 mm.

Or at a measurement distance of 25 m and a detector with a diameter of approximately 30 mm.

The measurement of the cut-off quality shall be considered acceptable if the requirements of the paragraphs 4.1.1 to 4.1.3 of this annex shall comply with at least one measurement at 10 m or 25 m.

The measuring distance at which the test was determined shall be recorded in paragraph 9. of the communication form in Annex 2 of this Regulation.

The scanning is performed from downwards upwards through the cut-off line along the vertical lines at – 2,5° and + 2,5° from the v-v line. When so measured, the quality of the cut-off line shall meet the following requirements:

- 4.1.1. Not more than one cut-off line shall be visible.

- 4.1.2. Sharpness of cut-off:

If scanned vertically through the horizontal part of the cut-off line along vertical lines at ± 1° from the v-v line, the maximum value measured for the sharpness factor G of the cut-off line shall not be less than 0,08 where:

$$G = (\log E_V - \log E_{(V \pm 0,1^\circ)})$$

- 4.1.3. Linearity

The part of the cut-off line which serves vertical adjustment shall be horizontal from 3° left to 3° right of the v-v line. This requirement is satisfied, if the vertical positions of the inflection points according to paragraph 3.2 at 3° left and right of the v-v line do not deviate by more than ± 0,20°.

5. INSTRUMENTAL VERTICAL ADJUSTMENT

If the cut-off line complies with the above quality requirements, the vertical beam adjustment can be performed instrumentally. For this purpose the inflection point where $d^2 (\log E) / dv^2 = 0$ is positioned on the v-v line and below the h-h line. The movement for measuring and adjusting the cut-off line shall be upwards from below the nominal position.

ANNEX 10

Overview of operational periods concerning test for stability of photometric performance

Abbreviations

P: passing beam lamp

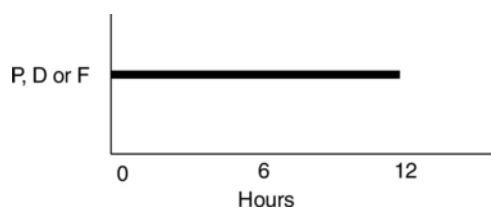
D: driving beam lamp ($D_1 + D_2$ means two driving beams)

F: front fog lamp

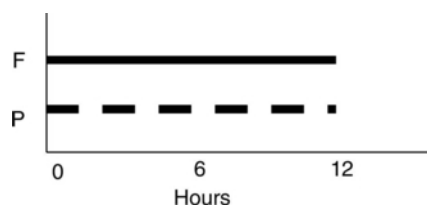
All following grouped headlamps and front fog lamps together with the added marking symbols are given as examples and are not exhaustive.

■ ■ ■ ■: means a cycle of 15 minutes off and 5 minutes lit.

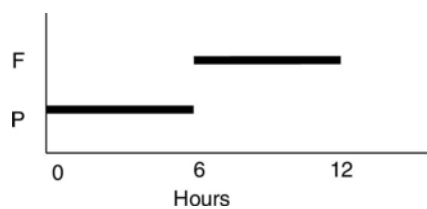
1. P or D or F (HC or HR or B OR F3)



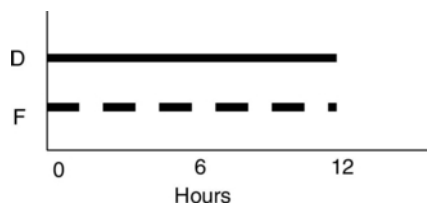
2. P+F (HC B OR F3)



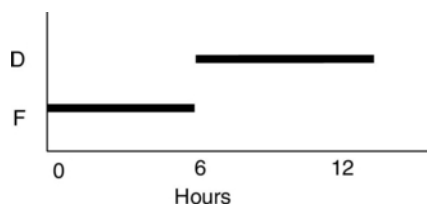
3. P+F (HC B OR F3) or HC/B OR F3



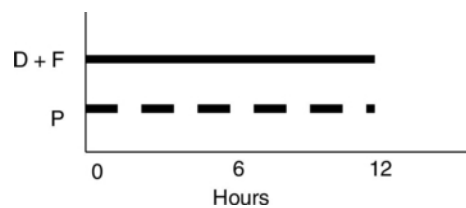
4. D+F (HR B OR F3) or $D_1 + D_2 + F$ (HR B OR F3)



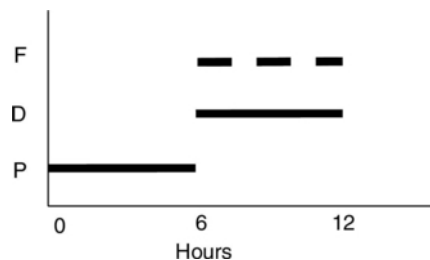
5. D+F (HR B OR F3) or $D_1 + D_2 + F$ (HR B OR F3)



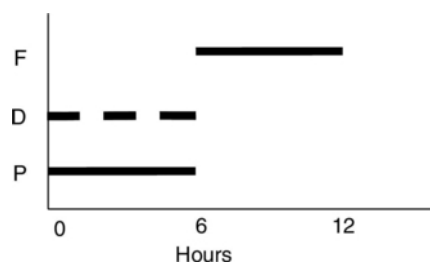
6. $P+D+F$ (HCR B OR F3) or $P+D_1+D_2+F$ (HCR HR B OR F3)



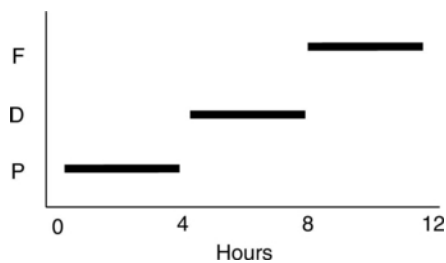
7. $P+D+F$ (HC/R B OR F3) or $P+D_1+D_2+F$ (HC/R HR B OR F3)



8. $P+D+F$ (HCR B OR F3) or $P+D_1+D_2+F$ (HCR HR B OR F3)



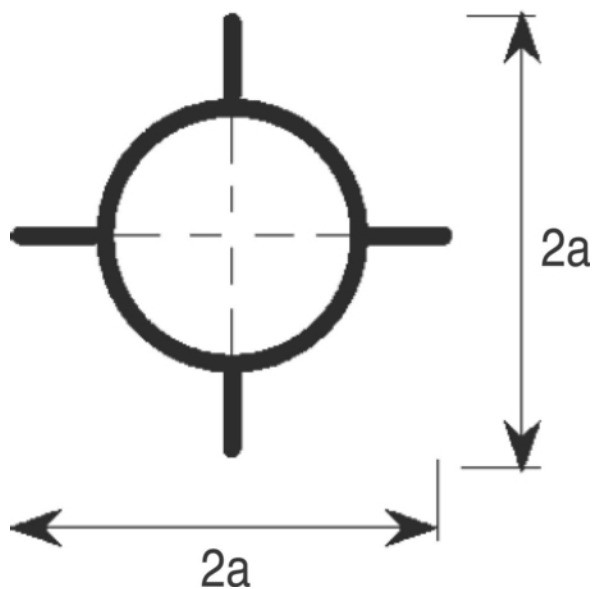
9. $P+D+F$ (HC/R B OR F3) or $P+D_1+D_2+F$ (HC/R HR B OR F3)



ANNEX 11

CENTRE OF REFERENCE

Diameter = $a = 2 \text{ mm min.}$



This optional mark of the centre of reference shall be positioned on the lens at its intersection with the reference axis of the front fog lamp.

The above drawing represents the mark of the centre of reference as projected on a plane substantially tangential to the lens about the centre of the circle. The lines constituting this mark may either be solid or dotted.

—

ANNEX 12

Requirements in case of use of led module(s) or of light-generators

1. GENERAL SPECIFICATIONS

- 1.1. Each LED module or light-generator sample submitted shall conform to the relevant specifications of this Regulation when tested with the electronic light source control-gear(s) supplied, if any.
- 1.2. LED modules or light-generators shall be so designed as to be, and to remain, in good working order when in normal use. They shall moreover exhibit no fault in design or manufacture.
- 1.3. LED modules or light-generators shall be tamperproof.
- 1.4. The design of removable LED modules shall be such that:
 - 1.4.1. after removal and replacement of the module the photometric requirements of the headlamp shall still be met;
 - 1.4.2. non-identical LED modules within the same lamp housing cannot be interchanged.
- 1.5. In the case of LED modules:
 - 1.5.1. the geometric position and dimensions of the elements for optical radiation and shielding, if any, shall be as indicated on the submitted data sheet.
 - 1.5.2. the measurement shall be made using optical methods through the transparent envelope, after ageing with the light source supplied by the electronic light source control-gear at test voltage.
 - 1.5.3. the position and dimension and transmission of the stripes or shields, if any, shall be as indicated on the submitted data sheet.

2. MANUFACTURE

- 2.1. The transparent envelope (e.g. bulb) of the light source shall exhibit no marks or spots, which might impair their efficiency and their optical performance.
- 2.2. In case of LED modules or light-generator(s):
 - 2.2.1. the LED(s) on the LED module shall be equipped with suitable fixation elements.
 - 2.2.2. the fixation elements shall be strong and firmly secured to the light source(s) and the LED module.
 - 2.2.3. the light source in the light generator shall be equipped with suitable fixation elements.
 - 2.2.4. The fixation elements shall be strong and firmly secured to the light source(s) and the light generator.

3. TEST CONDITIONS

- 3.1. Application and relaxation
 - 3.1.1. All samples shall be tested as specified in paragraph 4.
 - 3.1.2. The type of light sources shall be as defined in Regulation No 48 paragraph 2.7.1, in particular with regard to the element of visible radiation. Other types of light sources are not permitted.

3.1.3. Operating conditions

LED module or light-generator operating conditions:

3.1.3.1. all samples shall be tested under the conditions as specified in paragraph 6.4.1.4 of this Regulation.

3.1.3.2. if not specified differently in this annex, LED modules or light-generators shall be tested inside the front fog lamp as submitted by the manufacturer.

3.1.4. Ambient temperature

For the measurement of electrical and photometric characteristics, the front fog lamp shall be operated in dry and still atmosphere at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$.

3.1.5. In case of light-generators:

3.1.5.1. Power supply

The power supply used for the starting and run-up tests shall be sufficient to secure the quick rise of the high current pulse.

3.1.5.2. Burning position

The burning position shall be as indicated by the applicant. Ageing and testing positions shall be identical. If the lamp is accidentally operated in the wrong direction, it shall be re-aged before measurements begin. During ageing and measurements no electrically conducting objects shall be allowed within a space as indicated by the applicant. Moreover stray magnetic fields shall be avoided.

3.2. Ageing

3.2.1. LED modules or light-generators shall be aged.

3.2.2. The tests below shall be carried out after ageing with the LED module(s) or light-generator(s) supplied by the submitted electronic light source control-gear at test voltage.

3.2.3. LED module(s)

Upon the request of the applicant the LED module shall be operated for 15 h and cooled down to ambient temperature before starting the tests as specified in this Regulation.

3.2.4. Filament lamps

Filament lamps shall first be aged at their test voltage for approximately one hour. For dual-filament lamps, each filament shall be aged separately.

3.2.5. Gas discharge light sources

With the exception of the starting test, all tests shall be carried out with light sources which have been aged for a minimum of 15 cycles having the following switching cycle: 45 minutes on, 15 seconds off, 5 minutes on, 10 minutes off.

4. SPECIFIC TESTS

4.1. Filament lamps approved according to Regulation No 37, gas-discharge light sources approved according to Regulation No 99 and LED modules are exempted from the tests indicated in paragraphs 4.3.1 and 4.3.2 below.

4.2. Gas discharge light sources

The starting test shall be applied to light sources which have not been aged and have not been used for a period of at least 24 hours prior to the test. The light source shall start directly and remain alight.

4.3. Run-up

4.3.1. Filament lamps are exempted from this test.

4.3.2. Gas discharge light sources

The run-up test shall be applied to light sources which have not been used for a period of at least 1 hour prior to the test. The front fog lamp shall reach at least in the point 0°, 2,5°D on the line 6 a luminous intensity:

after 1 second: 25 per cent of its objective luminous flux;

after 4 seconds: 80 per cent of its objective luminous flux.

The objective luminous flux is indicated on the submitted data sheet.

4.4. Hot re-strike

4.4.1. Filament lamps are exempted from this test.

4.4.2. Gas discharge light sources

The light source shall be started and be operated with the electronic light source control-gear at test voltage for a period of 15 minutes. The supply voltage to the electronic light source control-gear shall then be switched off for a period of 10 seconds, and be switched on again. The light source shall restart directly after being switched-off for a period of 10 seconds. After one second the light source shall emit at least 80 per cent of its objective luminous flux.

4.5. Colour rendering

4.5.1. Red content

In addition to measurements as described in paragraph 7 of part A or B to this Regulation, the minimum red content of the light of a LED module or light-generator shall be such that:

$$k_{\text{red}} = \frac{\int_{\lambda=610 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) V(\lambda) d\lambda}{\int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) V(\lambda) d\lambda} \geq 0,05$$

where:

$E_e(\lambda)$ (unit: W) is the spectral distribution of the irradiance;

$V(\lambda)$ (unit: 1) is the spectral luminous efficiency;

λ (unit: nm) is the wavelength.

This value shall be calculated using intervals of one nanometre.

4.6. UV-radiation

The UV-radiation of the LED module or light-generator shall be such that:

$$k_{\text{UV}} = \frac{\int_{\lambda=250 \text{ nm}}^{400 \text{ nm}} E_e(\lambda) S(\lambda) d\lambda}{k_m \int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) V(\lambda) d\lambda} \leq 10^{-5} \text{ W / lm}$$

where:

$S(\lambda)$ (unit: 1) is the spectral weighting function;

$k_m = 683 \text{ lm/W}$ is the maximum value of the luminous efficacy of radiation;

(For definitions of the other symbols see paragraph 4.5.1)

This value shall be calculated using intervals of one nanometre. The UV-radiation shall be weighted according to the values as indicated in the UV table below.

UV Table

λ	$S(\lambda)$	λ	$S(\lambda)$	λ	$S(\lambda)$
250	0,430	305	0,060	355	0,00016
255	0,520	310	0,015	360	0,00013
260	0,650	315	0,003	365	0,00011
265	0,810	320	0,001	370	0,00009
270	1,000	325	0,00050	375	0,000077
275	0,960	330	0,00041	380	0,000064
280	0,880	335	0,00034	385	0,000530
285	0,770	340	0,00028	390	0,000044
290	0,640	345	0,00024	395	0,000036
295	0,540	350	0,00020	400	0,000030
300	0,300				

Values according to 'IRPA/INIRC Guidelines on limits of exposure to ultraviolet radiation'. Wavelengths (in nanometres) chosen are representative; other values should be interpolated.

4.7. Temperature stability

4.7.1. Luminous intensity

4.7.1.1. Filament lamps and gas discharge light sources are exempted from this test.

4.7.1.2. A photometric measurement shall be made after 1 minute of operation with the device at room temperature. The test point to be measured is horizontal 0° vertical 2,5°D.

4.7.1.3. The lamp shall continue operation until photometric stability has occurred. The moment at which the photometry is stable is defined as the point in time at which the variation of the photometric value is less than 3 per cent within any 15-minute period. After stability has occurred, aiming for complete photometry shall be performed in accordance with requirements of the specific device. Photometry at all test points is required for the specific device.

4.7.1.4. Calculate the ratio between the photometric test point values determined in paragraph 4.7.1.2 and the values determined in paragraph 4.7.1.3 once stability of photometry has been achieved.

4.7.1.5. Apply the ratio calculated in paragraph 4.7.1.4 to each of the remainder of the test points to create a new photometric table that describes the complete photometry based on 1 minute of operation.

4.7.1.6. The illuminance values measured after one minute and until photometric stability has occurred, shall comply with the minimum and maximum requirements.

4.7.2. Colour

The colour of the light emitted, measured after 1 minute and measured after 30 minutes of operation, shall be within the required colour boundaries in both instances.

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/wp29docsts.html>

Regulation No 20 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H4 lamps)

Revision 3

Incorporating all valid text up to:

03 series of amendments — Date of entry into force: 9 September 2001

CONTENTS

REGULATION

A. ADMINISTRATIVE PROVISIONS

0. Scope
1. Definitions
2. Application for approval of a headlamp
3. Markings
4. Approval

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS

5. General specifications
6. Illumination
7. Provisions concerning coloured lenses and filters
8. Gauging of discomfort
9. Standard (reference) headlamp
10. Observation concerning colour

C. FURTHER ADMINISTRATIVE PROVISIONS

11. Modification of the headlamp type and extension of approval
12. Conformity of production
13. Penalties for non-conformity of production
14. Production definitely discontinued
15. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments
16. Transitional provisions

ANNEXES

- Annex 1 — Communication concerning the approval or refusal or extension or withdrawal of approval (or production definitely discontinued) for a type of headlamp pursuant to Regulation No 20
- Annex 2 — Arrangements of approval marks
- Annex 3 — Measuring screen
- Annex 4 — Tests for stability of photometric performance of headlamps in operation
- Annex 5 — Minimum requirements for conformity of production control procedures
- Annex 6 — Requirements for lamps incorporating lenses of plastic material — testing of lens or material samples and of complete lamps
- Annex 7 — Minimum requirements for sampling by an inspector

A. ADMINISTRATIVE PROVISIONS

0. SCOPE ⁽¹⁾

This Regulation applies to motor vehicle headlamps which may incorporate lenses of glass or plastic material.

1. DEFINITIONS

For the purpose of this Regulation,

- 1.1. 'Lens' means the outermost component of the headlamp (unit) which transmits light through the illuminating surface;
- 1.2. 'Coating' means any product or products applied in one or more layers to the outer face of a lens;
- 1.3. Headlamps of different 'types' are headlamps which differ in such essential respects as:
- 1.3.1. the trade name or mark;
- 1.3.2. the characteristics of the optical system;
- 1.3.3. the inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation. However, the fitting or elimination of filters intended solely to change the colour of the beam but not its light distribution does not entail a change of type;
- 1.3.4. suitability for right-hand or left-hand traffic or for both traffic systems;
- 1.3.5. the kind of beam produced (passing beam, driving beam or both);
- 1.3.6. the materials constituting the lenses and coating, if any.

2. APPLICATION FOR APPROVAL OF A HEADLAMP ⁽²⁾

- 2.1. The application for approval shall be submitted by the owner of the trade name or mark or by his duly accredited representative. It shall specify:
- 2.1.1. whether the headlamp is intended to provide both a passing beam and a driving beam or only one of these beams;

⁽¹⁾ Nothing in this Regulation shall prevent a Party to the Agreement applying this regulation from prohibiting the combination of a headlamp incorporating a lens of plastic material approved under this Regulation with a mechanical headlamp-cleaning device (with wipers).

⁽²⁾ Application for approval of a filament lamp: see Regulation No 37.

- 2.1.2. whether, if the headlamp is intended to provide a passing beam, it is designed for both left-hand and right-hand traffic or for either left-hand or right-hand traffic only.
- 2.1.3. if the headlamp is equipped with an adjustable reflector, the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle.
- 2.2. Every application for approval shall be accompanied by:
 - 2.2.1. drawings in triplicate in sufficient detail to permit identification of the type and representing a frontal view of the headlamp, with details of lens ribbing if any, and the cross-section; the drawings shall indicate the space reserved for the approval mark;
 - 2.2.1.1. if the headlamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle, if the headlamp is for use in that (those) position(s) only;
 - 2.2.2. a brief technical description;
 - 2.2.3. two samples of the type of headlamp;
 - 2.2.3.1. for the testing of a coloured filter or coloured screen (or of a coloured lens): two samples.
 - 2.2.4. For the test of plastic material of which the lenses are made:
 - 2.2.4.1. thirteen lenses;
 - 2.2.4.1.1. six of these lenses may be replaced by six samples of material at least 60 × 80 mm in size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 × 15 mm;
 - 2.2.4.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;
 - 2.2.4.2. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.
- 2.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.
- 2.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control on conformity of production before type approval is granted.
- 3. MARKINGS ⁽³⁾
 - 3.1. Headlamps submitted for approval shall bear the trade name or mark of the applicant.
 - 3.2. They shall comprise, on the lens and on the main body ⁽⁴⁾, spaces of sufficient size for the approval mark and the additional symbols referred to in paragraph 4; these spaces shall be indicated on the drawings referred to in paragraph 2.2.1 above.

⁽³⁾ In the case of headlamps designed to meet the requirements of traffic moving on one side of the road only (either right or left), it is further recommended that the area which can be occulted to prevent discomfort to users in a country where traffic moves on the side of the road opposite to that of the country for which the headlamp was designed should be outlined indelibly on the front lens. This marking is not necessary, however, where the area is clearly apparent from the design.

⁽⁴⁾ If the lens cannot be detached from the main body of the headlamp, a space on the lens shall be sufficient.

3.3. Headlamps

designed to satisfy the requirements both of right-hand and of left-hand traffic shall bear markings indicating the two settings of the optical unit on the vehicle or of the filament lamp on the reflector; these markings shall consist of the letters 'R/D' for the position for right-hand traffic and the letters 'L/G' for the position for left-hand traffic.

4. APPROVAL

4.1. General

4.1.1. If all the samples of a type of headlamp submitted pursuant to paragraph 2 above satisfy the provisions of this Regulation, approval shall be granted.

4.1.2. Where grouped, combined or reciprocally incorporated lamps satisfy the requirements of more than one Regulation, a single international approval mark may be affixed provided that each of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it.

4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 02) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of headlamp covered by this Regulation, except if the approval is extended to a device which only differs from the already approved device by the colour of the light emitted.

4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of headlamp pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model shown in Annex 1 to this Regulation, with the indications according to paragraph 2.2.1.1.

4.1.4.1. if the headlamp is equipped with an adjustable reflector and if this headlamp is to be used only in mounting positions according to the indications in paragraph 2.2.1.1, the applicant shall be obliged by the Approval Authority to inform the user in a proper way about the correct mounting position(s).

4.1.5. In addition to the mark prescribed in paragraph 3.1, an approval mark as described in paragraphs 4.2 and 4.3 below shall be affixed in the spaces referred to in paragraph 3.2 above to every headlamp conforming to a type approved under this Regulation.

4.2. Composition of the approval mark

The approval mark shall consist of:

4.2.1. An international approval marking, comprising:

4.2.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽⁵⁾;

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

- 4.2.1.2. the approval number prescribed in paragraph 4.1.3 above;
- 4.2.2. the following additional symbol (or symbols):
 - 4.2.2.1. on headlamps meeting left-hand traffic requirements only, a horizontal arrow pointing to the right of an observer facing the headlamp, i.e. to the side of the road on which the traffic moves;
 - 4.2.2.2. on headlamps designed to meet the requirements of both traffic systems by means of an appropriate adjustment of the setting of the optical unit or the filament lamp, a horizontal arrow with a head on each end, the heads pointing respectively to the left and to the right;
 - 4.2.2.3. on headlamps meeting the requirements of this Regulation in respect of the passing beam only, the letters 'HC';
 - 4.2.2.4. on headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letters 'HR';
 - 4.2.2.5. on headlamps meeting the requirements of this Regulation in respect of both the passing beam and the driving beam, the letters 'HCR';
 - 4.2.2.6. on headlamps incorporating a lens of plastic material, the group of letters 'PL' to be affixed near the symbols prescribed in paragraphs 4.2.2.3 to 4.2.2.5 above;
 - 4.2.2.7. on headlamps meeting the requirements of this Regulation in respect of the driving beam, an indication of the maximum luminous intensity expressed by a reference mark, as defined in paragraph 6.3.2.1.2 below, placed near the circle surrounding the letter 'E';

In the case of reciprocally incorporated headlamps, indication of the maximum luminous intensity of the driving beams as a whole shall be expressed as above.

- 4.2.3. In every case the relevant operating mode used during the test procedure according to paragraph 1.1.1.1 of Annex 4 and the permitted voltage(s) according to paragraph 1.1.1.2 of Annex 4 shall be stipulated on the approval forms and on the communication forms transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation.

In the corresponding cases the device shall be marked as follows:

- 4.2.3.1. On headlamps meeting the requirements of this Regulation which are so designed that the filament of the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated: an oblique stroke (/) shall be placed behind the passing lamp symbol in the approval mark.
- 4.2.3.2. On headlamps meeting the requirements of Annex 4 to this Regulation only when supplied with a voltage of 6 V or 12 V, a symbol consisting of the number 24 crossed out by an oblique cross (x), shall be placed near the filament lamp holder.
- 4.2.4. The two digits of the approval number (at present 02) which indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.
- 4.2.5. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 above shall be clearly legible and be indelible even when the headlamp is fitted in the vehicle.

4.3. Arrangement of the approval mark

4.3.1. Independent lamps

Annex 2, figures 1 to 9, to this Regulation gives examples of arrangements of the approval mark with the abovementioned additional symbols.

4.3.2. Grouped, combined or reciprocally incorporated lamps

4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:

4.3.2.1.1. it is visible after their installation;

4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.

4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval, and if necessary, the required arrow shall be marked:

4.3.2.2.1. either on the appropriate light-emitting surface,

4.3.2.2.2. or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified (see four possible examples in Annex 2).

4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.

4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.

4.3.2.5. Annex 2, figure 10, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the abovementioned additional symbols.

4.3.3. Lamps, the lens of which are used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps

The provisions laid down in paragraph 4.3.2 above are applicable.

4.3.3.1. In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.2 above and bears the approval marks of the actual functions.

If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

4.3.3.2. Annex 2, figure 11, to this Regulation gives examples of arrangements of approval marks relating to the above case.

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS ⁽⁶⁾

5. GENERAL SPECIFICATIONS

- 5.1. Each sample shall conform to the specifications set forth in paragraphs 6 to 8 below.
- 5.2. Headlamps shall be so made as to retain their prescribed photometric characteristics and to remain in good working order when in normal use, in spite of the vibrations to which they may be subjected.
- 5.2.1. Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicles as to comply with the rules applicable to them. Such a device need not be fitted on units in which the reflector and the diffusing lens cannot be separated, provided the use of such units is confined to vehicles on which the headlamp setting can be adjusted by other means. Where a headlamp providing a passing beam and a headlamp providing a driving beam, each equipped with its own filament lamp, are assembled to form a composite unit the adjusting device shall enable each optical system individually to be duly adjusted.
- 5.2.2. However, these provisions shall not apply to headlamp assemblies whose reflectors are indivisible. For this type of assembly the requirements of paragraph 6.3 of this Regulation shall apply.
- 5.3. The components by which the filament lamp is fixed to the reflector shall be so made that, even in darkness, the filament lamp can be fixed in no position but the correct one ⁽⁷⁾. The filament lamp holder shall conform to the characteristics given on data sheet 7005-39-1 of IEC Publication 61-2, third edition, 1969.
- 5.4. Headlamps designed to satisfy the requirements both of right-hand and of left-hand traffic may be adapted for traffic on a given side of the road either by an appropriate initial setting when fitted on the vehicle or by selective setting by the user. Such initial or selective setting may consist, for example, of fixing either the optical unit at a given angle on the vehicle or the filament lamp at a given angle in relation to the optical unit. In all cases, only two different and clearly distinct settings, one for right-hand and one for left-hand traffic, shall be possible, and the design shall preclude inadvertent shifting from one setting to the other or setting in an intermediate position. Where two different setting positions are provided for the filament lamp, the components for attaching the filament lamp to the reflector must be so designed and made that, in each of its two settings, the filament lamp will be held in position with the precision required for headlamps designed for traffic on only one side of the road. Conformity with the requirements of this paragraph shall be verified by visual inspection and, where necessary, by a test fitting.
- 5.5. Complementary tests shall be done according to the requirements of Annex 4 to ensure that in use there is no excessive change in photometric performance.
- 5.6. If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of Annex 6.

6. ILLUMINATION

6.1. General provisions

- 6.1.1. Headlamps shall be so made that with suitable H4 filament lamps they give adequate illumination without dazzle when emitting the passing beam, and good illumination when emitting the driving beam.
- 6.1.2. The illumination produced by the headlamp shall be determined by means of a vertical screen set up 25 m forward of the headlamp and at right angles to its axes as shown in Annex 3 to this Regulation.

⁽⁶⁾ Technical requirements for filament lamps: see Regulation No 37.

⁽⁷⁾ A headlamp is regarded as satisfying the requirements of this paragraph if the filament lamp can be easily fitted into the headlamp and the feather keys can be correctly fitted into their slots even in darkness.

- 6.1.3. The headlamps shall be checked by means of an uncoloured standard (reference) filament lamp designed for a rated voltage of 12 V. In the case of headlamps which may be fitted with selective-yellow filters ⁽⁸⁾, such filters shall be replaced by geometrically identical uncoloured filters with a transmission factor of at least 80 per cent. During the checking of the headlamp, the voltage at the terminals of the filament lamp must be regulated so as to obtain the following characteristics:

	Consumption in watts	Light flux in lumens
passing filament	about 55	750
driving filament	about 60	1 250

The headlamp shall be considered acceptable if it meets the requirements of this paragraph 6 with at least one standard (reference) filament lamp, which may be submitted with the headlamp.

- 6.1.4. The dimensions determining the position of the filaments inside the standard filament lamp are shown in the relevant data sheets of Regulation No 37.

- 6.1.5. The bulb of the standard filament lamp must be of such shape and optical quality that it does not cause any reflection or refraction adversely affecting the light distribution. Compliance with this requirement shall be checked by measuring the light distribution obtained when a standard (reference) headlamp is fitted with the standard (reference) filament lamp (see paragraph 9 below).

6.2. Provisions concerning passing beams

- 6.2.1. The passing beam must produce a sufficiently sharp 'cut-off' to permit a satisfactory adjustment with its aid. The 'cut-off' must be a horizontal straight line on the side opposite to the direction of the traffic for which the headlamp is intended; on the other side, it must not extend beyond either the broken line HV H1 H4 formed by a straight line HV H1 making a 45° angle with the horizontal and the straight line H1 H4, 25 cm above the straight line hh, or the straight line HV H3, inclined at an angle of 15° above the horizontal (see Annex 3). A 'cut-off' extending beyond both line HV H2 and line H2H4 and resulting from a combination of the two above possibilities shall in no circumstances be permitted.

- 6.2.2. The headlamp shall be so aimed that

- 6.2.2.1. in the case of headlamps designed to meet the requirements of right-hand traffic, the 'cut-off' on the left-half of the screen ⁽⁹⁾ is horizontal and, in the case of headlamps designed to meet the requirements of left-hand traffic, the 'cut-off' on the right-half of the screen is horizontal;

- 6.2.2.2. this horizontal part of the 'cut-off' is situated on the screen 25 cm below the level hh (see Annex 3);

- 6.2.2.3. the 'elbow' of the 'cut-off' is on line vv. ⁽¹⁰⁾

- 6.2.3. When so aimed, the headlamp need, if its approval is sought solely for provision of a passing beam ⁽¹¹⁾, comply only with the requirements set out in paragraphs 6.2.5 to 6.2.7 below; if it is intended to provide both a passing beam and a driving beam, it shall comply with the requirements set out in paragraphs 6.2.5 to 6.2.7 and 6.3.

⁽⁸⁾ These filters shall consist of all components, including the lens, intended to colour the light (except those forming part of the filament lamp itself).

⁽⁹⁾ The test screen must be sufficiently wide to allow examination of the 'cut-off' over a range of at least 5° on either side of the line vv.

⁽¹⁰⁾ If the beam does not have a cut-off with a clear 'elbow', the lateral adjustment shall be effected in the manner which best satisfies the requirements for illumination at points 75 R and 50 R for right-hand traffic and for points 75 L and 50 L for left-hand traffic.

⁽¹¹⁾ Such a special 'passing beam' headlamp may incorporate a driving beam not subject to requirements.

6.2.4. Where a headlamp so aimed does not meet the requirements set out in paragraphs 6.2.5 to 6.2.7 and 6.3, its alignment may be changed, provided that the axis of the beam is not displaced laterally by more than 1° (= 44 cm) to the right or left ⁽¹²⁾. To facilitate alignment by means of the 'cut-off', the headlamp may be partially occulted in order to sharpen the 'cut-off'.

6.2.5. The illumination produced on the screen by the passing beam shall meet the following requirements:

Point on measuring screen		Required illumination in lux
Headlamps for right-hand traffic	Headlamps for left-hand traffic	
Point B 50 L	Point B 50 R	$\leq 0,4$
Point 75 R	Point 75 L	≥ 12
Point 75 L	Point 75 R	≤ 12
Point 50 L	Point 50 R	≤ 15
Point 50 R	Point 50 L	≥ 12
Point 50 V	Point 50 V	≥ 6
Point 25 L	Point 25 R	≥ 2
Point 25 R	Point 25 L	≥ 2
Any point in zone III		$\leq 0,7$
Any point in zone IV		≥ 3
Any point in zone I $\leq 2 \times (E_{50R} \text{ or } E_{50L})$ (*)		
(*) E_{50R} and E_{50L} are the illuminations actually measured.		

6.2.6. There shall be no lateral variations detrimental to good visibility in any of the zones I, II, III and IV.

6.2.7. The illumination values in zones 'A' and 'B' as shown in figure C in Annex 3 shall be checked by the measurement of the photometric values of points 1 to 8 on this figure; these values shall lie within the following limits ⁽¹³⁾:

$$1 + 2 + 3 \geq 0,3 \text{ lux, and}$$

$$4 + 5 + 6 \geq 0,6 \text{ lux, and}$$

$$0,7 \text{ lux} \geq 7 \geq 0,1 \text{ lux and}$$

$$0,7 \text{ lux} \geq 8 \geq 0,2 \text{ lux}$$

These new values shall not be required for headlamps which have been approved before the application date of Supplement 3 to the 02 series of amendments to this Regulation (2 December 1992) nor to the extensions of such approvals.

6.2.8. Headlamps designed to meet the requirements of both right-hand and left-hand traffic must, in each of the two setting positions of the optical unit or of the filament lamp, meet the requirements set forth above for the corresponding direction of traffic.

⁽¹²⁾ The limit of realignment of 1° towards the right or left is not incompatible with the upward or downward vertical realignment. The latter is limited only by the requirements of paragraph 6.3. However, the horizontal part of the 'cut-off' should not extend beyond the line hh (the provisions of paragraph 6.3 are not applicable to headlamps intended to meet the requirements of this Regulation only for provision of a passing beam).

⁽¹³⁾ Illumination values in any point of zones A and B, which also lies within zone III, shall not exceed 0,7 lux.

6.3. Provisions concerning driving beams

6.3.1. In the case of a headlamp designed to provide a driving beam and a passing beam, measurements of the illumination produced on the screen by the driving beam shall be taken with the same headlamp alignment as for measurements under paragraphs 6.2.5 to 6.2.7 above; in the case of a headlamp providing a driving beam only, it shall be so adjusted that the area of maximum illumination is centred on the point of intersection of lines hh and vv; such a headlamp need meet only the requirements referred to in paragraph 6.3. Where more than one light source is used to provide the driving beam, the combined functions shall be used to determine the maximum value of the illumination (E_M).

6.3.2. The illumination produced on the screen by the driving beam shall meet the following requirements.

6.3.2.1. The point of intersection (HV) of lines hh and vv shall be situated within the isolux 80 per cent of maximum illumination. This maximum value (E_M) shall not be less than 48 lux. The maximum value shall in no circumstances exceed 240 lux; in addition, in the case of a combined passing and driving headlamp, this maximum value shall not be more than 16 times the illumination measured for the passing beam at point 75 R (or 75 L).

6.3.2.1.1. The maximum intensity (I_M) of the driving beam expressed in thousands of candelas shall be calculated by the formula

$$I_M = 0,625 E_M$$

6.3.2.1.2. The reference mark (I'_M) of this maximum intensity, referred to in paragraph 4.2.2.7 above, shall be obtained by the ratio

$$I'_M = \frac{I_M}{3} = 0,208 E_M$$

This value shall be rounded off to the value 7,5-10-12,5-17,5-20-25-27,5-30-37,5-40-45-50.

6.3.2.2. Starting from point HV, horizontally to the right and left, the illumination shall be not less than 24 lux up to a distance of 1,125 m and not less than 6 lux up to a distance of 2,25 m.

6.4. In the case of headlamps with an adjustable reflector the requirements of paragraphs 6.2 and 6.3 are applicable for each mounting position indicated according to paragraph 2.1.3. For verification the following procedure shall be used:

6.4.1. each applied position is realised on the test goniometer with respect to a line joining the centre of the light source and point HV on the aiming screen. The adjustable reflector is then moved into such a position that the light pattern on the screen corresponds to the aiming prescriptions of paragraphs 6.2.1 to 6.2.2.3 and/or 6.3.1;

6.4.2. with the reflector initially fixed according to paragraph 6.4.1, the headlamp must meet the relevant photometric requirements of paragraphs 6.2 and 6.3;

6.4.3. additional tests are made after the reflector has been moved vertically +/- 2 degrees or at least into the maximum position, if less than 2°, from its initial position by means of the headlamps adjusting device. Having re-aimed the headlamp as a whole (by means of the goniometer for example) in the corresponding opposite direction the light output in the following directions shall be controlled and lie within the required limits:

passing beam: points HV and 75R (75L respectively);

driving beam: I_M and point HV (percentage of I_M).

6.4.4. if the applicant has indicated more than one mounting position, the procedure of paragraphs 6.4.1 to 6.4.3 shall be repeated for all the other positions;

6.4.5. if the applicant has not asked for special mounting positions, the headlamp shall be aimed for measurements of paragraphs 6.2 and 6.3 with the headlamps adjusting device in its mean position. The additional tests of paragraph 6.4.3 shall be made with the reflector moved into its extreme positions (instead of $\pm 2^\circ$) by means of the headlamps adjusting device.

6.5. The screen illumination values mentioned in paragraphs 6.2.5 to 6.2.7 and 6.3 above shall be measured by means of a photo-receptor, the effective area of which shall be contained within a square of 65 mm side.

7. PROVISIONS CONCERNING COLOURED LENSES AND FILTERS

7.1. Approval may be obtained for headlamps emitting either white or selective-yellow lights with an uncoloured filament lamp.

Expressed in CIE trichromatic coordinates, the corresponding colorimetric characteristics for yellow lenses or filters are as follows:

Selective-yellow filter (screen or lens)

Limit towards red $y \geq 0,138 + 0,58 x$

Limit towards green $y \leq 1,29 x - 0,1$

Limit towards white $y \geq -x + 0,996$

Limit towards spectral value $y \geq -x + 0,992$

which can also be expressed as follows:

dominant wavelength 575-585 nm

purity factor 0,90-0,98

The transmission factor must be $\geq 0,78$

The transmission factor shall be determined by using a light source with a colour temperature of 2 856 K ⁽¹⁴⁾.

7.2. The filter must be part of the headlamp, and must be attached to it in such a way that the user cannot remove it either inadvertently or, with ordinary tools, intentionally.

8. GAUGING OF DISCOMFORT

The discomfort caused by the passing beam of headlamps shall be gauged ⁽¹⁵⁾.

9. STANDARD (REFERENCE) HEADLAMP ⁽¹⁶⁾

A headlamp shall be deemed to be a standard (reference) headlamp if it

9.1. satisfies the abovementioned requirements for approval;

9.2. has an effective diameter of not less than 160 mm;

9.3. provides, with a standard (reference) filament lamp, at the various points and in the various zones referred to in paragraph 6.2.5, illumination equal to:

9.3.1. not more than 90 per cent of the maximum limits, and

⁽¹⁴⁾ Corresponding to illuminant A of the international commission on illumination (CIE).

⁽¹⁵⁾ This requirement will be the subject of a recommendation to administrations.

⁽¹⁶⁾ Different values may be accepted provisionally. In the absence of definitive specifications, the use of an approved headlamp is recommended.

- 9.3.2. not less than 120 per cent of the minimum limits, prescribed in the table in paragraph 6.2.5.

10. OBSERVATION CONCERNING COLOUR

Since any approval under this Regulation is granted, pursuant to paragraph 7.1 above, for a type of headlamp emitting either white light or selective-yellow light, Article 3 of the Agreement to which the Regulation is annexed shall not prevent the Contracting Parties from prohibiting headlamps emitting a beam of white or selective-yellow light on vehicles registered by them.

C. FURTHER ADMINISTRATIVE PROVISIONS

11. MODIFICATION OF THE HEADLAMP TYPE AND EXTENSION OF APPROVAL

- 11.1. Every modification of the headlamp type shall be notified to the administrative department which approved the headlamp type. The said department may then either:

- 11.1.1. Consider that the modifications made are unlikely to have appreciable adverse effects and that in any event the headlamp still complies with the requirements; or

- 11.1.2. Require a further test report from the technical service responsible for conducting the tests.

- 11.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 above to the Parties to the Agreement which apply this Regulation.

- 11.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

12. CONFORMITY OF PRODUCTION

- 12.1. Headlamps 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.

- 12.2. In order to verify that the requirements of paragraph 12.1 are met, suitable controls of the production shall be carried out.

- 12.3. The holder of the approval shall in particular:

- 12.3.1. ensure the existence of procedures for the effective control of the quality of products;

- 12.3.2. have access to the control equipment necessary for checking the conformity to each approved type;

- 12.3.3. ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the administrative service;

- 12.3.4. analyse the results of each type of test in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production;

- 12.3.5. ensure that for each type of product at least the tests prescribed in Annex 4 to this Regulation are carried out;

- 12.3.6. ensure that any collecting of samples giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

- 12.4. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit.
- 12.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.
- 12.4.2. The inspector may take samples at random to be tested in the manufacturer's laboratory. The minimum number of samples may be determined in the light of the results of the manufacturer's own checks.
- 12.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in the application of paragraph 12.4.2 above, the inspector shall select samples, to be sent to the technical service which has conducted the type approval tests, using the criteria of Annex 7.
- 12.4.4. The competent authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with the criteria of Annex 7.
- 12.4.5. The competent authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the competent authority and their confidence in the arrangements for ensuring effective control of the conformity of production. In the case where negative results are recorded, the competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.
- 12.5. Headlamps with apparent defects are disregarded.
- 12.6. The reference mark is disregarded.
13. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 13.1. The approval granted in respect of a type of headlamp pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a headlamp bearing the approval mark does not conform to the type approved.
- 13.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
14. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of headlamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
15. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.

16. TRANSITIONAL PROVISIONS

- 16.1. As from six months after the official date of entry into force of Regulation No 112, Contracting Parties applying this Regulation shall cease to grant ECE approvals according to this Regulation.
- 16.2. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to this and any previous series of amendments of this Regulation.
- 16.3. Approvals granted under this Regulation before the date of entry into force of Regulation No 112 and all extensions of approvals, including those to a preceding series of amendments to this Regulation granted subsequently, shall remain valid indefinitely.
- 16.4. Contracting Parties applying this Regulation shall continue to issue approvals for headlamps on the basis of this and any previous series of amendments to this Regulation, provided that the headlamps are intended as replacements for fitting to vehicles in use.
- 16.5. As from the official date of entry into force of Regulation No 112, no Contracting Party applying this Regulation shall prohibit the fitting on a new vehicle type of a headlamp approved under Regulation No 112.
- 16.6. Contracting Parties applying this Regulation shall continue to allow fitting on a vehicle type or vehicle of a headlamp approved to this Regulation.
- 16.7. Contracting Parties applying this Regulation shall continue to allow fitting or use on a vehicle in use of a headlamp approved to this Regulation as amended by any previous series of amendments, provided that the headlamp is intended for replacement.
-

ANNEX 1

COMMUNICATION

Maximum format: A4 (210 × 297 mm)



issued by: Name of administration:

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

concerning ⁽²⁾: APPROVAL GRANTED
APPROVAL EXTENDED
APPROVAL REFUSED
APPROVAL WITHDRAWN
PRODUCTION DEFINITELY DISCONTINUED

of a type of headlamp pursuant to Regulation No 20

Approval No Extension No

1. Trade name or mark of the device:
2. Manufacturer's name for the type of device:
3. Manufacturer's name and address:
4. If applicable, name and address of the 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. Brief description:

Category as described by the relevant marking ⁽³⁾:

Colour of light emitted: white/selective yellow ⁽²⁾
10. Position of the approval mark:
11. Reason(s) for extension (if applicable):
12. Approval granted/refused/extended/withdrawn ⁽²⁾:
13. Place:
14. Date:

15. Signature:

16. The list of documents deposited with the administrative service which has granted approval is annexed to this communication and may be obtained on request.

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

(2) Strike out what does not apply.

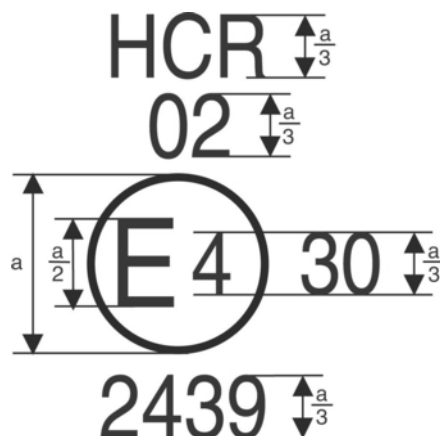
(3) Indicate the appropriate marking selected from the list below:

HC, HC, HC, HR, HR PL, HCR, HCR, HCR,
 $\rightarrow$ $\leftrightarrow$
 HC/R, HC/R, HC/R, HC/, HC/, HC/, HC PL, HC PL, HC PL,
 $\rightarrow$ $\leftrightarrow$ $\rightarrow$ $\leftrightarrow$
 HCR PL, HCR PL, HCR PL, HC/R PL, HC/R PL, HC/R PL,
 $\rightarrow$ $\leftrightarrow$
 HC/PL, HC/PL, HC/PL
 $\rightarrow$ $\leftrightarrow$

ANNEX 2

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS

Figure 1



$a = 12 \text{ mm min.}$

The headlamp bearing the approval marking shown above is a headlamp approved in the Netherlands (E4), under approval number 2439, meeting the requirements of this Regulation, as amended by the 02 series of amendments (02), in respect of both the driving beam and the passing beam (HCR) and which is designed for right-hand traffic only.

The figure 30 indicates that the maximum intensity of the driving beam is between 86 250 and 101 250 candelas.

Note: The approval number and the additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Figure 2

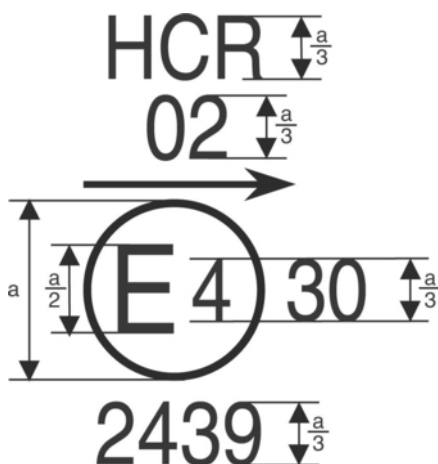
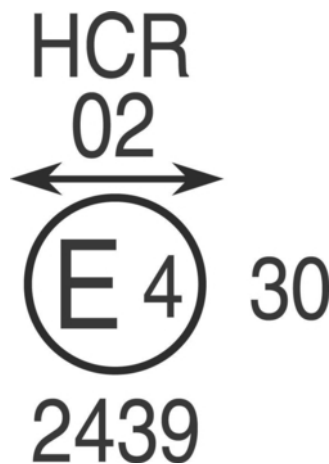


Figure 3a



$a = 12 \text{ mm min.}$

Figure 3b



The headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation with respect to both the passing beam and the driving beam and designed:

For left-hand traffic only.

For both traffic systems by means of an adjustment as desired of the setting of the optical unit or the filament lamp

Figure 4

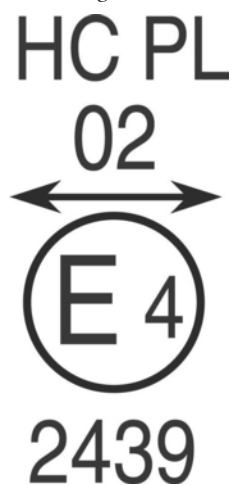


Figure 5



The headlamp bearing the approval mark shown above is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation with respect to the passing beam only, and designed:

For both traffic systems

For right-hand traffic only

Figure 6

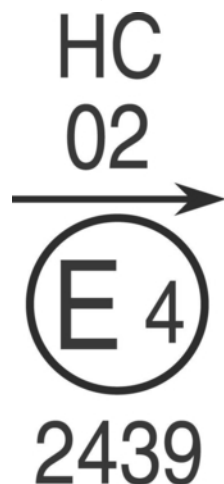
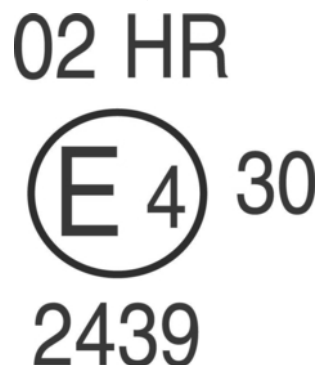


Figure 7



The headlamp bearing the approval mark shown above is a headlamp meeting the requirements of this Regulation:

With respect to the passing beam only, and designed for left-hand traffic only.

With respect to the driving beam only.

Figure 8

HC/R PL
02

2439

Figure 9

HC/ PL
02

2439

Identification of a headlamp incorporating the lens of plastic material meeting the requirements of Regulation No 20:

For the passing beam only and designed for left-hand traffic only.

For both the passing beam and the driving beam
and designed for right-hand traffic only.

For the passing beam only and designed for left-
hand traffic only.

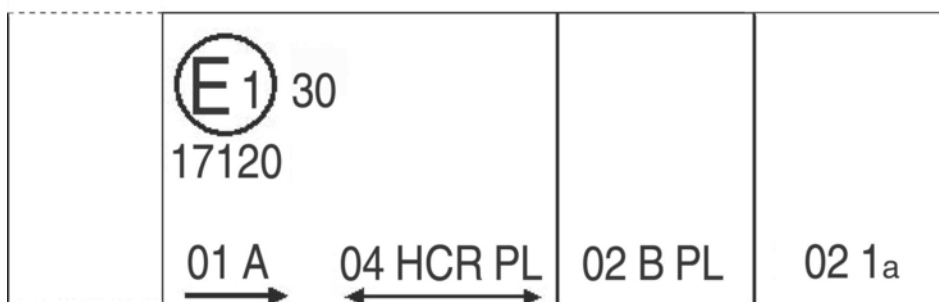
The passing lamp filament shall not be lit simultaneously with the driving lamp filament and/or any other headlamp with which it is reciprocally incorporated.

Simplified marking for grouped, combined or reciprocally incorporated lamps

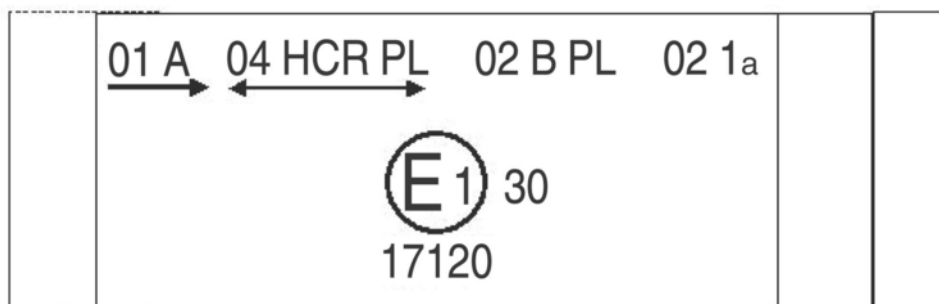
Figure 10

(The vertical and horizontal lines schematise the shape of the light-signalling device. They are not part of the approval mark.)

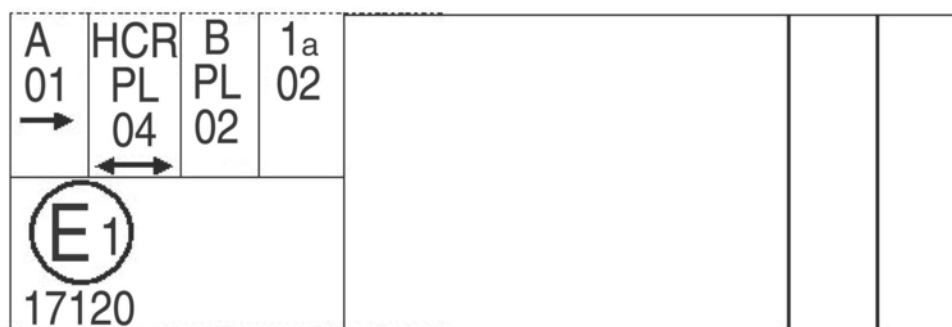
MODEL A



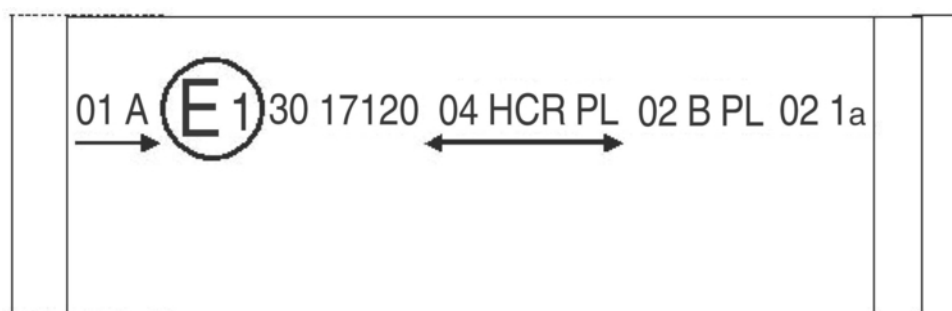
MODEL B



MODEL C



MODEL D



Note: The four examples shown above correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No 7;

A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas (as indicated by the number 30), approved in accordance with the 02 series of amendments to Regulation No 20 and incorporating a lens of plastic material;

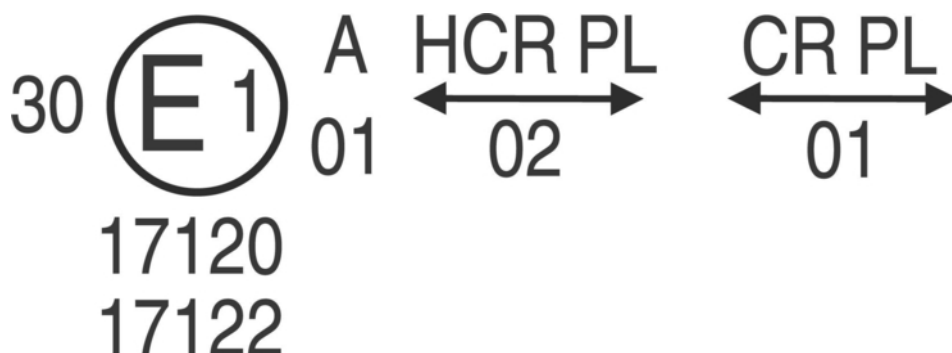
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No 6.

Lamp reciprocally incorporated with a headlamp

Figure 11

Example 1



The above example corresponds to the marking of a lens of plastic material intended to be used in different types of headlamps, namely:

either: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No 20 as amended by the 02 series of amendments, which is reciprocally incorporated with

a front position lamp approved in accordance with the 01 series of amendments to Regulation No 7;

or: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No 1 as amended by the 01 series of amendments, which is reciprocally incorporated with

the same front position lamp as above;

or even: either of the abovementioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:

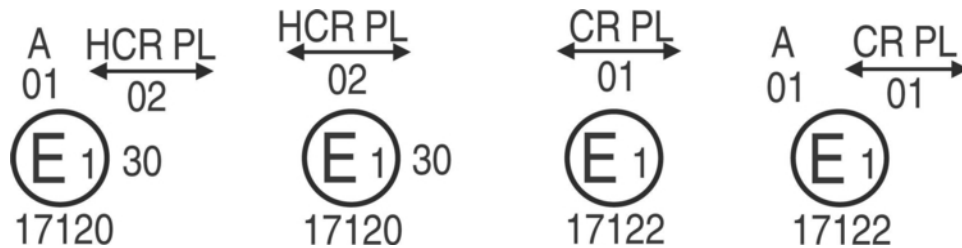
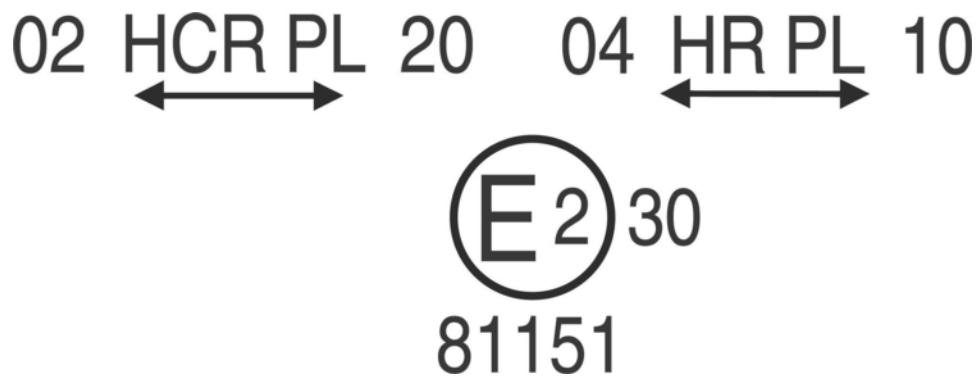


Figure 11 (continued)

Example 2



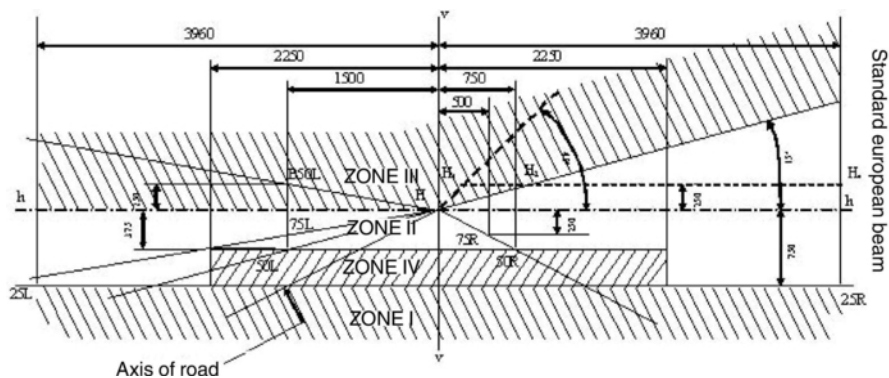
The above example corresponds to the marking of a lens of plastic material used in an assembly of two headlamps approved in France (E2), consisting of a headlamp emitting a passing beam designed for both traffic systems and of a driving beam with a maximum intensity comprised between x and y candelas, meeting the requirements of Regulation No 20, and of a headlamp emitting a driving beam with a maximum intensity comprised between w and z candelas, meeting the requirements of Regulation No 8 or Regulation No 20, the maximum intensity of all the driving beams being comprised between 86 250 and 101 250 candelas.

ANNEX 3

MEASURING SCREEN

A. Headlamp for right-hand traffic

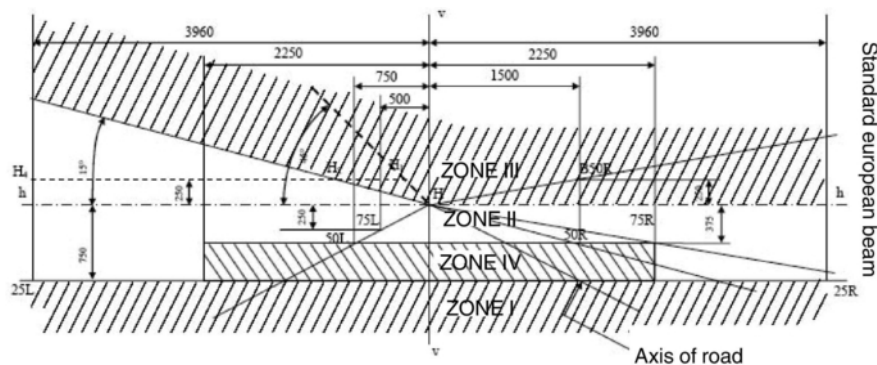
(Dimensions in mm)



h-h: horizontal plane } passing through focus of headlamp
 v-v: vertical plane }

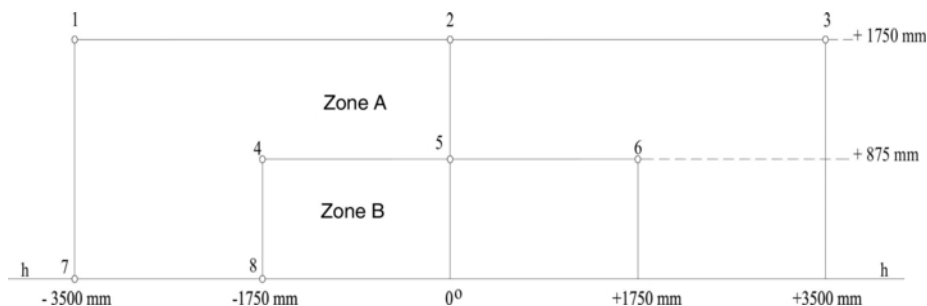
B. Headlamp for left-hand traffic

(Dimensions in mm)



h-h: horizontal plane } passing through focus of headlamp
 v-v: vertical plane }

Figure C



Note: Figure C shows the measuring points for right-hand traffic. Points 7 and 8 move to their corresponding location at the right-hand side of the picture for left-hand traffic.

ANNEX 4

Tests for stability of photometric performance of headlamps in operation

TESTS ON COMPLETE HEADLAMPS

Once the photometric values have been measured according to the prescriptions of this Regulation, in the point for $E_{\max}$ for driving beam and in points HV, 50 R, B 50 L for passing beam (or HV, 50 L, B 50 R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. 'Complete headlamp' shall be understood to mean the complete lamp itself including those surrounding body parts and lamps which could influence its thermal dissipation.

1. TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of $23\text{ °C} \pm 5\text{ °C}$, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clean headlamp

The headlamp shall be operated for 12 hours as described in subparagraph 1.1.1 and checked as prescribed in subparagraph 1.1.2.

1.1.1. Test procedure

The headlamp shall be operated for a period according to the specified time, so that:

- 1.1.1.1. (a) In the case where only one lighting function (driving or passing beam) is to be approved, the corresponding filament is lit for the prescribed time ⁽¹⁾;
- (b) In the case of a reciprocally incorporated passing lamp and driving lamp (dual filament lamp or two filament lamps):

If the applicant declares that the headlamp is to be used with a single filament lit ⁽²⁾ at a time, the test shall be carried out in accordance with this condition, activating ⁽¹⁾ each specified function successively for half the time specified in paragraph 1.1;

In all other cases ⁽²⁾ ⁽¹⁾, the headlamp shall be subjected to the following cycle until the time specified is reached:

15 minutes, passing-beam filament lit;

5 minutes, all filaments lit;

- (c) In the case of grouped lighting functions all the individual functions shall be lit simultaneously for the time specified for individual lighting functions (a), also taking into account the use of reciprocally incorporated lighting functions (b), according to the manufacturer's specifications.

1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply 90 per cent of the maximum wattage specified in the Regulation for filament lamps (Regulation No 37).

The applied wattage shall in all cases comply with the corresponding value of a filament lamp of 12 V rated voltage, except if the applicant for approval specifies that the headlamp may be used at a different voltage. In the latter case, the test shall be carried out with the filament lamp whose wattage is the highest that can be used.

⁽¹⁾ When the tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

⁽²⁾ Should two or more lamp filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the filaments simultaneously.

1.1.2. Test results

1.1.2.1. Visual inspection

Once the headlamp has been stabilised to the ambient temperature, the headlamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually; no distortion, deformation, cracking or change in colour of either the headlamp lens or the external lens, if any, shall be noticeable.

1.1.2.2. Photometric test

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

Passing beam:

50 R - B 50 L - HV for headlamps designed for right-hand traffic,

50 L - B 50 R - HV for headlamps designed for left-hand traffic.

Driving beam

Point of $E_{\max}$

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in paragraph 2 of this Annex).

A 10 per cent discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty headlamp

After being tested as specified in subparagraph 1.1 above, the headlamp shall be operated for one hour as described in subparagraph 1.1.1, after being prepared as prescribed in subparagraph 1.2.1, and checked as prescribed in subparagraph 1.1.2.

1.2.1. Preparation of the headlamp

1.2.1.1. Test mixture

1.2.1.1.1. For headlamp with the outside lens in glass:

The mixture of water and a polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

1 part by weight of vegetal carbon dust (beechwood) with a particle size of 0-100 μm ,

0,2 parts by weight of NaCMC ⁽³⁾, and

an appropriate quantity of distilled water, with a conductivity of $\leq 1 \text{ mS/m}$.

The mixture must not be more than 14 days old.

1.2.1.1.2. For headlamp with outside lens in plastic material:

The mixture of water and polluting agent to be applied to the headlamp shall be composed of:

9 parts by weight of silica sand with a particle size of 0-100 μm ,

⁽³⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 cP for a 2 per cent solution at 20 °C.

1 part by weight of vegetal carbon dust (beechwood) with a particle size of 0-100 µm,

0,2 part by weight of NaCMC ⁽⁴⁾,

13 parts by weight of distilled water with a conductivity of ≤ 1 mS/m, and

2 ± 1 parts by weight of surface-actant ⁽⁵⁾

The mixture must not be more than 14 days old.

1.2.1.2. Application of the test mixture to the headlamp

The test mixture shall be uniformly applied to the entire light-emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20 per cent of the values measured for each following point under the conditions described in this Annex:

Point of $E_{\max}$ in passing beam/driving beam and in driving beam only, 50 R and 50 V ⁽⁶⁾ for a passing lamp only, designed for right-hand traffic, 50 L and 50 V ⁽⁶⁾ for a passing lamp only, designed for left-hand traffic.

1.2.1.3. Measuring equipment

The measuring equipment shall be equivalent to that used during headlamp approval tests. A standard (reference) filament lamp shall be used for the photometric verification.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp.

The headlamp tested in accordance with paragraph 1, shall be subjected to the test described in 2.1, without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

Using a mass production filament lamp which has been aged for at least one hour the headlamp shall be operated on passing beam without being dismantled from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph 1.1.1.2). The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B 50 L for right-hand traffic or B 50 R for left-hand traffic) shall be verified 3 minutes (r_3) and 60 minutes (r_{60}) respectively after operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

2.2. Test results

2.2.1. The result in milliradians (mrad) shall be considered as acceptable for a passing lamp, only when the absolute value $\Delta r_1 = |r_3 - r_{60}|$ recorded on the headlamp is not more than 1,0 mrad ($\Delta r_1 \leq 1,0$ mrad).

⁽⁴⁾ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0,6-0,7 and a viscosity of 200-300 cP for a 2 per cent solution at 20 °C.

⁽⁵⁾ The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

⁽⁶⁾ Point 50 V is situated 375 mm below HV on the vertical line V-V on the screen at 25 m distance.

- 2.2.2. However, if this value is more than 1,0 mrad but not more than 1,5 mrad ($1,0 \text{ mrad} < \Delta r_I \leq 1,5 \text{ mrad}$) a second headlamp shall be tested as described in paragraph 2.1 after being subjected three consecutive times to the cycle as described below, in order to stabilise the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing beam for one hour, (the voltage shall be adjusted as specified in paragraph 1.1.1.2),

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values Δr_I , measured on the first sample and Δr_{II} measured on the second sample is not more than 1,0 mrad.

$$\frac{\Delta r_I + \Delta r_{II}}{2} \leq 1 \text{ mrad}$$

ANNEX 5

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp:

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and zone III, the maximum unfavourable deviation may be respectively:

B 50 L (or R):	0,2 lx equivalent 20 per cent
	0,3 lx equivalent 30 per cent
Zone III:	0,3 lx equivalent 20 per cent
	0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of + 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L (or R) ⁽¹⁾ (with a tolerance of + 0,1 lx), 75 R (or L), 50 V, 25 R, 25 L, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 E_{max}, a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3.2 of this Regulation.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left ⁽²⁾.

1.2.4. If the results of the tests described above do not meet the requirements, tests of the headlamp shall be repeated using another standard filament lamp.

1.3. With respect to the verification of the change in vertical position of the cut-off line under the influence of heat, the following procedure shall be applied;

One of the sampled headlamps shall be tested according to the procedure described in paragraph 2.1 of Annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of Annex 4.

The headlamp shall be considered as acceptable if Δr does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, a second headlamp shall be subjected to the test after which the mean of absolute values recorded on both samples shall not exceed 1,5 mrad.

1.4. The chromaticity coordinates shall be complied with when the headlamp is equipped with a filament lamp set to Standard A colour temperature.

The photometric performance of a headlamp emitting selective yellow light when equipped with a colourless filament lamp shall be the values contained in this Regulation multiplied by 0,84.

⁽¹⁾ Letters in brackets refer to headlamps intended for left-hand traffic.

⁽²⁾ See the corresponding footnote in the text of the Regulation.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of headlamp 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 characteristics and the verification of the change in vertical position of the cut-off line under the influence of heat.

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 headlamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of headlamps 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 headlamp shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points $E_{\max}$, HV ⁽³⁾, HL, HR ⁽⁴⁾ in the case of the driving beam, and to points B 50 L (or R), HV, 50 V, 75 R (or L) and 25 L (or R) in the case of the passing beam (see figure in Annex 3).

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 12.1 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 7 (first sampling) would be 0,95.

⁽³⁾ When the driving beam is reciprocally incorporated with the passing beam, HV in the case of the driving beam shall be the same measuring point as in the case of the passing beam.

⁽⁴⁾ HL and HR: points on 'hh' located at 1,125 m to the left and to the right of point HV respectively.

ANNEX 6

Requirements for lamps incorporating lenses of plastic material — testing of lens or material samples and of complete lamps

1. GENERAL SPECIFICATIONS

- 1.1. The samples supplied pursuant to paragraph 2.2.4 of this Regulation shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.
- 1.2. The two samples of complete lamps supplied pursuant to paragraph 2.2.3 of this Regulation and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6 below.
- 1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in Appendix 1 to this Annex.
- 1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1 to 2.5 below, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in Appendix 1, table B, shall be mandatory.

2. TESTS

2.1. Resistance to temperature changes

2.1.1. Tests

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and 85-95 per cent RH;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH;

15 hours at $-30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH; 3 hours at $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$;

1 hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH;

Before this test, the samples shall be kept at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and 60-75 per cent RH for at least four hours.

Note: The periods of one hour at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements

2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam of a passing lamp or a passing/driving lamp (B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

E_{max} route for the driving beam of a driving lamp or a passing/driving lamp;

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10 per cent including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5 500 K and 6 000 K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2 500 nm. The samples shall be exposed to an energetic illumination of $1\,200\text{ W/m}^2 \pm 200\text{ W/m}^2$ for a period such that the luminous energy that they receive is equal to $4\,500\text{ MJ/m}^2 \pm 200\text{ MJ/m}^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50\text{ °C} \pm 5\text{ °C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min.

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of $23\text{ °C} \pm 5\text{ °C}$, in accordance with the following cycle:

spraying: 5 minutes;
drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1 above and the measurement described in paragraph 2.2.3.1 below have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2 with the mixture defined in paragraph 2.2.2.1 below.

2.2.2.1. Test mixture

The test mixture shall be composed of 61,5 per cent n-heptane, 12,5 per cent toluene, 7,5 per cent ethyl tetra-chloride, 12,5 per cent trichloroethylene and 6 per cent xylene (volume per cent).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1 above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm^2 , corresponding to an effort of 100 N applied on a test surface of $14 \times 14\text{ mm}$.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3 (Resistance to detergents) $23\text{ °C} \pm 5\text{ °C}$. Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0,2 per cent impurities at $23\text{ °C} \pm 5\text{ °C}$ and then wiped off with a soft cloth.

2.2.3. Results

2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission

$\Delta t = (T_2 - T_3)/T_2$, measured on the three samples according to the procedure described in Appendix 2 to this Annex shall not exceed 0,020

($\Delta t_m \leq 0,020$).

- 2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation $\Delta d = (T5-T4)/T2$, measured on the three samples according to the procedure described in Appendix 2 to this Annex shall not exceed 0,020

($\Delta d \leq 0,020$).

- 2.3. Resistance to detergents and hydrocarbons

- 2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to $50\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and then immersed for five minutes in a mixture maintained at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and composed of 99 parts distilled water containing not more than 0,02 per cent impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at $50\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$. The surface of the samples shall be cleaned with a moist cloth.

- 2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70 per cent n-heptane and 30 per cent toluene (volume per cent), and shall then be dried in the open air.

- 2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission $\Delta t = (T2-T3)/T2$, measured on the three samples according to the procedure described in Appendix 2 to this shall not exceed 0,010

($\Delta t \leq 0,010$).

- 2.4. Resistance to mechanical deterioration

- 2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in Appendix 3 to this Annex.

- 2.4.2. Results

After this test, the variations:

in transmission: $\Delta t = (T2-T3)/T2$,

and in diffusion: $\Delta d = (T5-T4)/T2$,

shall be measured according to the procedure described in Appendix 2 in the area specified in paragraph 2.2.4.1.1 of this Regulation. The mean value of the three samples shall be such that: $\Delta t \leq 0,100$; $\Delta d \leq 0,050$.

- 2.5. Test of adherence of coatings, if any

- 2.5.1. Preparation of the sample

A surface of $20\text{ mm} \times 20\text{ mm}$ in area of the coating of a lens shall be cut with a razor blade or a needle into a grid of squares approximately $2\text{ mm} \times 2\text{ mm}$. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force adhesion of 2 N/(cm of width) $\pm$ 20 per cent measured under the standardised conditions specified in Appendix 4 to this Annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1,5 m/s $\pm$ 0,2 m/s.

2.5.3. Results

There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15 per cent of the gridded surface.

2.6. Tests of the complete headlamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No 1 shall be subjected to the test described in paragraph 2.4.1 above.

2.6.1.2. Results

After the test, the results of photometric measurements carried out on the headlamp in accordance with this Regulation shall not exceed by more than 30 per cent the maximum values prescribed at points B 50 L and HV and not be more than 10 per cent below the minimum values prescribed at point 75 R (in the case of headlamps intended for left-hand traffic, the points to be considered are B 50 R, HV and 75 L).

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No 2 shall be subjected to the test described in paragraph 2.5 above.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognised as complying with this Regulation if:

3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paragraphs 2.2.2, 2.3.1 and 2.3.2);

3.1.2. After the test described in paragraph 2.6.1.1, the photometric values at the points of measurement considered in paragraph 2.6.1.2 are within the limits prescribed for conformity of production by this Regulation.

3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

APPENDIX 1

CHRONOLOGICAL ORDER OF APPROVAL TESTS

A. Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.4 of this Regulation)

Samples tests		Lenses or samples of material						Lenses						
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.1.	Limited photometry (paragraph 2.1.2)										x	x	x	
1.1.1.	Temperature change (paragraph 2.1.1)										x	x	x	
1.1.2	Limited photometry (paragraph 2.1.2)										x	x	x	
1.2.1.	Transmission measurement	x	x	x	x	x	x	x	x	x				
1.2.2.	Diffusion measurement	x	x	x				x	x	x				
1.3.	Atmospheric agent (paragraph 2.2.1)	x	x	x										
1.3.1.	Transmission measurement	x	x	x										
1.4.	Chemicals agents (paragraph 2.2.2)	x	x	x										
1.4.1.	Diffusion measurement	x	x	x										
1.5.	Detergents (paragraph 2.3.1)				x	x	x							
1.6.	Hydrocarbons (paragraph 2.3.2)				x	x	x							
1.6.1.	Transmission measurement				x	x	x							
1.7.	Deterioration (paragraph 2.4.1)							x	x	x				
1.7.1.	Transmission measurement							x	x	x				
1.7.2.	Diffusion measurement							x	x	x				
1.8.	Adherence (paragraph 2.5)													x

B. Tests on complete lamps (supplied pursuant to paragraph 2.2.3 of this Regulation)

Tests	Sample No	
	1	2
2.1. Deterioration (paragraph 2.6.1.1)	x	
2.2. Photometry (paragraph 2.6.1.2)	x	
2.3. Adherence (paragraph 2.6.2)		x

APPENDIX 2

Method of measurement of the diffusion and transmission of light

1. EQUIPMENT

(see figure)

The beam of a collimator K with a half divergence $\beta/2 = 17,4 \times 10^{-4}$ rd is limited by a diaphragm D_T with an opening of 6 mm against which the sample stand is placed.

A convergent achromatic lens L_2 , corrected for spherical aberrations, links the diaphragm D_T with the receiver R; the diameter of the lens L_2 shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\beta/2 = 14^\circ$.

An annular diaphragm D_D with angles $\alpha_0/2 = 1^\circ$ and $\alpha_{max}/2 = 12^\circ$ is placed in an image focal plane of the lens L_2 .

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

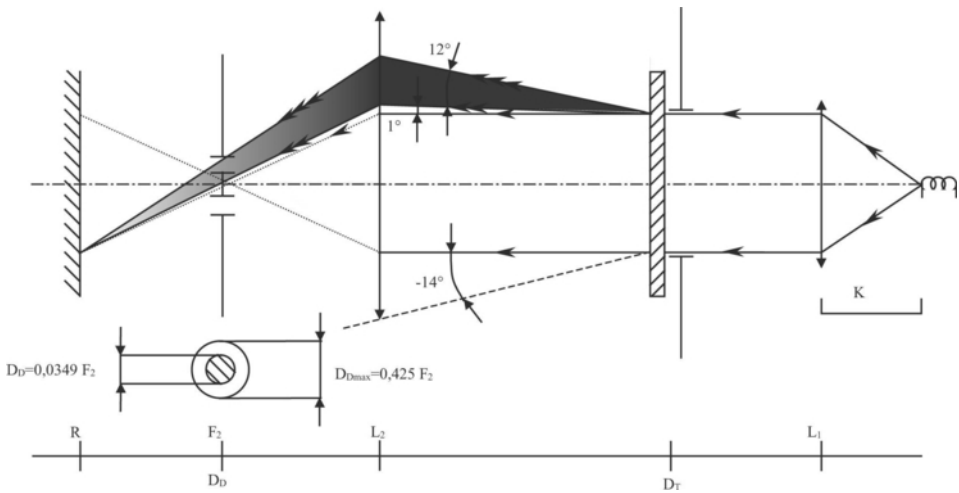
The distance $L_2 D_T$ and the focal length F_2 ⁽¹⁾, of the lens L_2 shall be so chosen that the image of D_T completely covers the receiver R.

When the initial incident flux is referred to 1 000 units, the absolute precision of each reading shall be better than 1 unit.

2. MEASUREMENTS

The following readings shall be taken:

Reading	With sample	With central of D_D	Quantity represented
T_1	no	no	Incident flux in initial reading
T_2	yes (before test)	no	Flux transmitted by the new material in a field of 24°C
T_3	yes (after test)	no	Flux transmitted by the tested material in a field of 24°C
T_4	yes (before test)	yes	Flux diffused by the new material
T_5	yes (after test)	yes	Flux diffused by the tested material



⁽¹⁾ For L_2 it is recommended to use a focal distance of about 80 mm.

APPENDIX 3

SPRAY TESTING METHOD

1. Test equipment

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1,3 mm in diameter allowing a liquid flow rate of $0,24 \pm 0,02$ l/minute at an operating pressure of 6,0 bars - 0, + 0,5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm $\pm$ 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm $\pm$ 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohr scale, with a grain size between 0 and 0,2 mm and an almost normal distribution, with an angular factor of 1,8 to 2;

Water of hardness not exceeding 205 g/m³ for a mixture comprising 25 g of sand per litre of water.

2. Test

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method described in Appendix 2, is such that:

$$\Delta d = \frac{T_5 - T_4}{T_2} = 0,0250 \pm 0,0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

APPENDIX 4

ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows determining, under standard conditions, the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

Measurement of the force necessary to unstick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at $23\text{ °C} \pm 5\text{ °C}$ and 65 ± 15 per cent relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see paragraph 3 above).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radially at a speed of approximately 300 mm/s, then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight length wise rubbing movement of the finger, without excessive pressure, in such a manner as to leave no air bubble between the tape and the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstick about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece. Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to unstick at a speed of $300\text{ mm/s} \pm 30\text{ mm/s}$ and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newtons per centimetre of width of the tape.

ANNEX 7

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 headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp;

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and Zone III the maximum deviation may be respectively:

B 50 L (or R): 0,2 lx equivalent 20 per cent

0,3 lx equivalent 30 per cent

Zone III: 0,3 lx equivalent 20 per cent

0,45 lx equivalent 30 per cent

1.2.2. or if

1.2.2.1. for the passing beam, the prescribed values in this Regulation are met at HV (with a tolerance of 0,2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 L (or R) (with a tolerance of 0,1 lx), 75 R (or L), 50 V, 25 R, and in the entire area of zone IV which is not more than 22,5 cm above line 25 R and 25 L;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0,75 E_{max} , a tolerance of + 20 per cent for maximum values and – 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3.2 of this Regulation. The reference mark is disregarded.

1.2.3. If the results of the tests described above do not meet the requirements, the alignment of the headlamp may be changed, provided that the axis of the beam is not displaced laterally by more than 1° to the right or left.

1.2.4. If the results of the tests described above do not meet the requirements, tests on the headlamp shall be repeated using another standard filament lamp.

1.2.5. Headlamps with apparent defects are disregarded.

1.2.6. The reference mark is disregarded.

1.3. The chromaticity coordinates shall be complied with when the headlamp is equipped with a filament lamp set to Standard A colour temperature.

The photometric performance of a headlamp emitting selective yellow light when equipped with a colourless filament lamp shall be multiplied by 0,84.

2. FIRST SAMPLING

In the first sampling four headlamps 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 headlamps shall not be contested if the deviations of the measured values of the headlamps in the unfavourable directions are:
 - 2.1.1.1. sample A
 - A1: one headlamp 0 per cent
one headlamp not more than 20 per cent
 - A2: both headlamps more than 0 per cent
but not more than 20 per cent
go to sample B
 - 2.1.1.2. sample B
 - B1: both headlamps 0 per cent
 - 2.1.2. or if the conditions of paragraph 1.2.2 for sample A are fulfilled.
- 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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:
 - 2.2.1.1. sample A
 - A3: one headlamp not more than 20 per cent
one headlamp 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 headlamp more than 0 per cent
but not more than 20 per cent
one headlamp not more than 20 per cent
 - B3: in the case of A2
one headlamp 0 per cent
one headlamp more than 20 per cent
but not more than 30 per cent
 - 2.2.2. or if the conditions of paragraph 1.2.2 for sample A are not fulfilled.
- 2.3. Approval withdrawn

Conformity shall be contested and paragraph 13 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the headlamps are:

 - 2.3.1. sample A
 - A4: one headlamp not more than 20 per cent
one headlamp more than 30 per cent
 - A5: both headlamps more than 20 per cent

2.3.2. sample B

- B4: in the case of A2
one headlamp more than 0 per cent
but not more than 20 per cent
one headlamp more than 20 per cent
- B5: in the case of A2
both headlamps more than 20 per cent
- B6: in the case of A2
one headlamp 0 per cent
one headlamp more than 30 per cent

2.3.3. or if the conditions of paragraph 1.2.2 for samples A and B are not fulfilled.

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two headlamps and fourth sample D of two headlamps, 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 headlamps shall not be contested if the deviations of the measured values of the headlamps are:

3.1.1.1. sample C

- C1: one headlamp 0 per cent
one headlamp not more than 20 per cent
- C2: both headlamps more than 0 per cent
but not more than 20 per cent

go to sample D

3.1.1.2. sample D

- D1: in the case of C2 both headlamps 0 per cent

3.1.2. or if the conditions of paragraph 1.2.2 for sample C are fulfilled.

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 headlamps shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the headlamps are:

3.2.1.1. sample D

- D2: in the case of C2
one headlamp more than 0 per cent
but not more than 20 per cent
one headlamp not more than 20 per cent

3.2.1.2. or if the conditions of paragraph 1.2.2 for sample C are not fulfilled:

3.3. Approval withdrawn

Conformity shall be contested and paragraph 14 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the headlamps are:

3.3.1. sample C

C3: one headlamp not more than 20 per cent

one headlamp more than 20 per cent

C4: both headlamps more than 20 per cent

3.3.2. sample D

D3: in the case of C2

one headlamp 0 or more than 0 per cent

one headlamp more than 20 per cent

3.3.3. or if the conditions of paragraph 1.2.2 for samples C and D are not fulfilled.

4. CHANGE OF THE VERTICAL POSITION OF THE CUT-OFF LINE

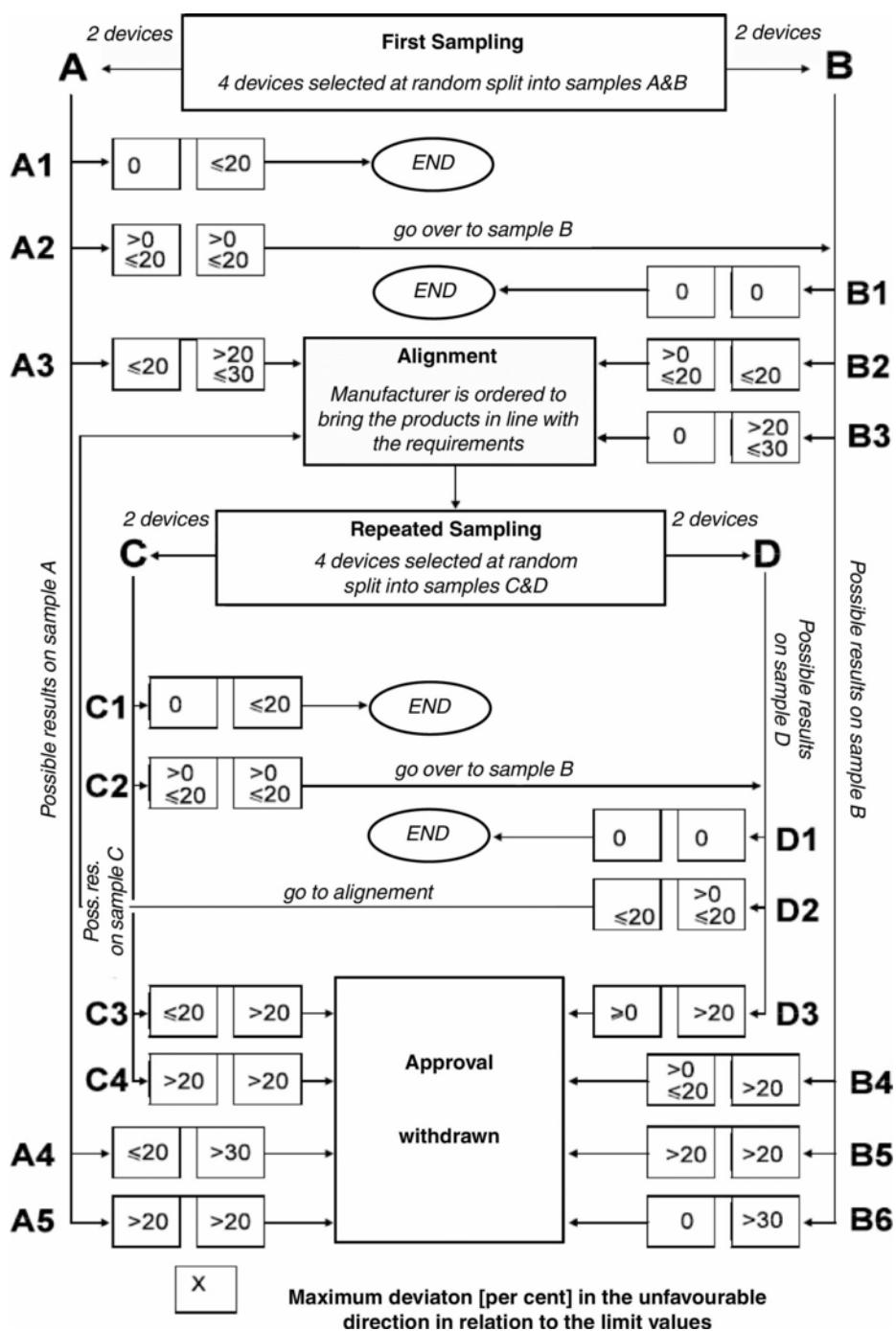
With respect to the verification of the change in vertical positions of the cut-off line under the influence of heat, the following procedure shall be applied:

One of the headlamps of sample A after sampling procedure in Figure 1 of this Annex shall be tested according to the procedure described in paragraph 2.1 of Annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of Annex 4. The headlamp shall be considered as acceptable if Δr does not exceed 1,5 mrad.

If this value exceeds 1,5 mrad but is not more than 2,0 mrad, the second headlamp of sample A shall be subjected to the test after which the mean of the absolute values recorded in both samples shall not exceed 1,5 mrad.

However, if this value of 1,5 mrad on sample A is not complied with, the two headlamps of sample B shall be subjected to the same procedure and the value of Δr for each of them shall not exceed 1,5 mrad.

Figure 1



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 46 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of devices for indirect vision and of motor vehicles with regard to the installation of these devices

Incorporating all valid text up to:

Supplement 4 to the 02 series of amendments — Date of entry into force: 22 July 2009

Corrigendum 1 to supplement 4 — Date of entry into force: 11 November 2009

CONTENTS

REGULATION

1. Scope

I. DEVICES FOR INDIRECT VISION

2. Definitions
3. Application for approval
4. Markings
5. Approval
6. Requirements
 - 6.1. Mirrors
 - 6.2. Devices for indirect vision other than mirrors
7. Modification of the type of device for indirect vision 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

II. INSTALLATION OF DEVICES FOR INDIRECT VISION

12. Definitions
13. Application for approval
14. Approval
15. Requirements
16. Modifications of the vehicle type and extension of approval
17. Conformity of production
18. Penalties for non-conformity of production
19. Production definitely discontinued
20. Names and addresses of Technical Services responsible for conducting approval tests, and of Administrative Departments
21. Transitional provisions

ANNEXES

- Annex 1 — Model of information document for type approval of a device for indirect vision
- Annex 2 — Model of information document for type approval of vehicle with respect to the installation of devices for indirect vision
- Annex 3 — Communication concerning the approval or refusal or extension or withdrawal of approval or production definitely discontinued of a type of device for indirect vision, pursuant to Regulation No 46
- Annex 4 — Communication concerning the approval or refusal or extension or withdrawal of approval or production definitely discontinued of a vehicle type with regard to the installation of devices for indirect vision, pursuant to Regulation No 46
- Annex 5 — Arrangement of approval mark for a device for indirect vision
- Annex 6 — Test method for determining reflectivity
- Annex 7 — Procedure for determining the radius of curvature 'r' of the reflecting surface of a mirror
- Annex 8 — Procedure for determining the 'H' point and the actual torso angle for seating positions in motor vehicles
- Appendix 1 — Description of the Three-Dimensional 'H' Point Machine
- Appendix 2 — Three-dimensional Reference System
- Appendix 3 — Reference Data Concerning Seating Positions
- Annex 9 — (reserved)
- Annex 10 — Calculation of the detection distance

1. SCOPE

This Regulation applies:

- (a) to compulsory and optional devices for indirect vision, set out in the table under paragraph 15.2.1.1.1 for vehicles of category M and N ⁽¹⁾ and to compulsory and optional devices for indirect vision mentioned in paragraphs 15.2.1.1.3 and 15.2.1.1.4 for vehicles of category L ⁽¹⁾ with bodywork at least partly enclosing the driver;
- (b) to the installation of devices for indirect vision on vehicles of category M and N and on vehicles of category L ⁽¹⁾ with bodywork at least partly enclosing the driver.

I. DEVICES FOR INDIRECT VISION

2. DEFINITIONS

For the purposes of this Regulation:

- 2.1. 'Devices for indirect vision' means devices to observe the traffic area adjacent to the vehicle which cannot be observed by direct vision. These can be conventional mirrors, camera-monitors or other devices able to present information about the indirect field of vision to the driver.
- 2.1.1. 'Mirror' means any device, excluding devices such as periscopes, intended to give a clear view to the rear, side or front of the vehicle within the fields of vision defined in paragraph 15.2.4.
- 2.1.1.1. 'Interior mirror' means a device as defined in paragraph 2.1, which can be fitted in the passenger compartment of a vehicle.

⁽¹⁾ 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).

- 2.1.1.2. 'Exterior mirror' means a device as defined in paragraph 2.1, which can be mounted on the external surface of a vehicle.
- 2.1.1.3. 'Surveillance mirror' means a mirror other than the ones defined in paragraph 2.1.1 which can be fitted to the inside or outside of the vehicle in order to provide fields of vision other than those specified in paragraph 15.2.4.
- 2.1.1.4. 'Vision support system' means a system to enable the driver to detect and/or see objects in the area adjacent to the vehicle.
- 2.1.1.5. 'r' means the average of the radii of curvature measured over the reflecting surface, in accordance with the method described in Annex 7.
- 2.1.1.6. 'The principal radii of curvature at one point on the reflecting surface (r_i)' means the values obtained with the apparatus defined in Annex 7, measured on the arc of the reflecting surface passing through the centre of this surface parallel to the segment b, as defined in paragraph 6.1.2.1.2.1 and on the arc perpendicular to this segment.
- 2.1.1.7. 'The radius of curvature at one point on the reflecting surface (r_p)' means the arithmetical average of the principal radii of curvature r_i and r'_i i.e.:

$$\parallel \quad r_p = \frac{r_i + r'_i}{2}$$

- 2.1.1.8. 'Spherical surface' means a surface, which has a constant and equal radius in all directions
- 2.1.1.9. 'Aspherical surface' means a surface, which has only in one plane a constant radius.
- 2.1.1.10. 'Aspherical mirror' means a mirror composed of a spherical and an aspherical part, in which the transition of the reflecting surface from the spherical to the aspherical part has to be marked. The curvature of the main axis of the mirror is defined in the x/y coordinate system defined by the radius of the spherical primary calotte with:

$$\parallel \quad y = R - \sqrt{R^2 - x^2} + k(x-a)^3$$

R: nominal radius in the spherical part

k: constant for the change of curvature

a: constant for the spherical size of the spherical primary calotte.

- 2.1.1.11. 'Centre of the reflecting surface' means the centre of the visible area of the reflecting surface.
- 2.1.1.12. 'The radius of curvature of the constituent parts of the mirror' means the radius 'c' of the arc of the circle which most closely approximates to the curved form of the part in question.
- 2.1.1.13. 'Class of mirror' means all devices having one or more common characteristics or functions. They are classified as follows:
- Class I: 'Interior rear-view mirror', giving the field of vision defined in paragraph 15.2.4.1.
 - Class II and III: 'Main exterior rear-view mirror', giving the fields of vision defined in paragraphs 15.2.4.2 and 15.2.4.3.
 - Class IV: 'Wide-angle exterior mirror', giving the field of vision defined in paragraph 15.2.4.4.
 - Class V: 'Close-proximity exterior mirror', giving the field of vision defined in paragraph 15.2.4.5.

- Class VI: 'Front mirror', giving the field of vision defined in paragraph 15.2.4.6.
 - Class VII: Mirrors intended for L category vehicles with bodywork.
- 2.1.2. 'Camera-monitor device for indirect vision' means a device as defined in paragraph 2.1, where the field of vision is obtained by means of a camera-monitor combination as defined in paragraphs 2.1.2.1 and 2.1.2.2.
- 2.1.2.1. 'Camera' means a device that renders an image of the outside world and then converts this image into a signal (e.g. video signal).
- 2.1.2.2. 'Monitor' means a device that converts a signal into images that are rendered into the visual spectrum.
- 2.1.2.3. 'Detection' means the ability to distinguish an object from its background/surroundings at certain distance.
- 2.1.2.4. 'Luminance contrast' means the brightness ratio between an object and its immediate background/surrounding that allows the object to be distinguished from its background/surroundings.
- 2.1.2.5. 'Resolution' means the smallest detail that can be discerned with a perceptual system, i.e. perceived as separate from the larger whole. The resolution of the human eye is indicated as 'visual acuity'.
- 2.1.2.6. 'Critical object' means a circular object with a diameter $D_0 = 0,8 \text{ m}$ ⁽²⁾.
- 2.1.2.7. 'Critical perception' means the level of perception that the human eye is generally capable of achieving under various conditions. For traffic conditions the limiting value for a critical perception is eight arc-minutes of visual angle.
- 2.1.2.8. 'Field of vision' means the section of the tri-dimensional space which is monitored with the help of a device for indirect vision. Unless otherwise stated, this is based on the view on ground level offered by a device and/or devices other than mirrors. This may be limited by the relevant detection distance corresponding to the critical object..
- 2.1.2.9. 'Detection distance' means the distance measured at ground level from the viewing reference point to the extreme point at which a critical object can just be perceived (the limiting value for a critical perception just barely achieved).
- 2.1.2.10. 'Critical field of vision' means the area in which a critical object has to be detected by means of a device for indirect vision and that is defined by an angle and one or more detection distances.
- 2.1.2.11. 'Viewing reference point' means the point linked to the vehicle to which the prescribed field of vision is related. This point is the projection on the ground of the intersection of a vertical plane passing through the driver's ocular points with a plane parallel to the median longitudinal plane of the vehicle situated 20 cm outside the vehicle.
- 2.1.2.12. 'Visual spectrum' means light with a wavelength within the range of the perceptual limits of the human eyes: 380-780 nm.
- 2.1.2.13. 'surveillance camera-monitor-recording device' means a camera and either a monitor or recording equipment other than the camera-monitor device defined in paragraph 2.1.2 which can be fitted to the inside or outside of the vehicle in order to provide fields of vision other than those specified in paragraph 15.2.4 or to provide a security system within or around the vehicle.

(2) A system for indirect vision is intended to detect relevant road users. The relevancy of a road user is defined by his or her position and (potential) speed. More or less in proportion with the speed of the pedestrian-cyclist- moped driver, the dimensions of these road users increase as well. For detection purposes a moped driver ($D = 0,8 \text{ m}$) at 40 m distance would be equal to a pedestrian ($D = 0,5 \text{ m}$) at a distance of 25 m. Considering the speeds, the moped driver would be selected as the criterion for the detection size; for that reason an object with a size of 0,8 m shall be used for determining the detection performance.

- 2.1.3. 'Other devices for indirect vision' means devices as defined in paragraph 2.1, where the field of vision is not obtained by means of a mirror or a camera-monitor type device for indirect vision.
- 2.1.4. 'Type of device for indirect vision' means devices that do not differ on the following essential characteristics:
- design of the device inclusive, if pertinent, the attachment to the bodywork,
 - in case of mirrors the class, the shape, the dimensions and radius of curvature of the mirror's reflecting surface,
 - in case of camera-monitor devices the detection distance and the range of vision.
3. APPLICATION FOR APPROVAL
- 3.1. The application for approval of a type of device for indirect vision shall be submitted by the holder of the trade name or mark or by his duly accredited representative.
- 3.2. A model of information document is shown in Annex 1.
- 3.3. For each type of device for indirect vision the application shall be accompanied by:
- 3.3.1. in case of mirrors, four samples: three for use in the tests and one to be retained by the laboratory for any further examination that might subsequently prove necessary. Additional specimens may be called for at the request of the laboratory;
- 3.3.2. in case of other devices for indirect vision: one sample of all the parts.
4. MARKINGS
- 4.1. The samples of devices for indirect vision 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 device shall possess a space large enough to accommodate the approval mark, which must be legible when the device has been mounted on the vehicle; this space shall be shown on the drawings referred to in Annex 1.
5. APPROVAL
- 5.1. If the samples submitted for approval meet the requirements of paragraph 6 of this Regulation, approval of the pertinent type of device for indirect vision shall be granted.
- 5.2. An approval number shall be assigned to each type approved. Its first two digits (at present 02) 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 type of device for indirect vision.
- 5.3. Notice of approval or of refusal or of extension or withdrawal of approval or of production definitely discontinued of a type of device for indirect vision 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 3 to this Regulation.

- 5.4. There shall be affixed, conspicuously and in the space referred to in paragraph 4.2 above, to every device for indirect vision 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 ⁽³⁾;
- 5.4.2. An approval number;
- 5.4.3. An additional symbol I or II or III or IV or V or VI or VII, specifying the class to which the type of mirror belongs or the symbol S in case of any device for indirect vision other than a mirror. The additional symbol shall be placed in any convenient position in the vicinity of the circle containing the letter 'E'.
- 5.5. The approval mark and the additional symbol shall be clearly legible and be indelible.
- 5.6. Annex 5 to this Regulation gives an example of the arrangement of the aforesaid approval mark and additional symbol.
6. REQUIREMENTS
- 6.1. MIRRORS
- 6.1.1. GENERAL SPECIFICATIONS
- 6.1.1.1. All mirrors shall be adjustable.
- 6.1.1.2. The edge of the reflecting surface must be enclosed in a protective housing (holder, etc.) which, on its perimeter, must have a value 'c' greater than or equal to 2,5 mm at all points and in all directions. If the reflecting surface projects beyond the protective housing, the radius of curvature 'c' on the edge of the projecting part must be not less than 2,5 mm and the reflecting surface must return into the protective housing under a force of 50 N applied to the point of greatest projection, relative to the protective housing, in a horizontal direction, approximately parallel to the longitudinal median plane of the vehicle.
- 6.1.1.3. When the mirror is mounted on a plane surface, all parts, irrespective of the adjustment position of the device, including those parts remaining attached to the support after the test provided for in paragraph 6.1.3.2, which are in potential, static contact with a sphere either 165 mm in diameter in the case of an interior mirror or 100 mm in diameter in the case of an exterior mirror, must have a radius of curvature 'c' of not less than 2,5 mm.
- 6.1.1.4. Edges of fixing holes or recesses of which the diameter or longest diagonal is less than 12 mm are exempt from the radius requirements of paragraph 6.1.1.3 provided that they are blunted.

⁽³⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for 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 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 UNECE symbol), 43 for Japan, 44 (vacant), 45 for Australia, 46 for Ukraine, 47 for Republic of South Africa, 48 for New Zealand, 49 for Cyprus, 50 for Malta and 51 for Republic of Korea. 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.

- 6.1.1.5. The device for the attachment of mirrors to the vehicle must be so designed that a cylinder with a 70 mm radius (50 mm in the case of an L-category vehicle), having as its axis the axis, or one of the axes, of pivot or rotation which ensures deflection of the mirror in the direction of impact concerned, passes through at least part of the surface to which the device is attached.
- 6.1.1.6. The parts of exterior mirrors referred to in paragraphs 6.1.1.2 and 6.1.1.3 which are made of a material with a Shore A hardness not exceeding 60 are exempt from the relevant provisions.
- 6.1.1.7. In the case of those parts of interior mirrors which are made of a material with a Shore A hardness of less than 50 and which are mounted on a rigid support, the requirements of paragraphs 6.1.1.2 and 6.1.1.3 shall only apply to the support.

6.1.2. SPECIAL SPECIFICATIONS

6.1.2.1. DIMENSIONS

6.1.2.1.1. Interior rear-view mirrors (Class I)

The dimensions of the reflecting surface must be such that it is possible to inscribe thereon a rectangle one side of which is 40 mm and the other 'a' mm in length, where

$$a = 150 \text{ mm} \times \frac{1}{1 + \frac{1\,000}{r}}$$

||

and r is the radius of curvature.

6.1.2.1.2. Main exterior rear-view mirrors (Classes II and III)

6.1.2.1.2.1. The dimensions of the reflecting surface must be such that it is possible to inscribe therein:

- a rectangle 40 mm high the base length of which, measured in millimetres, has the value 'a',
- a segment which is parallel to the height of the rectangle and the length of which, expressed in millimetres, has the value 'b'.

6.1.2.1.2.2. The minimum values of 'a' and 'b' are given in the table below:

Class of rear-view mirror	a (mm)	b (mm)
II	$\frac{170}{1 + \frac{1\,000}{r}}$	200
III	$\frac{130}{1 + \frac{1\,000}{r}}$	70

6.1.2.1.3. 'Wide-angle' exterior mirrors (Class IV)

The contours of the reflecting surface must be of simple geometric form and its dimensions such that it provides, if necessary in conjunction with a Class II exterior mirror, the field of vision specified in paragraph 15.2.4.4.

6.1.2.1.4. 'Close-proximity' exterior mirrors (Class V)

The contours of the reflecting surface must be of simple geometric form and its dimensions such that the mirror provides the field of vision specified in paragraph 15.2.4.5.

6.1.2.1.5. Front mirrors (Class VI)

The contours of the reflecting surface must be of simple geometric form and its dimensions such that the mirror provides the field of vision specified in paragraph 15.2.4.6.

6.1.2.1.6. Mirrors for Category L vehicles with bodywork (Class VII)

6.1.2.1.6.1. 'Main' exterior mirrors (Class VII)

The minimum dimensions of the reflecting surface shall be such that:

- (a) Its area shall not be less than 6 900 mm²;
- (b) The diameter of circular mirrors shall not be less than 94 mm;
- (c) Where rear view mirrors are not circular, their dimensions shall enable a 78 mm-diameter circle to be prescribed on their reflecting surface.

The maximum dimensions of the reflecting surface shall be such that:

- (a) The diameter of any circular rear view mirror shall not be greater than 150 mm;
- (b) The reflecting surface of any non-circular rear view mirror shall lie within a rectangle measuring 120 mm × 200 mm.

6.1.2.2. Reflecting surface and coefficients of reflection

6.1.2.2.1. The reflecting surface of a mirror must be either flat or spherically convex. Exterior mirrors may be equipped with an additional aspherical part provided that the main mirror fulfils the requirements of the indirect field of vision.

6.1.2.2.2. Differences between the radii of curvature of mirrors

6.1.2.2.2.1. The difference between r_i or r'_i , and r_p at each reference point must not exceed 0,15 r.

6.1.2.2.2.2. The difference between any of the radii of curvature (r_{p1} , r_{p2} , and r_{p3}) and r must not exceed 0,15 r.

6.1.2.2.2.3. When r is not less than 3 000 mm, the value of 0,15 r quoted in paragraphs 6.1.2.2.2.1 and 6.1.2.2.2.2 is replaced by 0,25 r.

6.1.2.2.3. Requirements for aspherical parts of mirrors

6.1.2.2.3.1. Aspherical mirrors shall be of sufficient size and shape to provide useful information to the driver. This normally means a minimum width of 30 mm at some point.

6.1.2.2.3.2. The radius of curvature r_i of the aspherical part shall not be less than 150 mm.

6.1.2.2.4. Value of 'r' for spherical mirrors must not be less than:

6.1.2.2.4.1. 1 200 mm for interior rear-view mirrors (Class I);

6.1.2.2.4.2. 1 200 mm for Class II and III main exterior rear-view mirrors;

6.1.2.2.4.3. 300 mm for 'wide-angle' exterior mirrors (Class IV) and 'close-proximity' exterior mirrors (Class V);

6.1.2.2.4.4. 200 mm for front mirrors (Class VI);

6.1.2.2.4.5. 1 000 mm or more than 1 500 mm in the case of Class VII mirrors.

- 6.1.2.2.5. The value of the normal coefficient of reflection, as determined according to the method described in Annex 6, must be not less than 40 per cent.

In the case of reflecting surfaces with a changeable degree of reflection, the 'day' position must 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 must be not less than 4 per cent.

- 6.1.2.2.6. The reflecting surface must retain the characteristics laid down in paragraph 6.1.2.2.5 in spite of prolonged exposure to adverse weather conditions in normal use.

- 6.1.3. Test

- 6.1.3.1. Mirrors in Classes I to VI and Class VII (having fitments identical to Class III) shall be subjected to the tests described in paragraph 6.1.3.2.1 and 6.1.3.2.2. Class VII mirrors with a stem, shall be subjected to the tests described in paragraph 6.1.3.2.3.

- 6.1.3.1.1. The test provided for in paragraph 6.1.3.2 shall not be required in the case of any exterior mirror of which no part is less than 2 m from the ground, regardless of the adjustment position, when the vehicle is under a load corresponding to its maximum technically permissible mass.

This derogation also applies to the attachments of mirrors (attachment plates, arms, swivel joints, etc.) which are situated less than 2 m from the ground and which do not project beyond the overall width of the vehicle, measured in the transverse plane passing through the lowest mirror attachments or any other point forward of this plane if this configuration produces a greater overall width.

In such cases, a description specifying that the mirror must be mounted so as to conform to the above-mentioned conditions for the positioning of its attachments on the vehicle must be provided.

Where advantage is taken of this derogation, the arm shall be indelibly marked with the

symbol Δ
2m

and the type-approval certificate shall be endorsed to this effect.

- 6.1.3.2. Impact test

The test according to this paragraph is not to be carried out for devices integrated in the bodywork of the vehicle and providing a frontal deflecting area of an angle not more than 45° measured in relation to the longitudinal median plane of the vehicle, or devices not protruding more than 100 mm measured beyond the circumscribing bodywork of the vehicle according to Regulation No 26.

- 6.1.3.2.1. Description of the test rig

- 6.1.3.2.1.1. The test rig consists of a pendulum capable of swinging about two horizontal axes at right angles to each other, one of which is perpendicular to the plane containing the 'release' trajectory of the pendulum.

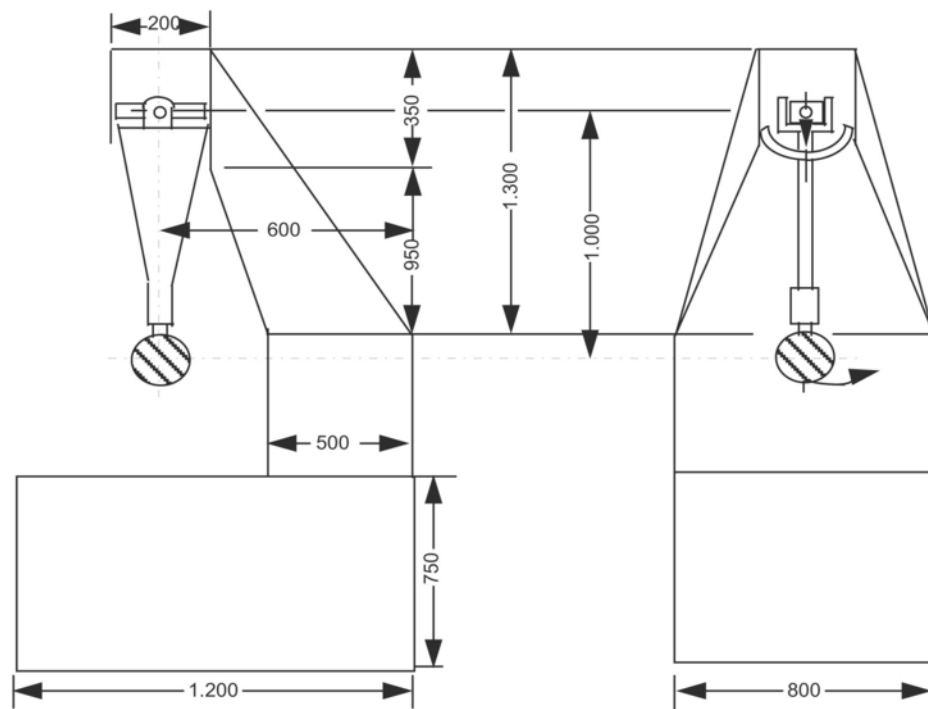
The end of the pendulum comprises a hammer formed by a rigid sphere with a diameter of 165 ± 1 mm having a 5 mm thick rubber covering of Shore A hardness 50.

A device is provided which permits determination of the maximum angle assumed by the arm in the plane of release.

A support firmly fixed to the structure of the pendulum serves to hold the specimens in compliance with the impact requirements specified in paragraph 6.1.3.2.2.6.

Figure 1 below gives the dimensions (in mm) of the test rig and the special design specifications:

Figure 1



- 6.1.3.2.1.2. The centre of percussion of the pendulum coincides with the centre of the sphere, which forms the hammer. It is at a distance l 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 is $m_o = 6,8 \pm 0,05$ kilograms. The relationship of m_o to the total mass m of the pendulum and to the distance d between the centre of gravity of the pendulum and its axis of rotation is expressed in the equation:

$$m_o = m \times \frac{d}{l}$$

- 6.1.3.2.2. Description of the test

- 6.1.3.2.2.1. The procedure used to clamp the mirror to the support shall be that recommended by the manufacturer of the device or, where appropriate, by the vehicle manufacturer.

- 6.1.3.2.2.2. Positioning of the mirror for the test:

- 6.1.3.2.2.2.1. Mirrors shall be positioned on the pendulum impact rig in such a way that the axes which are horizontal and vertical when the mirror is installed on a vehicle in accordance with the applicant's mounting instructions are in a similar position;

- 6.1.3.2.2.2.2. When a mirror is adjustable with respect to the base, the test position shall be that in which any pivoting device is least likely to operate, within the limits of adjustment provided by the applicant;

- 6.1.3.2.2.2.3. When the mirror has a device for adjusting its distance from the base, the device must be set in the position in which the distance between the housing and the base is shortest;

- 6.1.3.2.2.2.4. When the reflecting surface is mobile in the housing, it shall be so adjusted that the upper corner, which is furthest from the vehicle, is in the position of greatest projection relative to the housing.

- 6.1.3.2.2.3. Except in the case of test 2 for interior mirrors (see paragraph 6.1.3.2.2.6.1), 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 reflecting surface as defined in paragraph 2.1.1.10. The longitudinal direction of oscillation of the pendulum shall be parallel to the longitudinal median plane of the vehicle.

- 6.1.3.2.2.4. When, under the conditions governing adjustment laid down in paragraphs 6.1.3.2.2.1 and 6.1.3.2.2.2 parts of the mirror limit the return of the hammer, the point of impact must be displaced in a direction perpendicular to the axis of rotation or pivoting in question.

The displacement must be no greater than is strictly necessary for the execution of the test; it must be limited in such a way that:

- either the sphere delimiting the hammer remains at least tangential to the cylinder as defined in paragraph 6.1.1.5;
- or the point of contact with the hammer is located at least 10 mm from the periphery of the reflecting surface.

- 6.1.3.2.2.5. 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 mirror at the moment when the pendulum reaches the vertical position.

- 6.1.3.2.2.6. The mirrors are subjected to impact under the following different conditions:

6.1.3.2.2.6.1. Interior mirrors

- Test 1: The points of impact shall be as defined in paragraph 6.1.3.2.2.3. The impact must be such that the hammer strikes the mirror on the reflecting surface side.
- Test 2: Point of impact on the edge of the protective housing, such that the impact produced makes an angle of 45° with the plane of the reflecting surface and is situated in the horizontal plane passing through the centre of that surface. The impact must occur on the reflecting surface side.

6.1.3.2.2.6.2. Exterior mirrors

- Test 1: The point of impact shall be as defined in paragraph 6.1.3.2.2.3 or 6.1.3.2.2.4. The impact must be such that the hammer strikes the mirror on the reflecting surface side.
- Test 2: The point of impact shall be as defined in paragraph 6.1.3.2.2.3 or 6.1.3.2.2.4. The impact must be such that the hammer strikes the mirror on the side opposite to the reflecting surface.

Where Class II or III rear-view mirrors are fixed to the same mounting as Class IV rear-view mirrors, the above-mentioned tests shall be executed on the lower mirror. Nevertheless, the technical service responsible for testing may repeat one or both of these tests on the upper mirror if this is less than 2 m from the ground.

- 6.1.3.2.3. Bending test on the protective housing attached to the stem (Class VII)

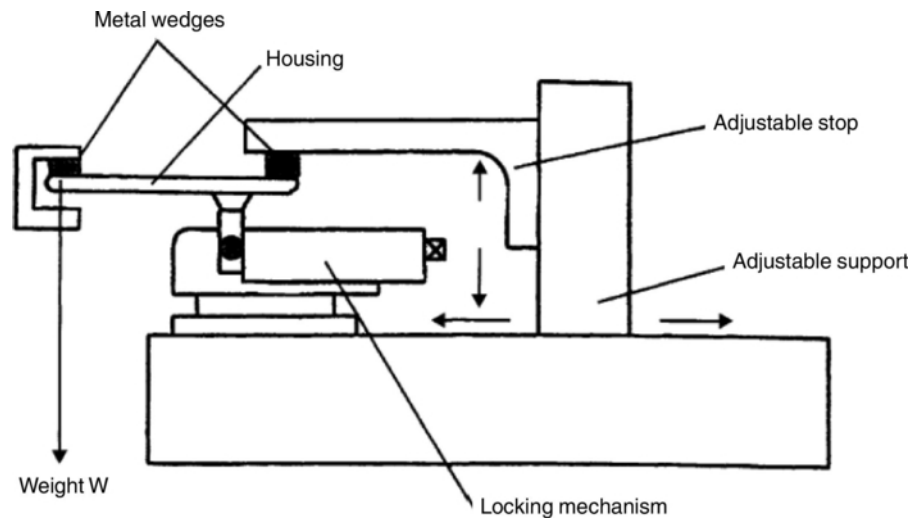
6.1.3.2.3.1. Description of test

The protective housing is placed horizontally in a device in such a way that it is possible to lock the attachment support adjusters firmly. In the direction of the largest dimension of the housing, the end closest to the point of attachment on the adjuster for the support shall be immobilized by a 15 mm-wide rigid stop covering the entire width of the housing.

At the other end, a stop identical to the one described above is placed on the housing so that the specified test load can be applied to it (Figure 2).

The end of the housing opposite to that where the force is exerted may be locked rather than held in position as shown in Figure 2.

Figure 2

Example of rear view mirror bending-test rig

- 6.1.3.2.3.2. The test loading shall be 25 kilograms and shall be maintained for one minute.
- 6.1.3.3. Results of the tests
- 6.1.3.3.1. In the tests described in paragraph 6.1.3.2, the pendulum must continue to swing after impact in such a way that the projection of the position assumed by the arm on the plane of release makes an angle of at least 20° with the vertical. The accuracy of measurement of the angle shall be within $\pm 1^\circ$.
- 6.1.3.3.1.1. This requirement is not applicable to mirrors stuck to the windscreen, in respect of which the requirement stipulated in paragraph 6.1.3.3.2 shall apply after the test.
- 6.1.3.3.1.2. The required angle to the vertical is reduced from 20° to 10° for all Class II and Class IV rear-view mirrors and for Class III rear-view mirrors which are attached to the same mounting as Class IV mirrors.
- 6.1.3.3.2. Should the mounting of the mirror break during the tests described in paragraph 6.1.3.2 for mirrors stuck to the windscreen, the part remaining must not project beyond the base by more than 10 mm and the configuration remaining after the test must satisfy the conditions laid down in paragraph 6.1.1.3.
- 6.1.3.3.3. The reflecting surface must not break during the tests described in paragraph 6.1.3.2. However, breakage of the reflecting surface will be allowed if one of the following conditions is fulfilled:
- 6.1.3.3.3.1. the fragments of glass still adhere to the back of the housing or to a surface firmly attached to the housing; partial separation of the glass from its backing is admissible provided that this does not exceed 2,5 mm on either side of the cracks. It is permissible for small splinters to become detached from the surface of the glass at the point of impact;
- 6.1.3.3.3.2. the reflecting surface is made of safety glass.
- 6.2. DEVICES FOR INDIRECT VISION OTHER THAN MIRRORS
- 6.2.1. GENERAL REQUIREMENTS
- 6.2.1.1. If adjustment by the user is needed, the device for indirect vision shall be adjustable without the use of tools.
- 6.2.1.2. If a device for indirect vision can only render the total prescribed field of vision by scanning the field of vision, the total process of scanning, rendering and reset to its initial position together shall not take more than 2 seconds.

6.2.2. CAMERA-MONITOR DEVICES FOR INDIRECT VISION

6.2.2.1. General requirements

6.2.2.1.1. When the camera-monitor device for indirect vision is mounted on a plane surface, all parts, irrespective of the adjustment position of the device which are in potential, static contact with a sphere either 165 mm in diameter in the case of a monitor or 100 mm in diameter in the case of a camera, must have a radius of curvature 'c' of not less than 2,5 mm.

6.2.2.1.2. Edges of fixing holes or recesses of which the diameter or longest diagonal is less than 12 mm are exempt from the radius requirements of paragraph 6.2.2.1.1 provided that they are blunted.

6.2.2.1.3. For parts of the camera and the monitor which are made of a material with a Shore A hardness of less than 60 and which are mounted on a rigid support, the requirements of paragraph 6.2.2.1.1 shall only apply to the support.

6.2.2.2. Functional requirements

6.2.2.2.1. The camera should function well under low sunlight conditions. The camera shall provide a luminance contrast of at least 1:3 under low sun condition in a region outside the part of the image where the light source is reproduced (condition as defined in EN 12368: 8.4). The light source shall illuminate the camera with 40 000 lx. The angle between the normal of the sensor plane and the line connecting the midpoint of the sensor and the light source shall be 10°.

6.2.2.2.2. The monitor shall render a minimum contrast under various light conditions as specified by ISO 15008:2003.

6.2.2.2.3. It shall be possible to adjust the average luminance of the monitor either manually or automatically to the ambient conditions.

6.2.2.2.4. The measurements for the luminance contrast shall be carried out according to ISO 15008:2003.

6.2.3. OTHER DEVICES FOR INDIRECT VISION

It has to be proved that the device meets the following requirements:

6.2.3.1. The device shall perceive the visual spectrum and shall always render this image without the need for interpretation into the visual spectrum.

6.2.3.2. The functionality shall be guaranteed under the circumstances of use in which the system shall be put into service. Depending on the technology used in obtaining images and presenting them paragraph 6.2.2.2 shall be entirely or partly applicable. In other cases this can be achieved by establishing and demonstrating by means of system sensitivity analogous to paragraph 6.2.2.2 that a function is ensured that is comparable to or better than what is required for and by demonstrating that a functionality is guaranteed that is equivalent or better than that required for mirror- or camera-monitor type devices for indirect vision.

7. MODIFICATION OF THE TYPE OF DEVICE FOR INDIRECT VISION AND EXTENSION OF APPROVAL

7.1. Every type modification of the device for indirect vision including its connection to the body-work shall be notified to the administrative department which approved the type of device for indirect vision. The department may then either:

7.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the device for indirect vision still complies with the requirements; or

7.1.2. Require a further test report from the technical service responsible for conducting the tests.

- 7.2. Confirmation or refusal of approval, specifying the alterations shall be communicated by the procedure specified in paragraph 5.3 above to the Parties to the Agreement which apply this Regulation.
- 7.3. The extension of approval shall be notified to all Parties to the 1958 Agreement applying this Regulation by the procedure set out in paragraph 5.3 above.
- 7.4. The Competent Authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension.
8. CONFORMITY OF PRODUCTION
- 8.1. The conformity of production procedure shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2).
- 8.2. Every device for indirect vision approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 6 above.
9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 9.1. The approval granted in respect of a type of device for indirect vision pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 8.1. above is not complied with or if the type of device for indirect vision did not satisfy the requirements prescribed in paragraph 8.2 above.
- 9.2. 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 communication form bearing at the end, in large letters, the signed and dated annotation 'APPROVAL WITHDRAWN'.
10. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of device for indirect vision 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'.
11. 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.

II. INSTALLATION OF DEVICES FOR INDIRECT VISION

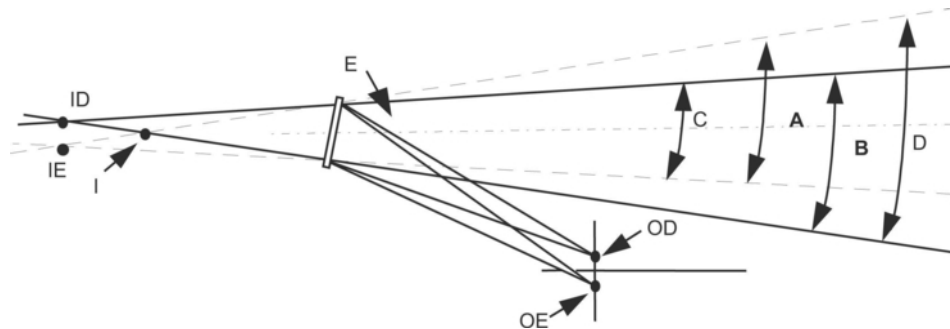
12. DEFINITIONS

For the purpose of this Regulation:

- 12.1. 'The 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 a vertical longitudinal plane which must pass through the centre of the driver's designated seating position, as specified by the vehicle manufacturer.

- 12.2. 'Ambinocular vision' means the total field of vision obtained by the superimposition of the monocular fields of the right eye and the left eye (see Figure 3 below).

Figure 3



E = interior rear-view mirror
 OD = driver's eyes
 OE = driver's eyes
 ID = virtual monocular images
 IE = virtual monocular images
 I = virtual ambinocular image
 A = angle of vision of left eye
 B = angle of vision of right eye
 C = binocular angle of vision
 D = ambinocular angle of vision

- 12.3. 'Type of vehicle as regards indirect vision' means motor vehicles which are identical in respect of the following basic features:
- 12.3.1. Type of device for indirect vision;
- 12.3.2. The bodywork features which reduce the field of vision;
- 12.3.3. The coordinates of point R (where applicable);
- 12.3.4. The prescribed positions, and type-approval markings of compulsory and (if fitted) optional devices for indirect vision.
- 12.4. 'Vehicles of categories L2, L5, M1, M2, M3, N1, N2 and N3' mean those defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3), Annex 7 (document TRANS/WP.29/78/Rev.1/Amend.2).
- 12.5. 'Forward control' means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub in the forward quarter of the vehicle length.
13. APPLICATION FOR APPROVAL
- 13.1. The application for approval of a vehicle type with regard to the installation of devices for indirect vision shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 13.2. A model of information document is shown in Annex 2.

- 13.3. A vehicle representative of the vehicle type to be approved shall be submitted to the technical service responsible for conducting the approval tests.
- 13.4. The Competent Authority shall verify the existence of satisfactory arrangements for ensuring effective checks on conformity of production before type-approval is granted.
14. APPROVAL
- 14.1. If the vehicle type submitted for approval in accordance with paragraph 13 above meets the requirements of paragraph 15 of this Regulation, approval shall be granted.
- 14.2. An approval number shall be assigned to each type approved. Its first two digits (at present 02) shall indicate the series of amendments incorporating the most recent or 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 vehicle type.
- 14.3. Notice of approval or of refusal or of extension or withdrawal 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 4 to this Regulation.
15. REQUIREMENTS
- 15.1. GENERAL
- 15.1.1. The compulsory and optional devices for indirect vision, set out in the table under paragraph 15.2.1.1.1, installed on the vehicle shall be of a type approved under this Regulation.
- 15.1.2. Mirrors and other devices for indirect vision must be fitted in such a way that the mirror or other device does not move so as significantly to change the field of vision as measured or vibrate to an extent which would cause the driver to misinterpret the nature of the image perceived.
- 15.1.3. The conditions laid down in paragraph 15.1.2 must 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.
- 15.1.4. The fields of vision defined below shall be established using ambinoocular vision, the eyes being at the 'driver's ocular points' as defined in paragraph 12.1. The fields of vision shall be determined when the vehicle is in running order as defined in document TRANS/WP.29/78/Rev.1/Amend.2, Annex 7, paragraph 2.5.4, plus for M1 and N1 vehicles one front seat passenger (75 kg). When established through windows, the glazing shall have a total light transmission factor in accordance with Regulation No 43, Annex 21.
- 15.2. MIRRORS
- 15.2.1. Number
- 15.2.1.1. Minimum number of compulsory mirrors
- 15.2.1.1.1. The fields of vision prescribed in paragraph 15.2.4 shall be obtained from the minimum number on mandatory mirrors set out in the following table. Where the presence of a mirror is not requested on a mandatory base, this means that no other system for indirect vision can be requested on a mandatory base.

Vehicle category	Interior mirror	Exterior mirrors				
	Interior mirror Class I	Main mirror (large) Class II	Main mirror (small) Class III	Wide-angle mirror Class IV	Close-proximity mirror Class V	Front mirror Class VI
M ₁	Compulsory Unless the vehicle is fitted with anything other than safety glazing material in the field of vision prescribed in paragraph 15.2.4.1. Optional If the mirror does not provide rearward vision	Optional	Compulsory 1 on the driver's side and 1 on the passenger's side Class II mirrors may be fitted as an alternative.	Optional 1 on the driver's side and/or 1 on the passenger's side	Optional 1 on the driver's side and 1 on the passenger's side (both must be fitted at least 2 m above the ground)	Optional (must be fitted at least 2 m above the ground)
M ₂	Optional (no requirements for the field of view)	Compulsory 1 on the driver's side and 1 on the passenger's side	Not permitted	Optional 1 on the driver's side and/or 1 on the passenger's side	Optional 1 on the driver's side and 1 on the passenger's side (both must be fitted at least 2 m above the ground)	Optional (must be fitted at least 2 m above the ground)
M ₃	Optional (no requirements for the field of view)	Compulsory 1 on the driver's side and 1 on the passenger's side	Not permitted	Optional 1 on the driver's side and / or 1 on the passenger's side	Optional 1 on the driver's side and 1 on the passenger's side (both must be fitted at least 2 m above the ground)	Optional (must be fitted at least 2 m above the ground)
N ₁	Compulsory Unless the vehicle is fitted with anything other than safety glazing material in the field of vision prescribed in paragraph 15.2.4.1 Optional If the mirror does not provide rearward vision	Optional	Compulsory 1 on the driver's side and 1 on the passenger's side Class II mirrors may be fitted as an alternative.	Optional 1 on the driver's side and/or 1 on the passenger's side	Optional 1 on the driver's side and 1 on the passenger's side (both must be fitted at least 2 m above the ground)	Optional (must be fitted at least 2 m above the ground)
N ₂ ≤ 7,5 t	Optional (no requirements for the field of view)	Compulsory 1 on the driver's side and 1 on the passenger's side	Not permitted	Compulsory For both sides if a Class V mirror can be fitted Optional For both sides together if not	Compulsory (see paragraphs 15.2.2.7 and 15.2.4.5.5) One on the passenger's side Optional One on the driver's side (both must be fitted at least 2 m above the ground). A tolerance of + 10 cm may be applied	Optional 1 front mirror (must be fitted at least 2 m above the ground)

Vehicle category	Interior mirror	Exterior mirrors				
	Interior mirror Class I	Main mirror (large) Class II	Main mirror (small) Class III	Wide-angle mirror Class IV	Close-proximity mirror Class V	Front mirror Class VI
$N_2 > 7,5\text{ t}$	Optional (no requirements for the field of view)	Compulsory 1 on the driver's side and 1 on the passenger's side	Not permitted	Compulsory 1 on the driver's side and 1 on the passenger's side	Compulsory , see paragraph 15.2.2.7 and 15.2.4.5.5) 1 on the passenger's side Optional 1 on Driver's side (both must be fitted at least 2 m above the ground)	Compulsory , see paragraph 15.2.1.1.2 1 front mirror (must be fitted at least 2 m above the ground)
N_3	Optional (no requirements for the field of view)	Compulsory 1 on the driver's side and 1 on the passenger's side	Not permitted	Compulsory 1 on the driver's side and 1 on the passenger's side	Compulsory , see paragraph 15.2.2.7 and 15.2.4.5.5) 1 on the passenger's side Optional 1 on driver's side (both must be fitted at least 2 m above the ground)	Compulsory , see paragraph 15.2.1.1.2 1 front mirror (must be fitted at least 2 m above the ground)

- 15.2.1.1.2. In case the described field of vision of a front mirror prescribed in paragraph 15.2.4.6 and/or a close proximity mirror described in paragraph 15.2.4.5 can be obtained by another device for indirect vision that is approved according to paragraph 6.2 and that is installed according to paragraph 15, this device can be used instead of the relevant mirror or mirrors.

In case a camera/monitor device is used, the monitor must exclusively show:

- the field of vision prescribed in paragraph 15.2.4.5 when the close proximity mirror has been substituted,
- the field of vision prescribed in paragraph 15.2.4.6 when the front mirror has been substituted while the vehicle is moving forward with a speed up to 10 km/h, or
- simultaneously the fields of vision prescribed in paragraphs 15.2.4.5 and 15.2.4.6 when the close proximity mirror and the front mirror have been substituted. In the case of the vehicle is moving forward at a higher speed than 10 km/h or moving backwards, the monitor may be used for other information, provided that the field of vision prescribed in paragraph 15.2.4.5 is permanently displayed.

- 15.2.1.1.3. Rear view mirrors required for L-category vehicles with body work

Category of vehicle	Interior mirror (Class I)	Main exterior mirror(s) (Classes III and VII)
L category motor vehicles fitted with bodywork which partly or wholly encloses the driver	1 (*)	1, if there is an interior mirror; 2, if there is not an interior mirror

(*) No interior rear-view mirror is required if the visibility conditions referred to in paragraph 15.2.5.4.1 below cannot be met. In this case two exterior rear-view mirrors are required, one on the left and one on the right hand side of the vehicle.

Where a single exterior rear view mirror is fitted this shall be located on the left hand side of the vehicle in those countries where the traffic drives on the right and on the right hand side of the vehicle in those countries where the traffic drives on the left.

15.2.1.1.4. Optional rear-view mirrors for L-category vehicles

The fitting of an exterior rear-view mirror on the side of the vehicle opposite to that of the mandatory rear-view mirror referred to in paragraph 15.2.1.1.3, is permissible. The rear-view mirror shall meet the requirements of this Regulation.

15.2.1.2. The provisions of this Regulation do not apply to the surveillance mirrors defined in paragraph 2.1.1.3. Nevertheless, the exterior surveillance mirrors must be mounted at least 2 m above the ground when the vehicle is under a load corresponding to its maximum technical permissible mass.

15.2.2. Position

15.2.2.1. Mirrors must be so placed that the driver, when sitting on the driving seat in a normal driving position, has a clear view of the road to the rear, side(s) or front of the vehicle.

15.2.2.2. Exterior mirrors shall be visible through the side windows or through the portion of the windscreen that is swept by the windscreen wiper. Nevertheless, for design reasons, this last provision (i.e. the provisions relating the cleaned part of the windscreen) shall not apply to:

- (a) exterior mirrors on the passenger side and optional exterior mirrors on the driver side of vehicles of categories M2 and M3;
- (b) Class VI mirrors.

15.2.2.3. In the case of any vehicle, which is 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 headboards. All vehicles and mirror configurations taken into consideration during the tests shall be shown on the type-approval certificate for a vehicle with regard to the installation of mirrors (see Annex 4).

15.2.2.4. The prescribed exterior mirror on the driver's side of the vehicle must be so located that an angle of not more than 55° is formed between the vertical longitudinal median plane of the vehicle and the vertical plane passing through the centre of the mirror and through the centre of the straight line 65 mm long which joins the driver's two ocular points.

15.2.2.5. Mirrors must not project 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 15.2.4.

15.2.2.6. Where the lower edge of an exterior mirror is less than 2 m above the ground when the vehicle is loaded to its technically permissible maximum laden mass, this mirror must not project more than 250 mm beyond the overall width of the vehicle measured without mirrors.

15.2.2.7. Class V and Class VI mirrors shall be mounted on vehicles in such a way that, regardless of their position after adjustment, no part of these mirrors or their holders is less than 2 m from the ground when the vehicle is under a load corresponding to its technically permissible maximum laden mass.

These mirrors shall not, however, be mounted on vehicles the cab height of which is such as to prevent compliance with this requirement. In this case an other device for indirect vision is not requested.

15.2.2.8. Subject to the requirements of paragraphs 15.2.2.5, 15.2.2.6 and 15.2.2.7, mirrors may project beyond the permissible maximum widths of vehicles.

15.2.2.9. All Class VII mirrors shall be attached in such a way that they remain in a stable position under normal vehicle driving conditions.

15.2.3. Adjustment

15.2.3.1. The interior mirror must be capable of being adjusted by the driver from his driving position.

15.2.3.2. The exterior mirror situated on the driver's side must be capable of being adjusted from inside the vehicle while the door is closed, although the window may be open. The mirror may, however, be locked in position from the outside.

15.2.3.3. The requirements of paragraph 15.2.3.2 do not apply to exterior mirrors which, after having been knocked out of alignment, can be returned to their former position without the need for adjustment.

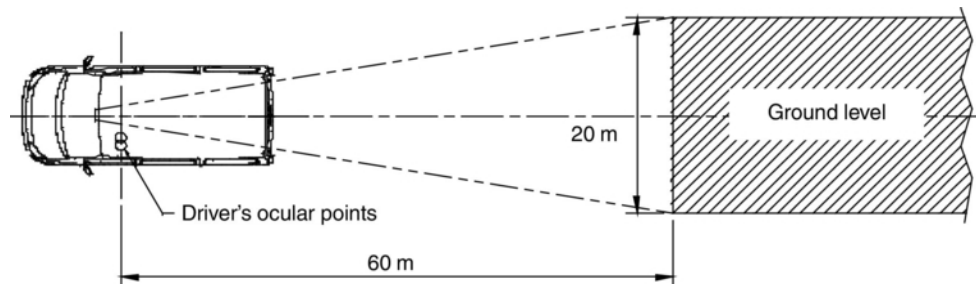
15.2.4. Fields of vision

15.2.4.1. Interior rear-view mirror (Class I)

The field of vision must 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 and extending from 60 m behind the driver's ocular points (Figure 4) to the horizon.

Figure 4

Field of vision of Class I mirror



15.2.4.2. Main exterior rear-view mirrors Class II

15.2.4.2.1. Exterior rear-view mirror on the driver's side

The field of vision must be such that the driver can see at least a 5 m wide, flat, horizontal portion of the road, which is bounded by a plane which is parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle on the driver's side of the vehicle and extends from 30 m behind the driver's ocular points to the horizon.

In addition, the road must be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points (see Figure 5).

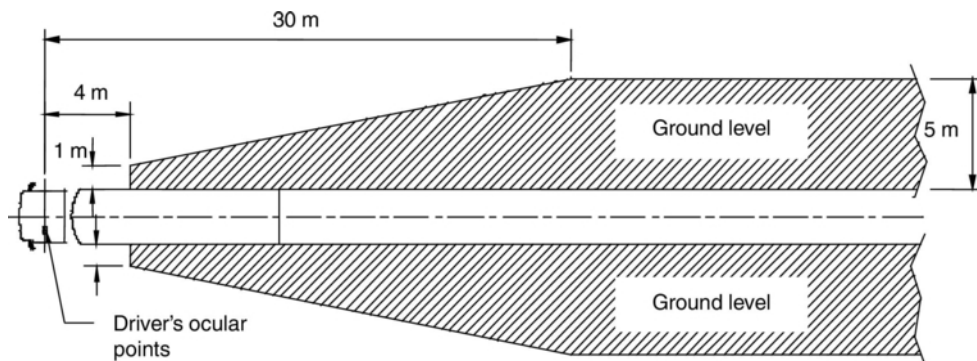
15.2.4.2.2. Exterior rear-view mirror on the passenger's side

The field of vision must be such that the driver can see at least a 5 m wide, flat, horizontal portion of the road, which is bounded on the passenger's side by a plane parallel to the median longitudinal vertical plane of the vehicle and passing through the outermost point of the vehicle on the passenger's side and which extends from 30 m behind the driver's ocular points to the horizon.

In addition, the road must be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points (see Figure 5).

Figure 5

Field of vision of Class II mirrors



15.2.4.3. Main exterior rear-view mirrors Class III

15.2.4.3.1. Exterior rear-view mirror on the driver's side

The field of vision must be such that the driver can see at least a 4 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle on the driver's side of the vehicle and extends from 20 m behind the driver's ocular points to the horizon (see Figure 6).

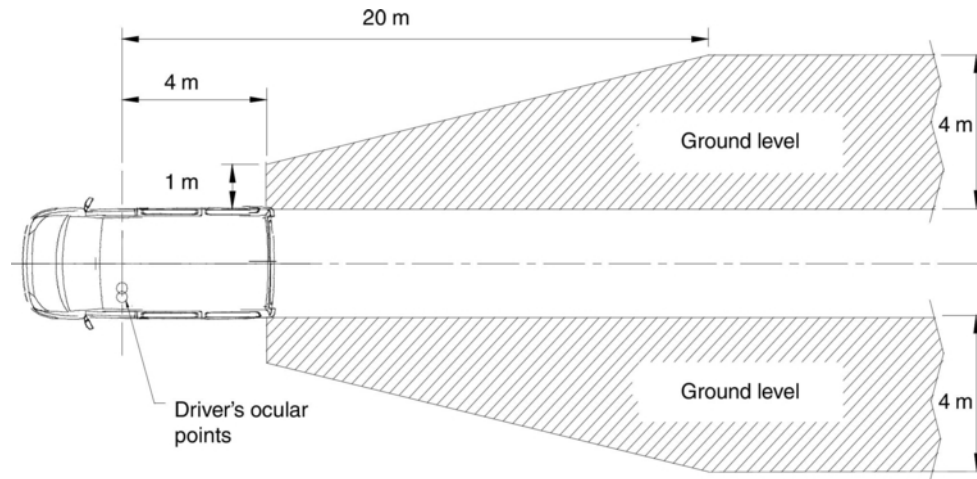
In addition, the road must be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points.

15.2.4.3.2. Exterior rear-view mirror on the passenger's side

The field of vision must be such that the driver can see at least a 4 m wide flat, horizontal portion of the road which is bounded by a plane parallel to the median longitudinal vertical plane passing through the outermost point of the vehicle on the passenger's side and which extends from 20 m behind the driver's ocular points to the horizon (see Figure 6).

In addition, the road must be visible to the driver over a width of 1 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 4 m behind the vertical plane passing through the driver's ocular points.

Figure 6

Field of vision of Class III mirrors

15.2.4.4. 'Wide-angle' exterior mirror (Class IV)

15.2.4.4.1. 'Wide-angle' exterior mirror on the driver's side

The field of vision must be such that the driver can see at least a 15 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane of the vehicle and passing through the outermost point of the vehicle on the driver's side and which extends from at least 10 m to 25 m behind the driver's ocular points.

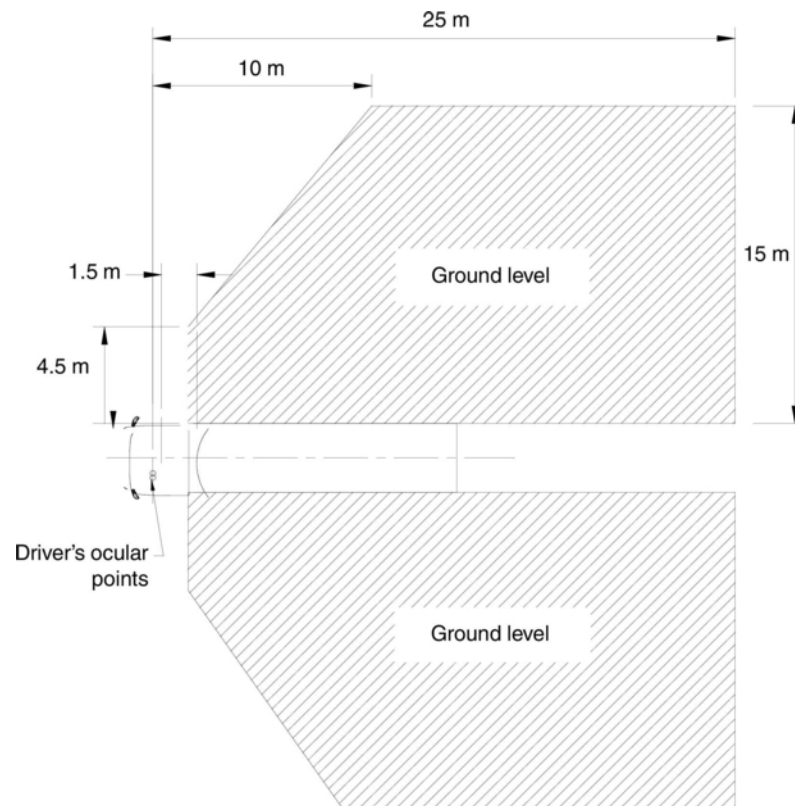
In addition, the road must be visible to the driver over a width of 4,5 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 1,5 m behind the vertical plane passing through the driver's ocular points (see Figure 7).

15.2.4.4.2. 'Wide-angle' exterior mirror on the passenger's side

The field of vision must be such that the driver can see at least a 15 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane of the vehicle and passing through the outermost point of the vehicle on the passenger's side and which extends from at least 10 m to 25 m behind the driver's ocular points.

In addition, the road must be visible to the driver over a width of 4,5 m, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle starting from a point 1,5 m behind the vertical plane passing through the driver's ocular points (see Figure 7).

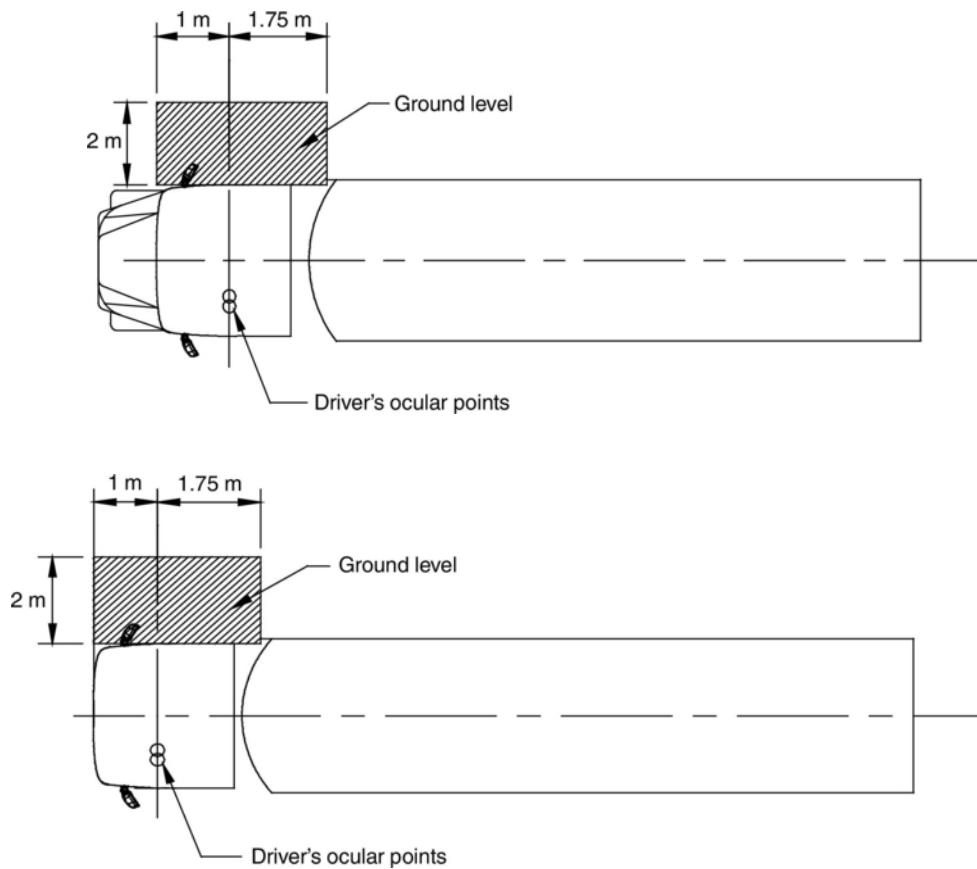
Figure 7

Field of vision of Class IV wide-angle mirrors**15.2.4.5. 'Close-proximity' exterior mirror (Class V)**

The field of vision must be such that the driver can see a flat horizontal portion of the road along the side of the vehicle, bounded by the following vertical planes (see Figures 8a and 8b):

- 15.2.4.5.1. the plane parallel to the median longitudinal vertical plane of the vehicle which passes through the outermost point of the vehicle cab on the passenger's side;
- 15.2.4.5.2. in the transverse direction, the parallel plane passing at a distance of 2 m in front of the plane mentioned in paragraph 15.2.4.5.1;
- 15.2.4.5.3. to the rear, the plane parallel to the vertical plane passing through the driver's ocular points and situated at a distance of 1,75 m behind that plane;
- 15.2.4.5.4. to the front, the plane parallel to the vertical plane passing through the driver's ocular points and situated at a distance of 1 m in front of that plane. If the vertical transverse plane passing through the leading edge of the vehicle bumper is less than 1 m in front of the vertical plane passing through the driver's ocular points, the field of vision shall be limited to that plane.
- 15.2.4.5.5. In case the field of vision described in Figures 8a and 8b can be perceived through the combination of the field of vision from a Class IV wide-angle mirror and that of a Class VI front mirror, the installation of a Class V close proximity mirror is not compulsory.

Figures 8a and 8b

Field of vision of Class V close-proximity mirror

15.2.4.6. Front mirror (Class VI)

15.2.4.6.1. The field of vision shall be such that the driver can see at least a flat horizontal portion of the road, which is bounded by:

- (a) a transverse vertical plane through the outermost point of the front of the vehicle;
- (b) a transverse vertical plane 2 000 mm in front of the plane defined in (a);
- (c) a longitudinal vertical plane parallel to the longitudinal vertical median plane going through the outermost side of the vehicle at the driver's side; and
- (d) a longitudinal vertical plane parallel to the longitudinal vertical median plane 2 000 mm outside the outermost side of the vehicle opposite to the driver's side.

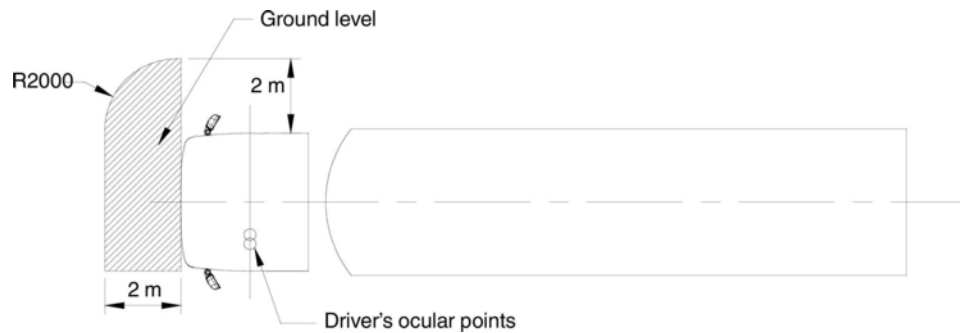
The front of this field of vision opposite to the driver's side may be rounded off with a radius of 2 000 mm (see figure 9).

For the defined field of vision, see also paragraph 15.2.4.9.2.

The provisions for front mirrors are compulsory for forward controlled (as defined in paragraph 12.5) vehicles of categories $N_2 > 7,5$ t and N_3 .

If vehicles of these categories cannot fulfil the requirements by using a front mirror or a camera/monitor device, a vision support system shall be used. In the case of a vision support system this device must be able to detect an object of 50 cm height and with a diameter of 30 cm within the field defined in figure 9.

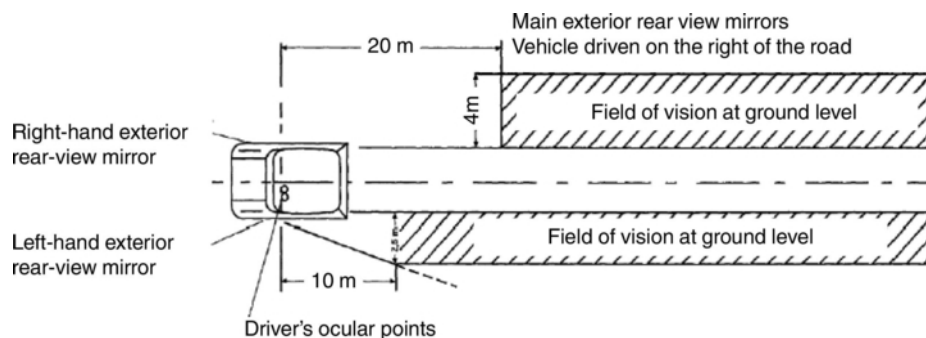
Figure 9

Field of vision of Class VI front mirror

- 15.2.4.6.2. However, if the driver can see, taking into account the obstructions by the A-pillars, a straight line 300 mm in front of the vehicle at a height of 1 200 mm above the road surface and which is situated between a longitudinal vertical plane parallel to the longitudinal vertical median plane going through the outermost side of the vehicle at the driver's side and a longitudinal vertical plane parallel to the longitudinal vertical median plane 900 mm outside the outermost side of the vehicle opposite to the driver's side, a front mirror of Class VI is not mandatory.
- 15.2.4.6.3. For the purpose of paragraphs 15.2.4.6.1 and 15.2.4.6.2 parts permanently attached to the vehicle that are situated both above the driver's eye points and in front of the transverse vertical plane passing through the foremost surface of the vehicle's front bumper shall not be taken into account when defining the front of the vehicle.
- 15.2.4.7. L-category mirror (Class VII).
- 15.2.4.7.1. Exterior rear-view mirror on the driver's side

The field of vision must be such that the driver can see at least a 2,50 m wide, flat, horizontal portion of the road, which is bounded by a plane parallel to the median longitudinal vertical plane and passing through the outermost point of the vehicle on the driver's side of the vehicle and extends from 10 m behind the driver's ocular points to the horizon (see Figure 10).

Figure 10

Field of vision of Class VII mirrors

- 15.2.4.7.2. Exterior rear-view mirror on the passenger's side

The field of vision must be such that the driver can see at least a 4 m wide flat, horizontal portion of the road which is bounded by a plane parallel to the median longitudinal vertical plane passing through the outermost point of the vehicle on the passenger's side and which extends from 20 m behind the driver's ocular points to the horizon (see Figure 10).

- 15.2.4.8. In the case of mirrors consisting of several reflecting surfaces which are either of different curvature or make an angle with each other, at least one of the reflecting surfaces must provide the field of vision and have the dimensions (paragraph 6.1.2.1.2.2) specified for the class to which they belong.
- 15.2.4.9. Obstructions
- 15.2.4.9.1. Interior rear-view mirror (Class I)
- The field of vision may be reduced by the presence of headrest and devices such as, in particular, sun visors, rear windscreen wipers, heating elements and stop lamp(s) of category S3 or by components of bodywork such as window columns of rear split doors, provided that the required field of vision is reduced only partly. The degree of obstruction shall be measured with the headrests adjusted to their lowest possible position and with the sun visors folded back.
- 15.2.4.9.2. Exterior mirrors (Classes II, III, IV, V, VI and VII)
- In the fields of vision specified above, obstruction due to the bodywork and its components, such as other cab mirrors, door handles, outline marker lights, direction indicators and front and rear bumpers, as well as reflective-surface cleaning components, shall not be taken into account if they are responsible for a total obstruction of less than 10 per cent of the specified field of vision. In the case of a vehicle designed and constructed for special purposes where, due to its special features, it is not possible to meet this requirement, the obstruction of the required field of vision of a Class VI mirror caused by the special features may be more than 10 per cent but not more than necessary for its special function.
- 15.2.4.10. Test procedure
- The field of vision shall be determined by placing powerful light sources at the ocular points and examining the light reflected on the vertical monitoring screen. Other equivalent methods may be used.
- 15.3. DEVICES FOR INDIRECT VISION OTHER THAN MIRRORS
- 15.3.1. A device for indirect vision shall give such performances that a critical object can be observed within the described field of vision, taking into account the critical perception.
- 15.3.2. Obstruction of the driver's direct view caused by the installation of a device for indirect vision shall be restricted to a minimum.
- 15.3.3. For the determination of the detection distance in case of camera-monitor devices for indirect vision, the procedure of Annex 10 shall be applied.
- 15.3.4. Installation requirements for the monitor
- The viewing direction of the monitor shall roughly be the same direction as the one for the main mirror.
- 15.3.5. Vehicles may be equipped with additional devices for indirect vision.
- 15.3.6. The provisions of this Regulation do not apply to the surveillance camera-monitor-recording devices defined in paragraph 2.1.2.13. Exterior surveillance cameras either shall be mounted at least 2 m above the ground when the vehicle is under a load corresponding to its maximum technical permissible mass, or, if their lower edge is less than 2 m from the ground, shall not project more than 50 mm beyond the overall width of the vehicle measured without this device and have a radii of curvature of not less than 2,5 mm.
16. MODIFICATIONS OF THE VEHICLE TYPE AND EXTENSION OF APPROVAL
- 16.1. Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:
- 16.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the vehicle still complies with the requirements; or

- 16.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 16.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 4 to this Regulation.
- 16.3. The Competent Authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension.
17. CONFORMITY OF PRODUCTION
- 17.1. The conformity of production procedure shall comply with those set out in the Agreement, Appendix 2, (E/ECE/324-E/ECE/TRANS/505/Rev.2).
- 17.2. Every vehicle approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 15. above.
18. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 18.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 17.1 above is not complied with or if the vehicle fails to pass the checks prescribed in paragraph 17.2 above.
- 18.2. 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'.
19. 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. 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'.
20. 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.
21. TRANSITIONAL PROVISIONS
- 21.1. As from the official date of entry into force of the 02 series of amendments to this Regulation, no Contracting Party applying this Regulation shall refuse an application for approval under this Regulation as amended by the 02 series of amendments.
- 21.2. As from 26 January 2006, Contracting Parties applying this Regulation shall grant approvals to a type of vehicle with regard to the installation of devices for indirect vision only if the type of vehicle meets the requirements of this Regulation as amended by the 02 series of amendments. However, this date shall be postponed by 12 months as regards the requirements concerning the installation of a Class VI front mirror.
- 21.3. As from 26 January 2006, Contracting Parties applying this Regulation shall grant approvals to a type of devices for indirect vision only if the type meets the requirements of this Regulation as amended by the 02 series of amendments. However, this date shall be postponed by 12 months with regard to the requirements concerning a Class VI front mirror as a component and its installation on vehicles.

- 21.4. As from 26 January 2010 for vehicles of category M1 and N1 and 26 January 2007 for vehicles of other categories, Contracting Parties applying this Regulation may refuse to recognize approvals of a type of vehicle which have not been granted in accordance with the 02 series of amendments to this Regulation.
- 21.5. As from 26 January 2010 for vehicles of category M1 and N1 and from 26 January 2007 for vehicles of other categories, Contracting Parties applying this Regulation may refuse to recognize approvals of a device for indirect vision which have not been granted in accordance with the 02 series of amendments to this Regulation.
- 21.6. Approvals which were granted to rear-view mirrors of Classes I or III pursuant to this Regulation in its original form (00 series) or modified by the 01 series of amendments before the date of entry into force of this series of amendments shall remain valid.
- 21.7. The provisions of this Regulation shall not prohibit the approval of a type of vehicle with regard to the mounting of rear-view mirrors pursuant to this Regulation as modified by the 02 series of amendments, if all or part of the rear-view mirrors of Classes I or III, with which it is fitted, bear the approval mark prescribed by the original version (00 or 01 series) of this Regulation.
- 21.8. Notwithstanding the provisions of paragraphs 21.3 and 21.5 above, for the purpose of replacement parts Contracting Parties applying this Regulation shall continue to grant approvals according to the 01 series of amendments to this Regulation, to devices for indirect vision for use on vehicle types which have been approved before the date mentioned in paragraph 21.2 pursuant to the 01 series of amendments of Regulation No 46, and, where applicable, subsequent extensions to these approvals.
-

ANNEX 1

Information document for type-approval of a device for indirect vision

The following information, if applicable, shall be supplied in triplicate and must include a list of contents.

Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

1. Make (trade name of manufacturer):
2. Type and general commercial description(s):
3. Means of identification of the type, if indicated on the device:
4. Category of vehicle for which the device is intended:
5. Name and address of manufacturer:
6. Location and method of affixing of the approval mark:
7. Address(es) of assembly plant(s):
8. Mirrors (state for each mirror):
- 8.1. Variant
- 8.2. Drawing(s) for the identification of the mirror:
- 8.3. Details of the method of attachment:
9. Devices for indirect vision other than mirrors:
- 9.1. Type and characteristics (such as a complete description of the device):
- 9.1.1. In the case of camera-monitor device, the detection distance (mm), contrast, luminance range, glare correction, display performance (black and white/colour), image repetition frequency, luminance reach of the monitor:
- 9.2. sufficiently detailed drawings to identify the complete device including installation instructions; the position for the type-approval mark has to be indicated on the drawings:

ANNEX 2

Information document for type-approval of a vehicle with respect to the installation of devices for indirect vision

The following information, if applicable, shall be supplied in triplicate and include a list of contents.

Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

GENERAL

1. Make (trade name of manufacturer):
2. Type and general commercial description(s):
3. Means of identification of type, if marked on the vehicle (b):
4. Location of that marking:
5. Category of vehicle (c):
6. Name and address of manufacturer:
7. Address(es) of assembly plant(s):

GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

8. Photograph(s) and/or drawing(s) of a representative vehicle:
9. Driving cab (forward control or bonneted) ⁽¹⁾:
10. Driving position: left/right ⁽¹⁾:
- 10.1. The vehicle is equipped to be driven in right-hand/left hand traffic ⁽¹⁾.
11. Range of vehicle dimensions (overall):
- 11.1. For chassis without bodywork
- 11.1.1. Width ⁽²⁾:
- 11.1.1.1. Maximum permissible width:
- 11.1.1.2. Minimum permissible width:
- 11.2. For chassis with bodywork:
- 11.2.1. Width ⁽¹⁾
12. Bodywork
- 12.1. Devices for indirect vision
- 12.1.1. Mirrors
- 12.1.1.1. Drawing(s) showing the position of the mirror relative to the vehicle structure:

- 12.1.1.2. Details of the method of attachment including that part of the vehicle structure to which it is attached:
- 12.1.1.3. Optional equipment which may affect the rearward field of vision:
- 12.1.1.4. A brief description of the electronic components (if any) of the adjustment device:
- 12.1.2. Devices for indirect vision other than mirrors:
- 12.1.2.1. Sufficiently detailed drawings with the installation instructions:

(¹) delete where not applicable.

(²) 'Overall width' of a vehicle means a dimension which is measured according to ISO standard 612-1978, term No 6.2. In case of vehicles of category other than M1, in addition to the provisions of that standard, when measuring the vehicle width the following devices must not be taken into account:

- customs sealing devices and their protection,
- devices for securing the tarpaulin and their protection,
- tyre failure tell-tale devices,
- protruding flexible parts of a spray-suppression system,
- lighting equipment,
- for buses, access ramps in running order, lifting platforms and similar equipment in running order provided that they do not exceed 10 mm from the side of the vehicle and the corners of the ramps facing forwards or rearwards are rounded to a radius of not less than 5 mm; the edges must be rounded to a radius of not less than 2,5 mm,
- devices for indirect vision,
- tyre-pressure indicators,
- retractable steps,
- the deflected part of the tyre walls immediately above the point of contact with the ground.

ANNEX 3

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



Issued by: Name of administration:

.....

.....

.....

Concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of device for indirect vision to Regulation No 46

Approval No Extension No

1. Trade name or mark of device:
 2. Manufacturer's name for the type of device:
 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 report issued by that service
 8. Number of report issued by that service
 9. Brief description
- Identification of the device: mirror, camera/monitor, other device ⁽²⁾
- Device for indirect vision of Class I, II, III, IV, V, VI, S ⁽²⁾
- Δ
- Symbol 2m as defined in paragraph 6.1.3.1.1 of this Regulation: yes/no ⁽²⁾
10. Position of the approval mark:
 11. Reason(s) for extension (if applicable):
 12. Approval granted/refused/extended/withdrawn ⁽²⁾
 13. Place:
 14. Date:
 15. Signature:
 16. The list of documents deposited with the Administrative Service which has granted approval is annexed to this communication and may be obtained on request.

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

⁽²⁾ Strike out what does not apply.

ANNEX 4

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



Issued by: Name of administration:

.....

.....

.....

Concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of vehicle with regard to the mounting of devices for indirect vision pursuant to Regulation No 46

Approval number: Extension No:

1. Make (trade name of manufacturer):
2. Type and general commercial description(s)
3. Means of identification of type, if marked on the vehicle:
- 3.1. Location of that marking:
4. Category of vehicle: (M₁, M₂, M₃, N₁, N₂ ≤ 7,5 t, N₂ > 7,5 t, N₃) ⁽²⁾
5. Name and address of manufacturer:
6. Address(es) of the production plant(s)
7. Additional information: (where applicable): See appendix
8. Technical service responsible for carrying out the tests:
9. Date of test report:
10. Number of test report:
11. Remarks (if any): See appendix
12. Place:
13. Date:
14. Signature:
15. The index to the information package lodged with the Approval Authority, which may be obtained on request is attached.

Appendix to type-approval communication form No ... concerning the type-approval of a vehicle with regard to the mounting of devices for indirect vision under Regulation No 46

1. Trade name or mark of mirrors and supplementary devices for indirect vision and component type-approval number:
2. Class(es) of mirrors and devices for indirect vision (I, II, III, IV, V, VI, VII, S) ⁽²⁾
3. Extension of type approval of the vehicle to cover the following device for indirect vision:
4. Data for identification of the R point of the driver's seating position:
5. Maximum and minimum bodywork width in respect of which the mirror and the devices for indirect vision has been granted type-approval (in the case of chassis/cab referred to in paragraph 15.2.2.3):
6. The following documents, bearing the type-approval number shown above, are annexed to this certificate:
 - drawings showing the mounting of the devices for indirect vision
 - drawings and plans showing the mounting position and characteristics of the part of the structure where the devices for indirect vision are mounted.
7. Remarks: (e.g. valid for right hand/left hand traffic) ⁽²⁾

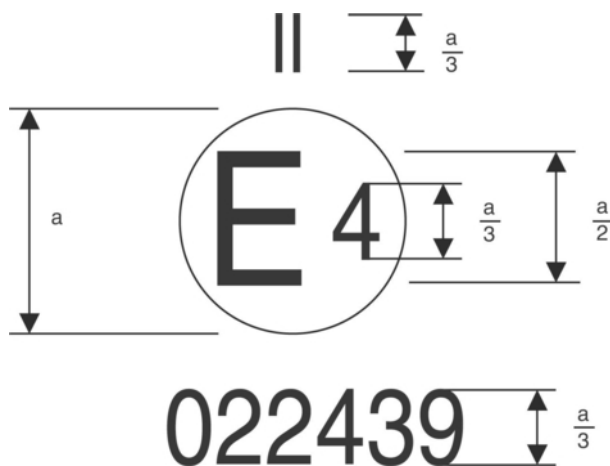
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulations).

⁽²⁾ Strike out what does not apply.

ANNEX 5

Arrangement of approval mark of a device for indirect vision

(See paragraph 5.4. of the Regulation)

 $a = 12 \text{ mm min.}$

The above approval mark affixed to a device for indirect vision indicates that the mirror is a rear-view mirror, of Class II, which has been approved in the Netherlands (E 4) pursuant to Regulation No 46 and under approval number 022439. The first two digits of the approval number indicate that Regulation No 46 already included the 02 series of amendments when the approval was granted.

Note: The approval number and the additional symbol must be placed close to the circle and either above or below the 'E' or to the left or right of that letter. The digits of the approval number must be on the same side of the 'E' and 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.

ANNEX 6

TEST METHOD FOR DETERMINING REFLECTIVITY

1. DEFINITIONS

- 1.1. CIE standard illuminate A ⁽¹⁾: Colorimetric illuminate, respecting the full radiator at $T_{68} = 2\,855,6$ K.
- 1.1.2. CIE standard source A ⁽¹⁾: Gas-filled tungsten filament lamp operating at a correlated colour temperature of $T_{68} = 2\,855,6$ K.
- 1.1.3. CIE 1931 standard colorimetric observer ⁽¹⁾: Receptor of radiation whose colorimetric characteristics correspond to the spectral tristimulus values $\bar{x}(\lambda)$, $\bar{y}(\lambda)$, $\bar{z}(\lambda)$ (see table).
- 1.1.4. CIE spectral tristimulus values ⁽¹⁾: Tristimulus values of the spectral components of an equi energy spectrum in the CIE (XYZ) system.
- 1.1.5. Photopic vision ⁽¹⁾: Vision by the normal eye when it is adapted to levels of luminance of at least several cd/m^2 .

2. APPARATUS

2.1. General

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 means of eliminating the effects of extraneous light.

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

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

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 illuminate-filter-receptor giving the overall equivalent of CIE standard illuminate 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. Geometrical conditions

The angle of the incident beam (θ) should preferably be $0,44 \pm 0,09$ 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 13 mm ($0,5$ 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.

⁽¹⁾ Definitions taken from CIE publication 50 (45), International Electrotechnical Vocabulary, Group 45, Lighting.

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 so located as not to receive direct light from either the incident or the reflected beam.

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 of 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. The accuracy of the receptor indicator unit shall be within ± 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 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

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).

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 reflectivity measurements are performed.

3.2. Indirect calibration method

The indirect calibration method is applicable in the case of 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 the indirect calibration method. The reflectance value is read directly from the indicating meter.

3.4. Non-flat (convex) mirror measurement

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 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, in accordance with the formula:

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

Figure 1

Generalised reflectometer showing experimental set-ups for the two calibration methods

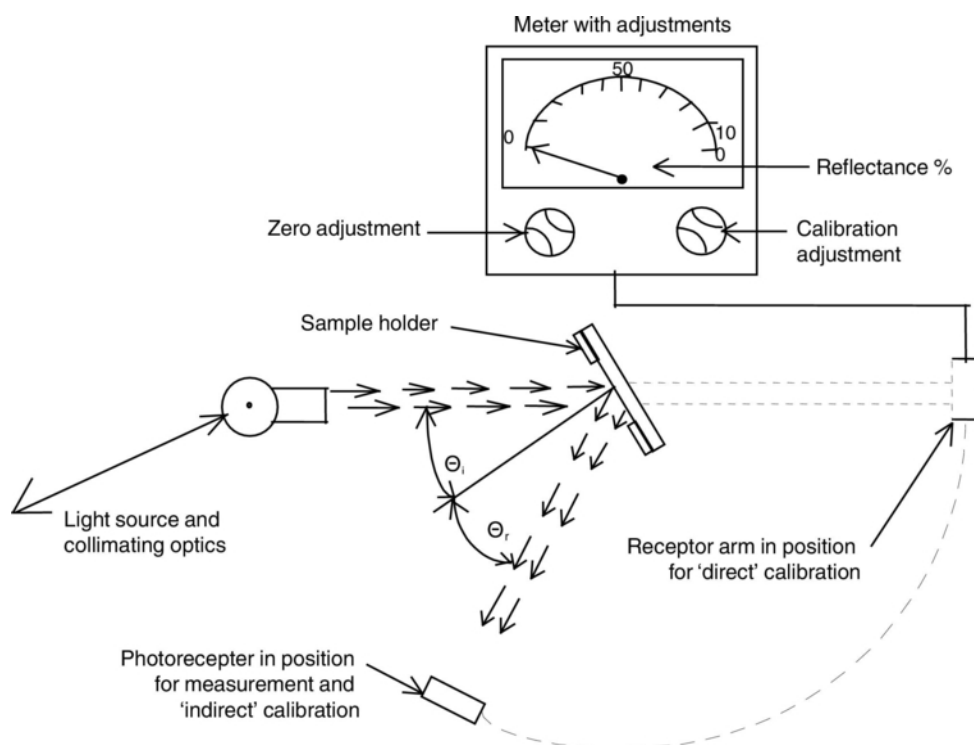
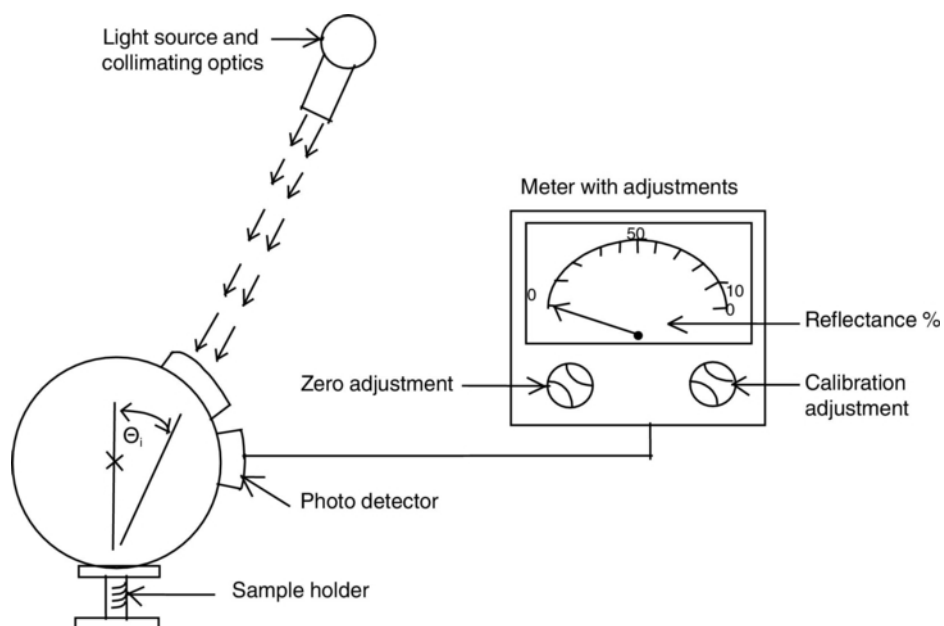


Figure 2

Generalised reflectometer, incorporating an integrating sphere in the receiver



Spectral tristimulus values for the CIE 1931 standard colorimetric observer ⁽²⁾

This table is taken from CIE publication 50 (45) (1970)

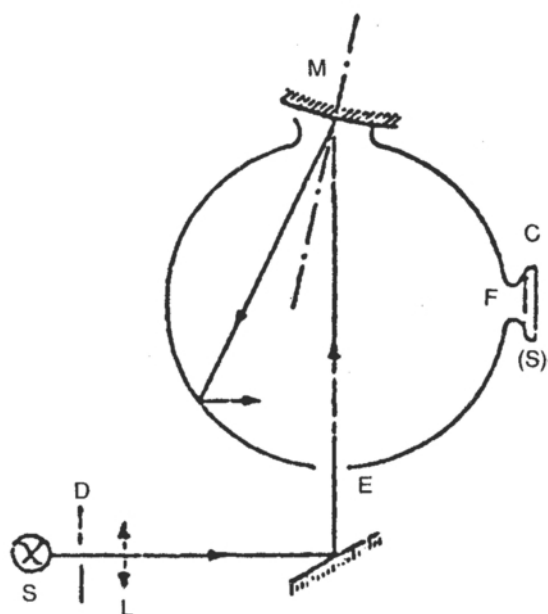
λ nm	$\bar{x}(\lambda)$	$\bar{y}(\lambda)$	$\bar{z}(\lambda)$
380	0,001 4	0,000 0	0,006 5
390	0,004 2	0,000 1	0,020 1
400	0,014 3	0,000 4	0,067 9
410	0,043 5	0,001 2	0,207 4
420	0,134 4	0,004 0	0,645 6
430	0,283 9	0,011 6	1,385 6
440	0,348 3	0,023 0	1,747 1
450	0,336 2	0,038 0	1,772 1
460	0,290 8	0,060 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	0,22 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	0,02 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

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

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

EXPLANATORY FIGURE

Example of device for measuring the reflection factor of spherical mirrors



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

ANNEX 7

Procedure for determining the radius of curvature 'r' of the reflecting surface of a mirror

1. MEASUREMENT

1.1. Equipment

A 'spherometer' similar to the one described in Figure 1 of this annex having the indicated distances between the tracing pin of the dial gauge and the fixed legs of the bar is used.

1.2. Measuring points

1.2.1. The principal radii of curvature shall be measured at three points situated as close as possible to positions at one-third, one-half and two-thirds of the distance along the arc of the reflecting surface passing through the centre of this surface and parallel to segment b, or of the arc passing through the centre of the reflecting surface which is perpendicular to it if this arc is the longer.

1.2.2. Where, owing to the size of the reflecting surface, it is impossible to obtain measurements in the directions defined in paragraph 2.1.1.6 of this Regulation, the Technical Services responsible for the tests may take measurements at the said point in two perpendicular directions as close as possible to those prescribed above.

2. CALCULATION OF THE RADIUS OF CURVATURE 'r'

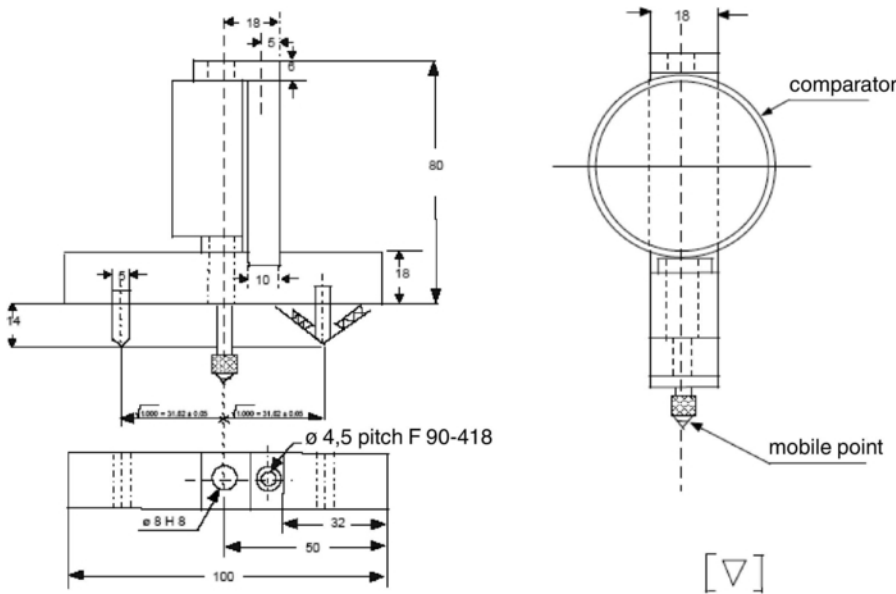
'r' expressed in mm is calculated from the formula:

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

where:

- r_{p1} = the radius of curvature at the first measuring point,
- r_{p2} = the radius of curvature at the second measuring point,
- r_{p3} = the radius of curvature at the third measuring point.

Figure 1
Spherometer



ANNEX 8

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

1. PURPOSE

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

2. DEFINITIONS

For the purposes of this annex:

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

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

3. REQUIREMENTS

3.1. Data presentation

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

- 3.1.1. the co-ordinates of the 'R' point relative to the three-dimensional reference system;
- 3.1.2. the design torso angle;
- 3.1.3. all indications necessary to adjust the seat (if it is adjustable) to the measuring position set out in paragraph 4.3 below.
- 3.2. Relationship between measured data and design specifications
 - 3.2.1. The co-ordinates of the 'H' point and the value of the actual torso angle obtained by the procedure set out in paragraph 4. below shall be compared, respectively, with the co-ordinates of the 'R' point and the value of the design torso angle indicated by the vehicle manufacturer.
 - 3.2.2. The relative positions of the 'R' point and the 'H' point and the relationship between the design torso angle and the actual torso angle shall be considered satisfactory for the seating position in question if the 'H' point, as defined by its co-ordinates, lies within a square of 50 mm side length with horizontal and vertical sides whose diagonals intersect at the 'R' point, and if the actual torso angle is within 5 degree of the design of the torso angle.
 - 3.2.3. If these conditions are met, the 'R' point and the design torso angle, shall be used to demonstrate compliance with the provisions of this Regulation.
 - 3.2.4. If the 'H' point or the actual torso angle does not satisfy the requirements of paragraph 3.2.2 above, the 'H' point and the actual torso angle shall be determined twice more (three times in all). If the results of two of these three operations satisfy the requirements, the conditions of paragraph 3.2.3 above shall apply.
 - 3.2.5. If the results of at least two of the three operations described in paragraph 3.2.4 above do not satisfy the requirements of paragraph 3.2.2 above, or if the verification cannot take place because the vehicle manufacturer has failed to supply information regarding the position of the 'R' point or regarding the design torso angle, the centroid of the three measured points or the average of the three measured angles shall be used and be regarded as applicable in all cases where the 'R' point or the design torso angle is referred to in this Regulation.

4. PROCEDURE FOR 'H' POINT AND ACTUAL TORSO ANGLE DETERMINATION

- 4.1. The vehicle shall be preconditioned at the manufacturer's discretion, at a temperature of 20 ± 10 °C to ensure that the seat material reaches the room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for one minute to flex the cushion and back. At the manufacturer's request, all seat assemblies shall remain unloaded for a minimum period of 30 min prior to installation of the 3-D H machine.
- 4.2. The vehicle shall be at the measuring attitude defined in paragraph 2.11 above.
- 4.3. The seat, if it is adjustable, shall be adjusted first to the rearmost normal driving or riding position, as indicated by the vehicle manufacturer, taking into consideration only the longitudinal adjustment of the seat, excluding seat travel used for purposes other than normal driving or riding positions. Where other modes of seat adjustment exist (vertical, angular, seat-back, etc.) these will be then adjusted to the position specified by the vehicle manufacturer. For suspension seats, the vertical position shall be rigidly fixed corresponding to a normal driving position as specified by the manufacturer.
- 4.4. The area of the seating position contacted by the 3-D H machine shall be covered by a muslin cotton, of sufficient size and appropriate texture, described as a plain cotton fabric having 18,9 threads per/cm² and weighing 0,228 kg/m² or knitted or non-woven fabric having equivalent characteristics.

If test is run on a seat outside the vehicle, the floor on which the seat is placed shall have the same essential characteristics ⁽²⁾ as the floor of the vehicle in which the seat is intended to be used.

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

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

- 4.12. Tilt the back pan forward to release the tension on the seat-back. Rock the 3-D H machine from side to side through 10° arc (5° to each side of the vertical centreplane) for three complete cycles to release any accumulated friction between the 3-D H machine and the seat.

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

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

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

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

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

- 4.13. Holding the T-bar to prevent the 3-D H machine from sliding forward on the seat cushion, proceed as follows:
- (a) return the back pan to the seat back;
 - (b) alternately apply and release a horizontal rearward load, not to exceed 25 N, to the back angle bar at a height approximately at the centre of the torso weights until the hip angle quadrant indicates that a stable position has been reached after load release. Care shall be exercised to ensure that no exterior downward or lateral loads are applied to the 3-D H machine. If another level adjustment of the 3-D H machine is necessary, rotate the back pan forward, re-level, and repeat the procedure from paragraph 4.12.
- 4.14. Take all measurements:
- 4.14.1. The co-ordinates of the 'H' point are measured with respect to the three-dimensional reference system;
 - 4.14.2. The actual torso angle is read at the back angle quadrant of the 3-D H machine with the probe in its fully rearward position.
- 4.15. If a re-run of the installation of the 3-D H machine is desired, the seat assembly should remain unloaded for a minimum period of 30 min prior to the re-run. The 3-D H machine should not be left loaded on the seat assembly longer than the time required to perform the test.
- 4.16. If the seats in the same row can be regarded as similar (bench seat, identical seats, etc.) only one 'H' point and one 'actual torso angle' shall be determined for each row of seats, the 3-D H machine described in appendix 1 to this annex being seated in a place regarded as representative for the row. This place shall be:
- 4.16.1. in the case of the front row, the driver's seat;
 - 4.16.2. in the case of the rear row or rows, an outer seat.
-

APPENDIX 1

DESCRIPTION OF THE THREE DIMENSIONAL 'H' POINT MACHINE ⁽¹⁾

(3-D H machine)

1. Back and seat pans

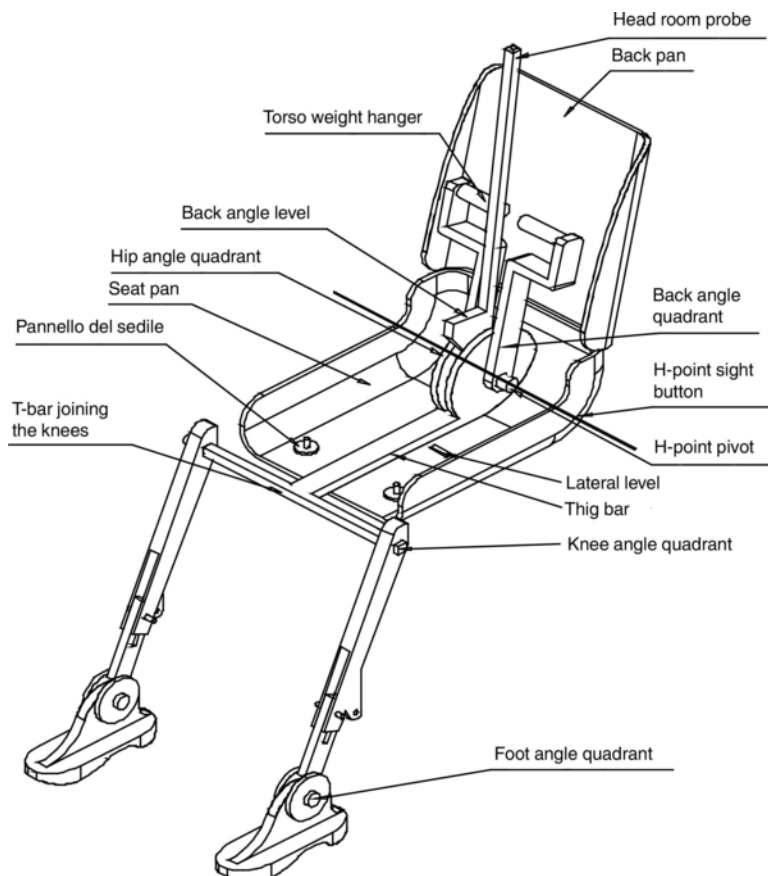
The back and seat pans are constructed of reinforced plastic and metal; they simulate the human torso and thigh and are mechanically hinged at the 'H' point. A quadrant is fastened to the probe hinged at the 'H' point to measure the actual torso angle. An adjustable thigh bar, attached to the seat pan,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

2. Body and leg elements

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

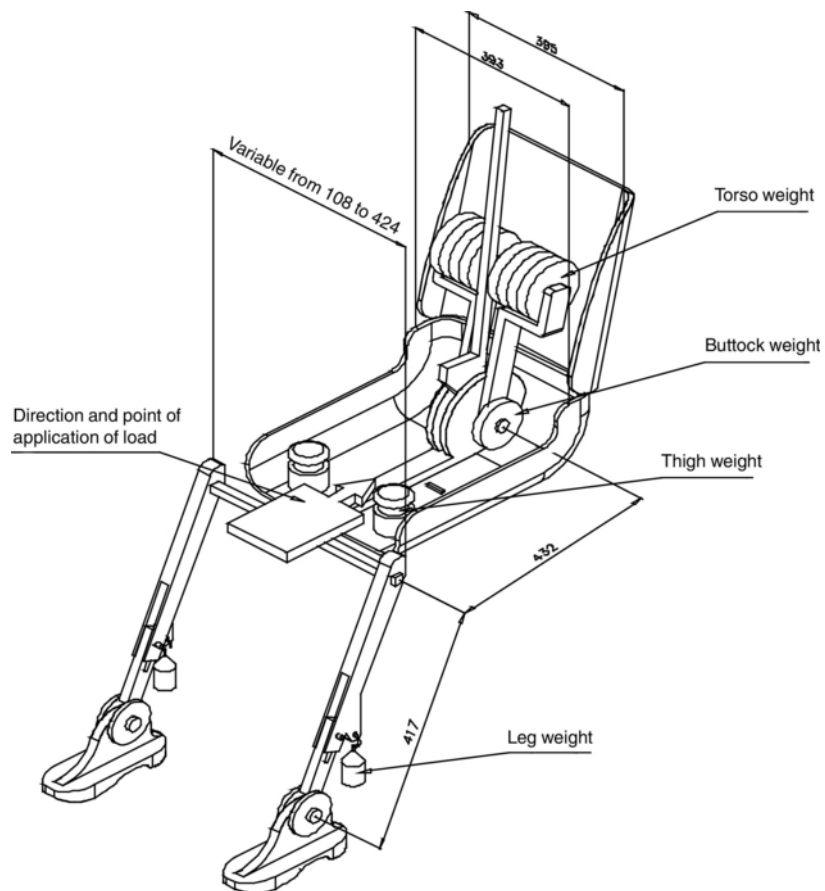
Figure 1

3-D H machine elements designation



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

Figure 2

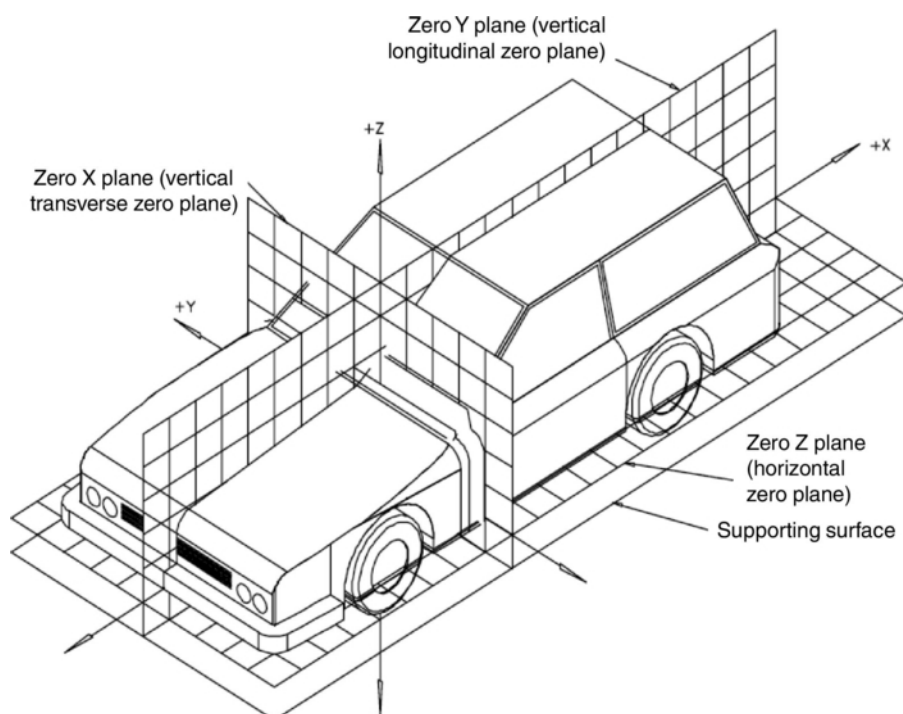
Dimensions of the 3-D H machine elements and load distribution

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) ⁽¹⁾.
2. The vehicle measuring attitude is established by positioning the vehicle on the supporting surface such that the co-ordinates of the fiducial marks correspond to the values indicated by the manufacturer.
3. The co-ordinates of the 'R' point and the 'H' point are established in relation to the fiducial marks defined by the vehicle manufacturer.

Figure

Three-dimensional reference system

⁽¹⁾ 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 digit is an Arabic numeral and designates the row of seats, counting from the front to the rear of the vehicle. The second digit is a capital letter which designates the location of the seating position in a row, as viewed in the direction of forward motion of the vehicle; the following letters shall be used:

L = left
C = centre
R = right

2. Description of vehicle measuring attitude

2.1. Co-ordinates of fiducial marks

X
Y
Z

3. List of reference data

3.1. Seating position:

3.1.1. Co-ordinates of 'R' point

X
Y
Z

3.1.2. Design torso angle

3.1.3. Specifications for seat adjustment ⁽¹⁾

horizontal:
vertical:
angular:
torso angle:

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

⁽¹⁾ Strike out what does not apply.

ANNEX 9

(reserved)

ANNEX 10

CALCULATION OF THE DETECTION DISTANCE

1. CAMERA MONITOR DEVICE FOR INDIRECT VISION

1.1. Resolution threshold of a camera

The resolution threshold of a camera is defined by the formula:

$$\omega_c = 60 \frac{\beta_c}{2N_c}$$

where:

ω_c — resolution threshold of the camera (arc-min)

β_c — angle of vision of the camera (°)

N_c — number of video lines of the camera (#)

The manufacturer shall supply the values for β_c and N_c

1.2. Determination of the critical viewing distance of the monitor

For a monitor having certain dimensions and properties, a distance to the monitor can be calculated within which the detection distance is dependent only on the performances of the camera. This critical viewing distance $r_{m,c}$ is defined by:

$$r_{m,c} = \frac{H_m}{N_m \cdot 2 \cdot \tan\left(\frac{\omega_{eye}}{2,60}\right)}$$

where:

$r_{m,c}$ — critical viewing distance (m)

H_m — height of the monitor image (m)

N_m — number of video lines of the monitor (—)

ω_{eye} — resolution threshold of the observer (minutes of arch)

The number 60 is for conversion from minutes of arches to degrees.

The manufacturer shall supply the values for H_m and N_m .

$$\omega_{eye} = 1$$

1.3. Determination of the detection distance

1.3.1. Maximum detection distance within the critical viewing distance where, due to the installation, the distance eye-monitor is less than the critical viewing distance, the maximum attainable detection distance shall be defined by:

$$r_d = \frac{D_o}{\tan\left(\frac{f \cdot \omega_c}{60}\right)} = \frac{D_o}{\tan\left(\frac{f \cdot \beta_c}{2 \cdot N_c}\right)}$$

where:

r_d — detection distance [m]

D_o — diameter of the object [m]

f — threshold increasing factor

ω_c , β_c and N_c according to paragraph 1.1.

$$D_o = 0,8 \text{ m}$$

$$f = 8$$

- 1.3.2. Detection distance greater than the critical viewing distance. Where, due to the installation, the distance eye-monitor is more than the critical viewing distance, the maximum obtainable detection distance shall be defined:

$$r_d = \frac{D_o}{\tan \left[\frac{f \cdot \beta_c}{2N_c} \cdot \frac{N_m}{0,01524 \cdot D_m} \cdot r_m \cdot \tan \left(\frac{\omega_{eye}}{60} \right) \right]}$$

where:

r_m — viewing distance to the monitor (m)

D_m — diagonal of the monitor screen (inch)

N_m — number of video lines of the monitor (-)

β_c and N_c according to paragraph 1.1.

N_m and ω_{eye} according to paragraph 1.2.

2. SECONDARY FUNCTIONAL REQUIREMENTS

Based on the installation conditions, a determination shall be made to discover whether the entire device can still satisfy the functional requirements listed in paragraph 6.2.2 of this Regulation, especially the glare correction, the maximum and the minimum luminance of the monitor. It shall also be determined the degree to which the glare correction will be addressed and the angle at which sunlight can strike a monitor and these shall be compared to the corresponding measuring results from the system measurements. This can be either based on a CAD-generated model, a determination of the angles of light for the device when mounted on the relevant vehicle, or by carrying out relevant measurements on the relevant vehicle as described in paragraph 6.2.2.2 of this Regulation.

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 118 of the Economic Commission for Europe of the United Nations (UN/ECE) —
Uniform technical prescriptions concerning the burning behaviour of materials used in the interior
construction of certain categories of motor vehicles**

Date of entry into force: 6 April 2005

CONTENTS

REGULATION

1. Scope
2. Definitions
3. Application for approval
4. Approval
5. Part I — Definitions — Specifications
6. Part II — Definitions — Specifications
7. Modification of the 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 — Information document for vehicle
- Annex 2 — Information document for component
- Annex 3 — Communication concerning approval of a vehicle type
- Annex 4 — Communication concerning approval of a component type
- Annex 5 — Arrangements of approval marks
- Annex 6 — Test to determine the horizontal burning rate of materials
- Annex 7 — Test to determine the melting behaviour of materials
- Annex 8 — Test to determine the vertical burning rate of materials

1. SCOPE

- 1.1. This Regulation applies to the burning behaviour (ignitibility, burning rate and melting behaviour) of interior materials used in vehicles of categories M₃, Classes II and III ⁽¹⁾, carrying more than 22 passengers, not being designed for standing passengers and urban use (city buses).

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

Type-approvals are granted according to:

- 1.2. Part I — Approval of a vehicle type with regard to the burning behaviour of the interior components used in the passenger compartment.
- 1.3. Part II — Approval of a component (materials, seats, curtains, separation walls, etc.) with regard to its burning behaviour.
2. DEFINITIONS: General
 - 2.1. 'Manufacturer' means the person or body who is responsible to the approval authority for all aspects of the type-approval process and for ensuring conformity of production. It is not essential that the person or body is directly involved in all stages of the construction of the vehicle or component which is the subject of the approval process.
 - 2.2. 'Passenger compartment' means the space for occupants' accommodation including bar, kitchen, toilet, etc.), bounded by:
 - the roof,
 - the floor,
 - the side walls,
 - the doors,
 - the outside glazing,
 - the rear compartment bulkhead, or the plane of the rear seat,
 - back support,
 - at the driver's side of the longitudinal vertical median plane of the vehicle, the vertical transversal plane through the driver's R-point as defined in Regulation No 17,
 - at the opposite side of the longitudinal vertical median plane of the vehicle, the front bulkhead.
 - 2.3. 'Production materials' means products, in the form of bulk materials (e.g. rolls of upholstery) or pre-formed components, supplied to a manufacturer for incorporation in a vehicle type approved under this Regulation, or to a workshop for use in the business of vehicle maintenance or repair.
 - 2.4. 'Seat' means a structure which may or may not be integral with the vehicle structure, complete with trim, intended to seat one adult person. The term covers both an individual seat or part of a bench seat intended to seat one adult person.
 - 2.5. 'Group of seats' means either a bench-type seat, or seats which are separate but side by side (i.e. with the foremost anchorages of one seat in line with or forward of the rearmost anchorages and in line with or behind the foremost anchorages of another seat) and which accommodate one or more seated adult persons.
 - 2.6. 'Bench seat' means a structure complete with trim, intended to seat more than one adult person.
3. APPLICATION FOR APPROVAL
 - 3.1. The application for approval of a vehicle or component type with regard to this Regulation shall be submitted by the manufacturer.
 - 3.2. It shall be accompanied by an information document conforming to the model shown in Annex 1 or in Annex 2.

- 3.3. The following must be submitted to the technical service responsible for conducting the type-approval tests:
 - 3.3.1. In the case of approval of a vehicle: a vehicle representative of the type to be approved.
 - 3.3.2. In the case of interior components already type approved: a list of the type-approval numbers and maker's type designations of the parts concerned, shall be enclosed in the application for the vehicle type-approval;
 - 3.3.3. In the case of interior components without ECE type-approval:
 - 3.3.3.1. Samples, the number of which is specified in Annexes 6 to 8, of the components used in the vehicles, which are representative of the type to be approved;
 - 3.3.3.2. Furthermore, one sample shall be submitted to the technical service for future reference purposes;
 - 3.3.3.3. For devices such as seats, curtains, separation walls, etc., the samples specified in paragraph 3.3.3.1 plus one complete device as mentioned above.
 - 3.3.3.4. The samples shall be clearly and indelibly marked with the applicant's trade name or mark and the type designation;
- 4. APPROVAL
 - 4.1. If the type submitted for approval to this Regulation meets the requirements of the relevant part(s) of this Regulation, approval of that type shall be granted.
 - 4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00, corresponding to 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 type of vehicle or component as defined in this Regulation.
 - 4.3. Notice of approval or of extension of approval of a type pursuant to this Regulation shall be communicated to the Contracting Parties to the Agreement applying this Regulation, by means of one of the forms conforming to the models in Annexes 3 or 4, as appropriate, to this Regulation.
 - 4.4. There shall be affixed, conspicuously and in a readily accessible location specified on the approval form, to every vehicle conforming to a type approved under this Regulation, to the packaging of every material (see paragraph 4.4.2.3) conforming to a type approved under this Regulation and to every component supplied separately conforming to a type approved under this Regulation, an international approval mark consisting of:
 - 4.4.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted component type-approval ⁽²⁾,

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

- 4.4.2. In the vicinity of the circle:
- 4.4.2.1. Symbols indicating the direction for which the burning rate of the component has been determined:
- ↔ for the horizontal direction (Annex 6),
 - ↑ for the vertical direction (Annex 8),
 - ↓ for the horizontal and vertical directions (Annexes 6 and 8);
- 4.4.2.2. The symbol 'V' indicating that the component has been approved according to its melting behaviour (Annex 7) and/or the symbol 'CD' indicating that the component has been approved as a complete device, such as seats, separation walls, luggage racks, etc.
- 4.4.2.3. Production materials do not need to be individually marked. However, the packaging with which they are supplied must be clearly marked with the approval mark described above.
- 4.4.2.4. If separately marked, large components, for example seats, comprising of more than one piece of approved material, may have a single mark indicating the approval number(s) of the material(s) used.
- 4.4.3. If a type conforms to a 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 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.
- 4.4.4. The approval mark shall be clearly legible and be indelible.
- 4.4.5. In the case of a vehicle, the approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.4.6. Annex 5 to this Regulation gives examples of arrangements of approval marks.
5. PART I — APPROVAL OF A VEHICLE TYPE WITH REGARD TO THE BURNING BEHAVIOUR OF THE INTERIOR COMPONENTS USED IN THE PASSENGER COMPARTMENT
- 5.1. Definition
- For the purpose of Part I of this Regulation,
- 5.1.1. 'Vehicle type' means vehicles that do not differ in such essential respects as the manufacturer's type designation.
- 5.2. Specifications
- 5.2.1. The interior materials of the passenger compartment used in the vehicle to be type approved shall meet the requirements of Part II of this Regulation.
- 5.2.2. The materials and/or equipment used in the passenger compartment and/or in devices approved as components shall be so installed as to minimise the risk of flame development and flame propagation.
- 5.2.3. Such interior materials and/or equipment shall only be installed in accordance with their intended purposes and the test(s) which they have undergone (see paragraphs 6.2.1, 6.2.2 and 6.2.3), especially in relation to their burning and melting behaviour (horizontal/vertical direction).

- 5.2.4. Any adhesive agent used to affix the interior material to its supporting structure shall not, as far as possible, exacerbate the burning behaviour of the material.

6. PART II — APPROVAL OF A COMPONENT WITH REGARD TO ITS BURNING BEHAVIOUR

6.1. Definitions

For the purpose of Part II of this Regulation,

- 6.1.1. 'Type of a component' means components which do not differ in such essential respects as:

6.1.1.1. the manufacturer's type designation,

6.1.1.2. the intended use (seat upholstery, roof lining, etc.),

6.1.1.3. the base material(s) (e.g. wool, plastic, rubber, blended materials),

6.1.1.4. the number of layers in the case of composite materials, and

6.1.1.5. other characteristics in so far as they have an appreciable effect on the performance prescribed in this Regulation.

6.1.2. 'Burning rate' means the quotient of the burnt distance measured according to Annex 6 and/or Annex 8 to this Regulation and the time taken to burn this distance. It is expressed in millimetres per minute.

6.1.3. 'Composite material' means a material composed of several layers of similar or different materials intimately held together at their surfaces by cementing, bonding, cladding, welding, etc. When different materials are connected together intermittently (for example, by sewing, high-frequency welding, riveting), such materials shall not be considered as composite materials.

6.1.4. 'Exposed face' means the side of a material which is facing towards the passenger compartment when the material is mounted in the vehicle.

6.1.5. 'Upholstery' means the combination of interior padding and surface finish material which together constitute the cushioning of the seat frame.

6.1.6. 'Interior lining(s)' means material(s) that (together) constitute(s) the surface finish and substrate of a roof, wall or floor.

6.2. Specifications

6.2.1. The following materials shall undergo the test described in Annex 6 to this Regulation:

(a) material(s) used for the upholstery of any seat and its accessories (including the driver's seat);

(b) material(s) used for the interior lining of the roof;

(c) material(s) used for the interior lining of the side and rear walls, including separation walls;

(d) material(s) with thermal and/or acoustic function;

(e) material(s) used for the interior lining of the floor;

(f) material(s) used for the interior lining of luggage-racks, heating and ventilation pipes;

(g) material(s) used for the light fittings.

The result of the test shall be considered satisfactory if, taking the worst test results into account, the horizontal burning rate is not more than 100 mm/minute or if the flame extinguishes before reaching the last measuring point.

6.2.2. The following materials shall undergo the test described in Annex 7 to this Regulation:

- (a) material(s) used for the interior lining of the roof;
- (b) material(s) used for the interior lining of the luggage-racks, heating and ventilation pipes situated in the roof;
- (c) material(s) used for the lights situated in the luggage-racks and/or roof.

The result of the test shall be considered satisfactory if, taking the worst test results into account, no drop is formed which ignites the cotton wool.

6.2.3. The materials used for the curtains and blinds (and/or other hanging materials) shall undergo the test described in Annex 8.

The result of the test shall be considered satisfactory if, taking the worst test results into account, the vertical burning rate is not more than 100 mm/minute.

6.2.4. Materials which are not required to undergo the tests described in Annexes 6 to 8 are:

- 6.2.4.1. parts made of metal or glass;
- 6.2.4.2. each individual seat accessory with a mass of non-metallic material less than 200 g. If the total mass of these accessories exceeds 400 g of non-metallic material per seat, then each material must be tested;
- 6.2.4.3. elements of which the surface area or the volume does not exceed respectively:
 - 6.2.4.3.1. 100 cm² or 40 cm³ for the elements which are connected to an individual seating place;
 - 6.2.4.3.2. 300 cm² or 120 cm³ per seat row and, at a maximum, per linear metre of the interior of the passenger compartment for these elements which are distributed in the vehicle and which are not connected to an individual seating place;
- 6.2.4.4. electric cables;
- 6.2.4.5. elements for which it is not possible to extract a sample in the prescribed dimensions as specified in paragraph 3.1 of Annex 6, paragraph 3 of Annex 7, and paragraph 3.1 of Annex 8

7. MODIFICATION OF THE TYPE AND EXTENSION OF APPROVAL

7.1. Every modification of a vehicle or component type with regard to this Regulation shall be notified to the administrative department which approved the vehicle or the component type. The department may then either:

- 7.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case vehicles or components still comply with the requirements, or
- 7.1.2. Require a further test report from the technical service responsible for conducting the tests.

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 applying this Regulation.

7.3. The competent authority issuing the extension of approval shall assign a serial number to each communication form drawn up 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 3 or Annex 4 to this Regulation.

8. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

- 8.1. Vehicles/components approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements of the relevant part(s) of this Regulation.
- 8.2. The authority that 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 one every two years.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 9.1. The approval granted in respect of a vehicle/component type pursuant to this Regulation may be withdrawn if the requirements set forth above are not met.
- 9.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the models in Annex 3 or Annex 4 to this Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a vehicle 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 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 3 or Annex 4 to this Regulation.

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

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

ANNEX 1

INFORMATION DOCUMENT

(in accordance with paragraph 3.2 of this Regulation relating to the ECE type-approval of a vehicle with regard to the burning behaviour of the interior components used in the passenger compartment)

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

1. GENERAL

- 1.1. Make (trade name of manufacturer):
- 1.2. Type and general commercial description(s):
- 1.3. Means of identification of type, if marked on the vehicle:
- 1.4. Location of that marking:
- 1.5. Category of vehicle ⁽¹⁾:
- 1.6. Name and address of manufacturer:
- 1.7. Address(es) of assembly plant(s):

2. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

- 2.1. Photographs and/or drawings of a representative vehicle:

3. BODYWORK

Interior fittings

- 3.1. Seats
 - 3.1.1. Number:
- 3.2. Burning behaviour of materials used in the interior construction of the vehicle
 - 3.2.1. Material(s) used for the interior lining of the roof
 - 3.2.1.1. Component type-approval number(s):
 - 3.2.2. Material(s) used for the rear and side walls
 - 3.2.2.1. Component type-approval number(s):
 - 3.2.3. Material(s) used for the floor
 - 3.2.3.1. Component type-approval number(s):
 - 3.2.4. Material(s) used for the upholstery of the seats
 - 3.2.4.1. Component type-approval number(s):

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

- 3.2.5. Material(s) used for heating and ventilation pipes
- 3.2.5.1. Component type-approval number(s):
- 3.2.6. Material(s) used for luggage racks
- 3.2.6.1. Component type-approval number(s):
- 3.2.7. Material(s) used for other purposes
- 3.2.7.1. Intended purposes:
- 3.2.7.2. Component type-approval number(s):
- 3.2.8. Components approved as complete devices (seats, separation walls, luggage racks, etc.)
- 3.2.8.1. Component type-approval number(s):
-

ANNEX 2

INFORMATION DOCUMENT

(in accordance with paragraph 3.2 of the Regulation relating to the ECE type-approval of a component with regard to its burning behaviour)

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

1. GENERAL

1.1. Make (trade name of manufacturer):

1.2. Type and general commercial description(s):

1.3. Name and address of manufacturer:

1.4. In the case of components and separate technical units, location and method of affixing of the EEC approval mark:

1.5. Address(es) of assembly plant(s):

2. INTERIOR MATERIALS

2.1. Material(s) used for:

2.2. Base material(s)/designation: .../... ..

2.3. Composite/single ⁽¹⁾ material, number of layers ⁽¹⁾:

2.4. Type of coating ⁽¹⁾:

2.5. Maximum/minimum thickness mm

2.6. Type-approval number, if available:

⁽¹⁾ Delete where not applicable.

ANNEX 3

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type pursuant to Regulation No 118

Approval No Extension No

Reason for extension:

SECTION I

GENERAL

- 1.1. Make (trade name of manufacturer):
- 1.2. Type:
- 1.3. Means of identification of type, if marked on the vehicle/component/separate technical unit ⁽²⁾ ⁽³⁾:
- 1.3.1. Location of that marking:
- 1.4. Category of vehicle ⁽⁴⁾:
- 1.5. Name and address of manufacturer:
- 1.6. Location of the ECE approval mark:
- 1.7. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable):
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:

5. Remarks (if any):
6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

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

(²) Strike out what does not apply (there are cases where nothing needs to be deleted, when more than one entry is applicable).

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

(⁴) 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 amended).

ANNEX 4

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a component type pursuant to Regulation No 118

Approval No Extension No

Reason for extension:

SECTION I

GENERAL

- 1.1. Make (trade name of manufacturer):
- 1.2. Type:
- 1.3. Means of identification of type, if marked on the device ⁽³⁾:
- 1.3.1. Location of that marking:
- 1.4. Name and address of manufacturer:
- 1.5. Location of the ECE approval mark:
- 1.6. Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable)
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any):

6. Place:
7. Date:
8. Signature:
9. The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

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

(²) Strike out what does not apply (there are cases where nothing needs to be deleted, when more than one entry is applicable).

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

ANNEX 5

ARRANGEMENTS OF APPROVAL MARKS

Example 1

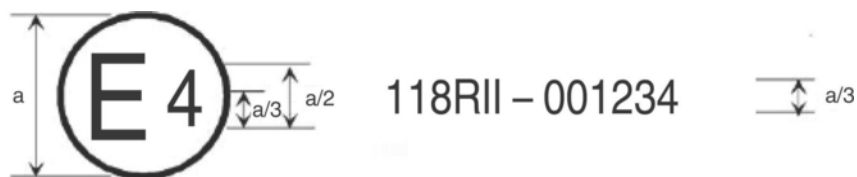
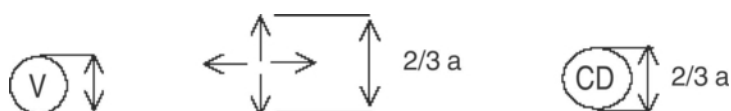
(see Part I of this Regulation)

 $a = 8 \text{ mm min}$

The above approval mark affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Part I of Regulation No 118 under approval No 001234. The first two digits (00) of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 118 in its original form.

Example 2

(see Part II of this Regulation)

 $a = 8 \text{ mm min}$ 

The above approval mark affixed to a component shows that the type concerned was approved in the Netherlands (E4) pursuant to Part II of Regulation No 118 under approval number 001234. The first two digits (00) of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 118 in its original form.

The additional symbol  indicates that this type of component has been approved according to its horizontal and vertical burning rate.

The symbols  and/or  indicate an approval according to Annex 7 and/or an approval as a complete device such as seats, separation walls, etc. The additional symbols are only used if applicable.

ANNEX 6

Test to determine the horizontal burning rate of materials

1. Sampling and principle
 - 1.1. Five samples shall undergo the test in the case of an isotropic material or ten samples in the case of a non-isotropic material (five for each direction).
 - 1.2. The samples shall be taken from the material under test. In materials having different burning rates in different material directions, each direction has to be tested. The samples are to be taken and placed in the test apparatus so that the highest burning rate will be measured. When the material is supplied in widths, a length of at least 500 mm shall be cut covering the entire width. From this the samples shall be taken so as to be at least 100 mm from the material edge and equidistant from each other. Samples shall be taken in the same way from finished products, when the shape of the product permits. When the thickness of the product is more than 13 mm, it shall be reduced to 13 mm by a mechanical process applied to the side which does not face the occupant compartment. If it is impossible, the test shall be carried out, in accordance with the technical service, on the initial thickness of the material, which shall be mentioned in the test report.

Composite materials (see paragraph 6.1.3) shall be tested as if they were of uniform construction. In the case of materials made of superimposed layers of different composition which are not composite materials, all the layers of material included within a depth of 13 mm from the surface facing towards the passenger compartment shall be tested individually.

- 1.3. A sample is held horizontally in a U-shaped holder and is exposed to the action of a defined flame for 15 seconds in a combustion chamber, the flame acting on the free end of the sample. The test determines if and when the flame extinguishes or the time in which the flame passes a measured distance.

2. Apparatus

- 2.1. Combustion chamber (figure 1), preferably of stainless steel and having the dimensions given in figure 2. The front of the chamber contains a flame-resistant observation window, which may cover the front and which can be constructed as an access panel.

The bottom of the chamber has vent holes, and the top has a vent slot all around. The combustion chamber is placed on four feet, 10 mm high.

The chamber may have a hole at one end for the introduction of the sample holder containing the sample; in the opposite end, a hole is provided for the gas line. Melted material is caught in a pan (see figure 3) which is placed on the bottom of the chamber between vent holes without covering any vent hole area.

Figure 1

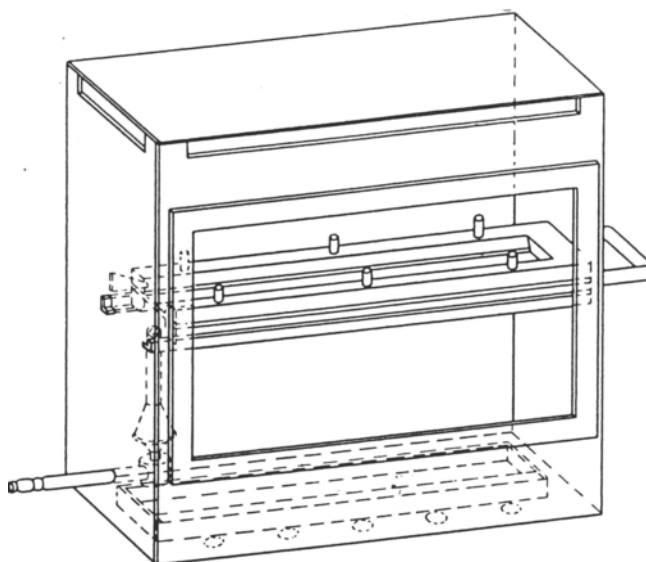
Example of combustion chamber with sample holder and drip tray

Figure 2

Example of combustion chamber

(Dimensions in millimetres)

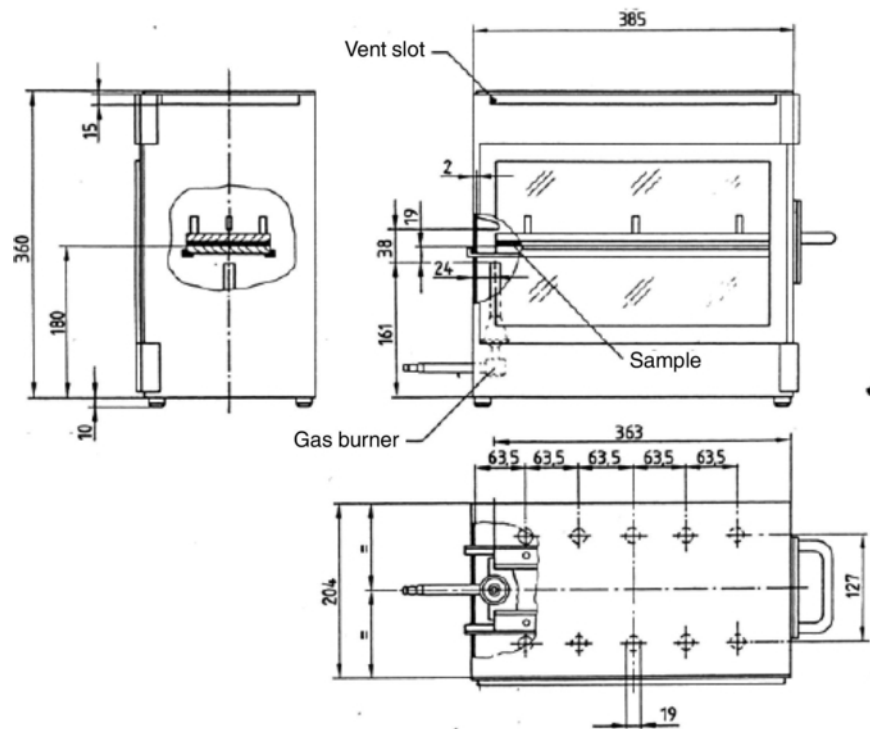
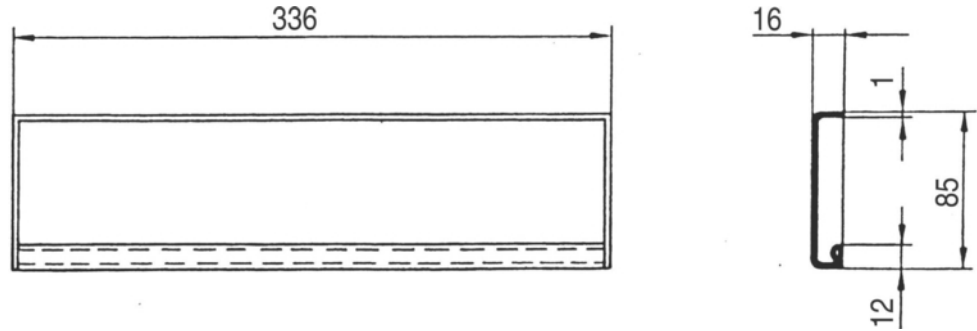


Figure 3

Typical drip pan

(Dimensions in millimetres)



- 2.2. Sample holder, consisting of two U-shaped metal plates or frames of corrosion-proof material. Dimensions are given in figure 4.

The lower plate is equipped with pins, the upper one with corresponding holes in order to ensure a consistent holding of the sample. The pins also serve as the measuring points at the beginning and end of the burning distance.

A support shall be provided in the form of 0,25 mm diameter heat resistant wires spanning the frame at 25 mm intervals over the bottom U-shaped frame (see figure 5).

The plane of the lower side of samples shall be 178 mm above the floor plate. The distance of the front edge of the sample holder from the end of the chamber shall be 22 mm; the distance of the longitudinal sides of the sample holder from the sides of the chamber shall be 50 mm (all inside dimensions). (See figures 1 and 2)

Figure 4

Example of sample holder

(Dimensions in millimetres)

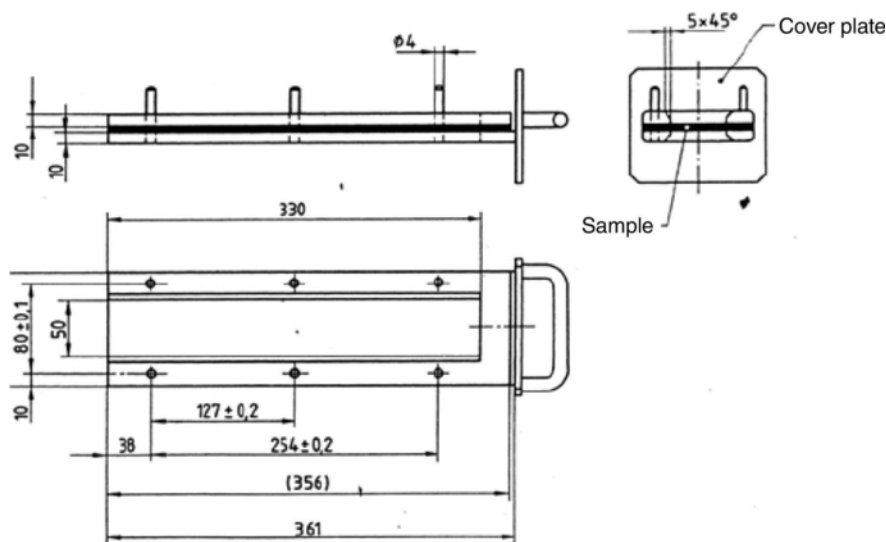
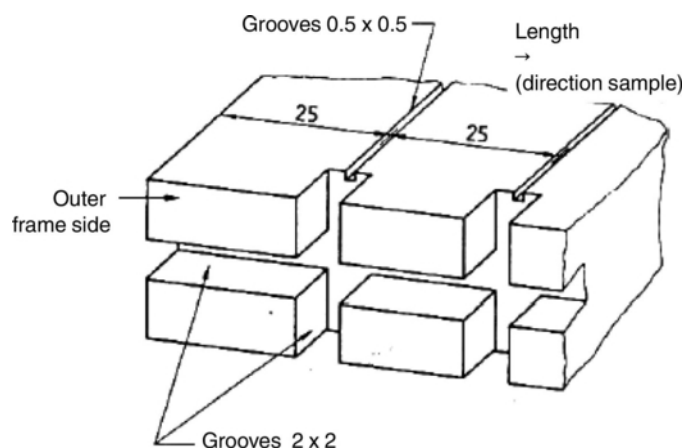


Figure 5

Example of section of lower U-frame design for wire support facility

(Dimensions in millimetres)



2.3. Gas burner

The small ignition source is provided by a Bunsen burner having an inside diameter of $9,5 \pm 0,5$ mm. It is located in the test cabinet so that the centre of its nozzle is 19 mm below the centre of the bottom edge of the open end of the sample (see figure 2).

2.4. Test gas

The gas supplied to the burner shall have a calorific value near 38 MJ/m^3 (for example natural gas).

2.5. Metal comb, at least 110 mm in length, with seven to eight smooth rounded teeth per 25 mm.

2.6. Stop-watch, accurate to 0,5 seconds.

2.7. Fume cupboard. The combustion chamber may be placed in a fume cupboard assembly provided that the internal volume is at least 20 times, but not more than 110 times, greater than the volume of the combustion chamber and provided that no single height, width, or length dimension of the fume cupboard is greater than 2,5 times either of the other two dimensions. Before the test, the vertical velocity of the air through the fume cupboard shall be measured 100 mm in front of and behind the final position where the combustion chamber will be located. It shall be between 0,10 and 0,30 m/s in order to avoid possible discomfort, by combustion products, to the operator. It is possible to use a fume cupboard with a natural ventilation and an appropriate air velocity.

3. Samples

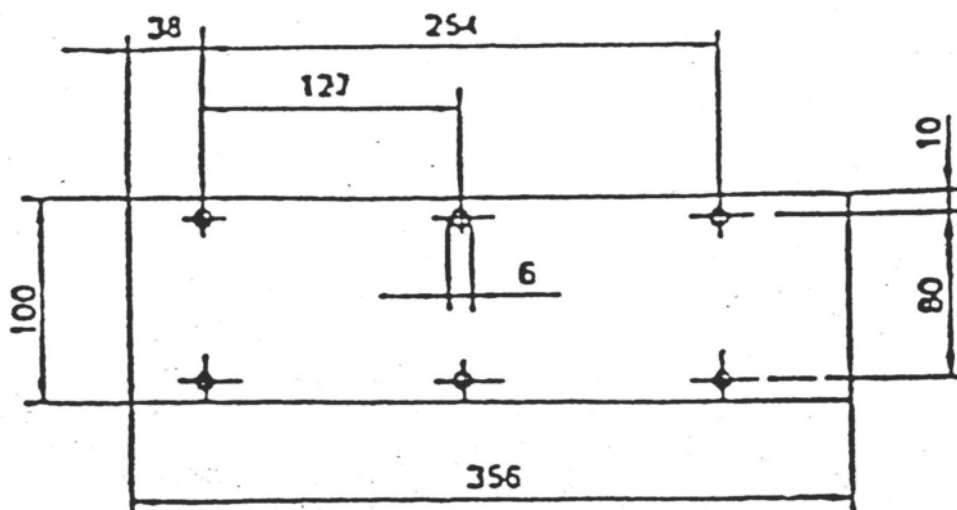
3.1. Shape and dimensions

3.1.1. The shape and dimensions of samples are given in figure 6. The thickness of the sample corresponds to the thickness of the product to be tested. It shall not be more than 13 mm. When taking the sample permits, the sample shall have a constant section over its entire length.

Figure 6

Sample

(Dimensions in millimetres)



3.1.2. If the shape and dimensions of a product do not permit taking a sample of the given size, the following minimum dimensions shall be maintained:

- (a) for samples having a width of 3 to 60 mm, the length shall be 356 mm. In this case the material is tested in the product's width;
- (b) for samples having a width of 60 to 100 mm, the length shall be at least 138 mm. In this case the potential burning distance corresponds to the length of the sample, the measurement starting at the first measuring point.

3.2. Conditioning

The samples shall be conditioned for at least 24 hours but not more than 7 days at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and a relative humidity of 50 ± 5 per cent and shall be maintained under these conditions until immediately prior to testing.

4. Procedure

- 4.1. Place samples with napped or tufted surfaces on a flat surface and comb twice against the nap using the comb (paragraph 2.5).
- 4.2. Place the sample in the sample holder (paragraph 2.2) so that the exposed side will be downwards to the flame.
- 4.3. Adjust the gas flame to a height of 38 mm using the mark in the chamber, the air intake of the burner being closed. Before starting the first test, the flame shall burn at least for 1 min for stabilisation.
- 4.4. Push the sample-holder into the combustion chamber so that the end of the sample is exposed to the flame, and after 15 seconds cut off the gas flow.
- 4.5. The measurement of the burning time starts at the moment when the foot of the flame passes the first measuring point. Observe the flame propagation on the side burning faster than the other (upper or lower side).
- 4.6. Measurement of burning time is completed when the flame has come to the last measuring point or when the flame extinguishes before coming to the last measuring point. If the flame does not reach the last measuring point, measure the burnt distance up to the point where the flame extinguished. Burnt distance is the decomposed part of the sample, which is destroyed on its surface or in the interior by burning.
- 4.7. In so far as the sample does not ignite or does not continue burning after the burner has been extinguished, or when the flame extinguishes before reaching the first measuring point, so that no burning time is measured note in the test report that the burning rate is 0 mm/min.
- 4.8. When running a series of tests or repeat tests, ensure that the combustion chamber and sample holder have a maximum temperature of $30\text{ }^{\circ}\text{C}$ before starting the next test.

5. Calculation

The burning rate, B ⁽¹⁾, in millimetres per minute, is given by the formula:

$$B = 60 s/t$$

where:

s = the burnt distance, in millimetres;

t = the time, in seconds, to burn distance s .

⁽¹⁾ The burning rate (B) for each sample is only calculated in the case where the flame reaches the last measuring point or the end of the sample.

ANNEX 7

Test to determine the melting behaviour of materials

1. Sampling and principle

1.1. Four samples, for both faces (if they are not identical) shall undergo the test.

1.2. A sample is placed in a horizontal position and is exposed to an electric radiator. A receptacle is positioned under the specimen to collect the resultant drops. Some cotton wool is put in this receptacle in order to verify if any drop is flaming.

2. Apparatus

The apparatus shall consist of (figure 1):

- (a) an electric radiator;
- (b) a support for the sample with grill;
- (c) a receptacle (for resultant drops);
- (d) a support (for the apparatus)

2.1. The source of heat is an electric radiator with a useful output of 500 W. The radiating surface must be made of a transparent quartz plate with a diameter of 100 ± 5 mm.

The radiated heat from the apparatus, measured on a surface which is situated parallel to the surface of the radiator at a distance of 30 mm, shall be 3 W/cm^2 .

2.2. Calibration

For calibration of the radiator, a heat flux meter (radiometer) of the Gardon (foil) type with a design range not exceeding 10 W/cm^2 shall be used. The target receiving radiation, and possibly to a small extent convection, shall be flat, circular, not more than 10 mm in diameter and coated with a durable matt black finish.

The target shall be contained within a water cooled body the front face of which shall be of highly polished metal, flat, coinciding with the plane of the target and circular, with a diameter of about 25 mm.

Radiation shall not pass through any window before reaching the target.

The instrument shall be robust, simple to set up and use, insensitive to draughts, and stable in calibration. The instrument shall have an accuracy of within ± 3 per cent and a repeatability within 0,5 per cent.

The calibration of the heat flux meter shall be checked whenever a recalibration of the radiator is carried out, by comparison with an instrument held as a reference standard and not used for any other purpose.

The reference standard instrument shall be fully calibrated at yearly intervals in accordance with a national standard.

2.2.1. Calibration check

The irradiance produced by the power input which the initial calibration has shown to correspond to an irradiance of 3 W/cm^2 shall be frequently checked (at least once every 50 operating hours) and the apparatus shall be recalibrated if such a check reveals a deviation greater than $0,06 \text{ W/cm}^2$.

2.2.2. Calibration procedure

The apparatus shall be placed in an environment essentially free of air currents (not more than 0,2 m/s).

Place the heat flux meter in the apparatus in the specimen position so that the target of the heat flux meter is located centrally within the radiator surface.

Switch on the electricity supply and establish the power input of the controller required to produce irradiance at the centre of the radiator surface of 3 W/cm². Adjustment to the power unit to record 3 W/cm² should be followed by a five minute period without further adjustment to ensure equilibrium.

2.3. The support for the samples shall be a metallic ring (figure 1). On top of this support a grill, made of stainless steel wire, is placed with the following dimensions:

- (a) interior diameter: 118 mm,
- (b) dimension of the holes: 2,10 mm square,
- (c) diameter of the steel wire: 0,70 mm.

2.4. The receptacle shall consist of a cylindrical tube with an interior diameter of 118 mm and a depth of 12 mm. The receptacle shall be filled with cotton wool.

2.5. A vertical column shall support the items specified in paragraphs 2.1, 2.3 and 2.4.

The radiator is placed on top of the support in a manner such that the radiating surface is horizontal and the radiation is downwards.

A lever/pedal shall be provided in the column to lift the support of the radiator slowly. It shall also be provided with a catch in order to ensure that the radiator can be brought back in its normal position.

In their normal position, the axes of the radiator, the support for the sample and the receptacle must coincide.

3. Samples

The test samples shall measure: 70 mm × 70 mm. Samples shall be taken in the same way from finished products, when the shape of the product permits. When the thickness of the product is more than 13 mm, it shall be reduced to 13 mm by a mechanical process applied to the side which does not face the occupant compartment. If it is impossible, the test shall be carried out, in accordance with the technical service, on the initial width of the material which shall be mentioned in the test report.

Composite materials (see paragraph 6.1.3 of the Regulation) shall be tested as if they were of uniform construction.

In the case of materials made of superimposed layers of different composition which are not composite materials, all the layers of material included within a depth of 13 mm from the surface facing towards the passenger compartment shall be tested individually.

The total mass of the sample to be tested shall be at least 2 g. If the mass of one sample is less, a sufficient number of samples shall be added.

If the two faces of the material differ, both faces must be tested, which means that eight samples are to be tested. The samples and the cotton wool shall be conditioned for at least 24 hours at a temperature 23 °C ± 2 °C and a relative humidity of 50 ± 5 per cent and shall be maintained under these conditions until immediately prior to testing

4. Procedure

The sample is placed on the support and the latter is so positioned that the distance between the surface of the radiator and the upper side of the sample is 30 mm.

The receptacle, including the cotton wool, is placed beneath the grill of the support at a distance of 300 mm.

The radiator is put aside, so that it cannot radiate on the sample, and switched on. When it is on full capacity it is positioned above the sample and timing is started.

If the material melts or deforms, the height of the radiator is modified to maintain the distance of 30 mm.

If the material ignites, the radiator is put aside three seconds afterwards. It is brought back in position when the flame has extinguished and the same procedure is repeated as frequently as necessary during the first five minutes of the test.

After the fifth minute of the test:

- (i) if the sample has extinguished (whether or not it has ignited during the first five minutes of the test) leave the radiator in position even if the sample reignites;
- (ii) if the material is flaming, await extinction before bringing the radiator into position again.

In either case, the test must be continued for an additional five minutes.

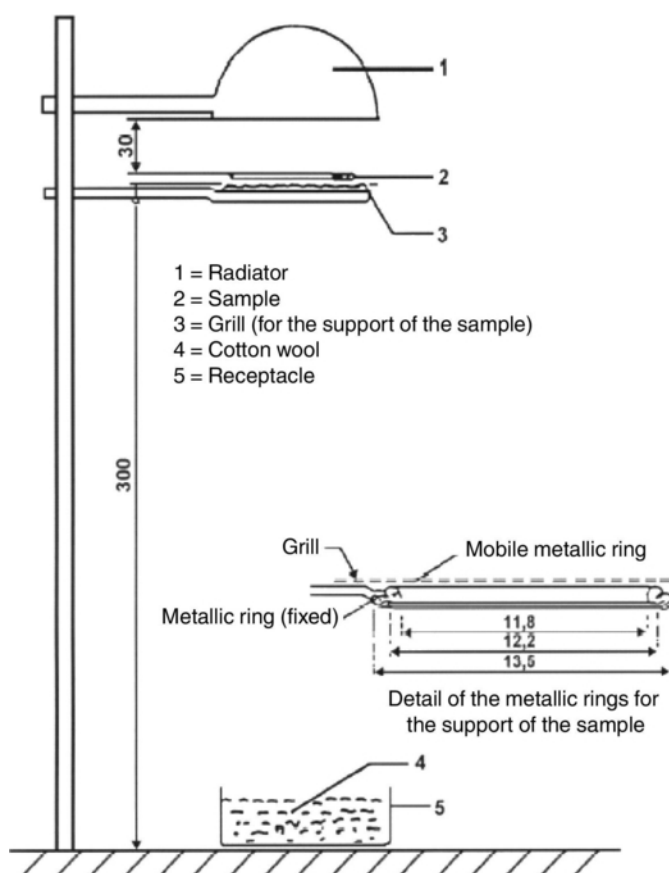
5. Results

Observed phenomena shall be noted in the test-report, such as:

- (i) the fall of drops, if any, whether flaming or not;
- (ii) if ignition of the cotton wool has taken place

Figure 1

(Dimensions in millimetres)



ANNEX 8

Test to determine the vertical burning rate of materials**1. SAMPLING AND PRINCIPLE**

- 1.1. Three samples shall undergo the test in the case of an isotropic material, or six samples in the case of a non-isotropic material.
- 1.2. This test consists of exposing samples, held in a vertical position, to a flame and determining the speed of propagation of the flame over the material to be tested.

2. APPARATUS

The apparatus shall consist of:

- (a) a specimen holder;
 - (b) a burner;
 - (c) a ventilation system to extract gas and combustion products;
 - (d) a template;
 - (e) marker threads of white mercerised cotton threads having a maximum linear density of 50 tex.
- 2.1. The specimen holder shall consist of a rectangular frame of 560 mm high and shall have two rigidly connected parallel rods spaced 150 mm apart on which pins shall be fitted for mounting the test specimen which is located in a plane at least 20 mm from the frame. The mounting pins shall be not greater than 2 mm in diameter and at least 27 mm long. The pins shall be located on the parallel rods at locations shown in figure 1. The frame shall be fitted onto a suitable support to maintain the rods in a vertical orientation during testing (for the purpose of locating the specimen on the pins in a plane away from the frame, spacer stubs 2 mm in diameter may be provided adjacent to the pins).
 - 2.2. The burner is described in figure 3.

The gas supplied to the burner can be either commercial propane gas or commercial butane gas.

The burner shall be positioned in front of, but below, the specimen such that it lies in a plane passing through the vertical centerline of the specimen and perpendicular to its face (see figure 2), such that the longitudinal axis is inclined upwards at 30° to the vertical towards the lower edge of the specimen. The distance between the tip of the burner and the lower edge of the specimen shall be 20 mm.
 - 2.3. The test apparatus may be placed in a fume cupboard assembly provided that the internal volume is at least 20 times, but not more than 110 times, greater than the volume of the test apparatus and provided that: no single height, width, or length dimension of the fume cupboard is greater than 2,5 times either of the other two dimensions. Before the test, the vertical velocity of the air through the fume cupboard shall be measured 100 mm in front of and behind the final position where the test apparatus will be located. It shall be between 0,10 and 0,30 m/s in order to avoid possible discomfort, by combustion products, to the operator. It is possible to use a fume cupboard with a natural ventilation and an appropriate air velocity.
 - 2.4. A flat rigid template made of suitable material and of a size corresponding to the size of the specimen shall be used. Holes approximately 2 mm in diameter shall be drilled in the template and positioned so that the distances between the centres of the holes correspond to the distances between the pins on the frames (see figure 1). The holes shall be located equidistant about the vertical centrelines of the template.

3. SAMPLES

- 3.1. The samples dimensions are: 560 × 170 mm
- 3.2. The samples shall be conditioned for at least 24 hours at a temperature of 23 °C ± 2 °C and a relative humidity of 50 ± 5 per cent and shall be maintained under these conditions until immediately prior to testing.

4. PROCEDURE

- 4.1. The test shall be carried out in an atmosphere having a temperature between 10 °C and 30 °C and a relative humidity between 15 per cent and 80 per cent.
- 4.2. The burner shall be preheated for 2 minutes. The flame height shall be adjusted to 40 ± 2 mm measured as the distance between the top of the burner tube and the tip of the yellow part of the flame when the burner is vertically oriented and the flame is viewed in dim light.
- 4.3. The specimen shall be placed on the pins of the test frame, making certain that the pins pass through the points marked off from the template and that the specimen is at least 20 mm removed from the frame. The frame shall be fitted on the support so that the specimen is vertical.
- 4.4. The marker threads shall be attached horizontally in front of the specimen at the locations shown in figure 1. At each location, a loop of thread shall be mounted so that the two segments are spaced 1 mm and 5 mm from the plane of the front of the specimen.

Each loop shall be attached to a suitable timing device. Sufficient tension shall be imposed to the thread to maintain its position relative to the specimen.

- 4.5. The flame shall be applied to the specimen for 5 seconds. Ignition shall be deemed to have occurred if flaming of the specimen continues for 5 seconds after removal of the igniting flame. If ignition does not occur, the flame shall be applied for 15 seconds to another conditioned specimen.
- 4.6. If any result in any set of three specimens exceeds the minimum result by 50 per cent, another set of three specimens shall be tested for that direction or face. If one or two specimens in any set of three specimens fail to burn to the top marker thread, another set of three specimens shall be tested for that direction or face.
- 4.7. The following times, in seconds, shall be measured:
- (a) from the start of the application of the igniting flame to the severance of the first marker thread (t_1);
 - (b) from the start of the application of the igniting flame to the severance of the second marker thread (t_2);
 - (c) from the start of the application of the igniting flame to the severance of the third marker thread (t_3).

5. RESULTS

The observed phenomena shall be written down in the test-report, to include:

- (i) the durations of combustion: t_1 , t_2 and t_3 in seconds, and
- (ii) the corresponding burnt distances: d_1 , d_2 and d_3 in mm.

The burning rate V_1 and the rates V_2 and V_3 , if applicable, shall be calculated (for each sample if the flame reaches at least the first marker thread) as follows:

$$V_i = 60 d_i/t_i \text{ (mm/min)}$$

The highest burning rate of V_1 , V_2 and V_3 shall be taken into account.

Figure 1

Specimen holder

(Dimensions in millimetres)

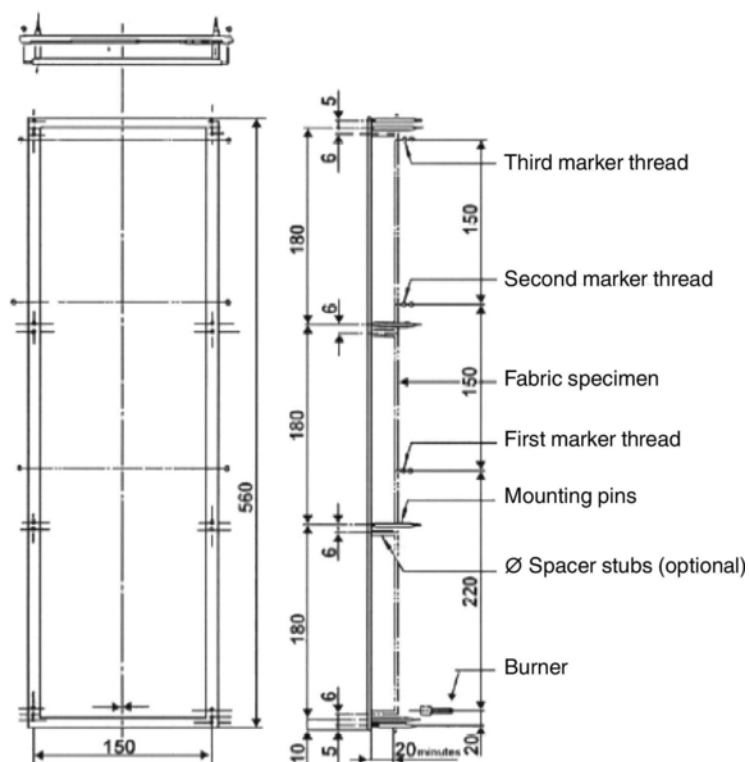


Figure 2

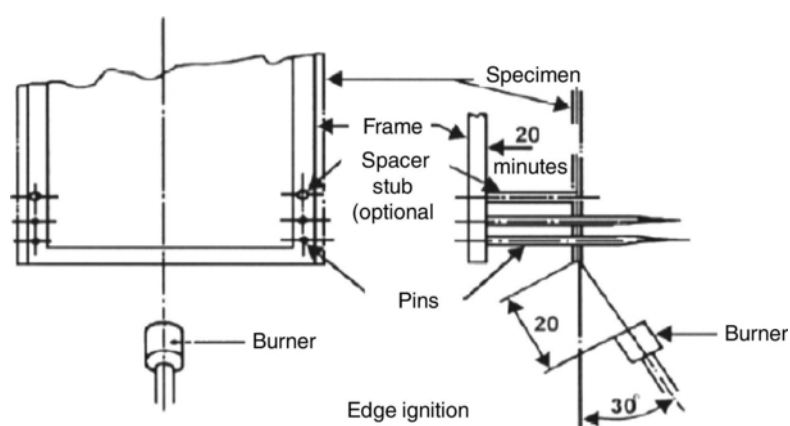
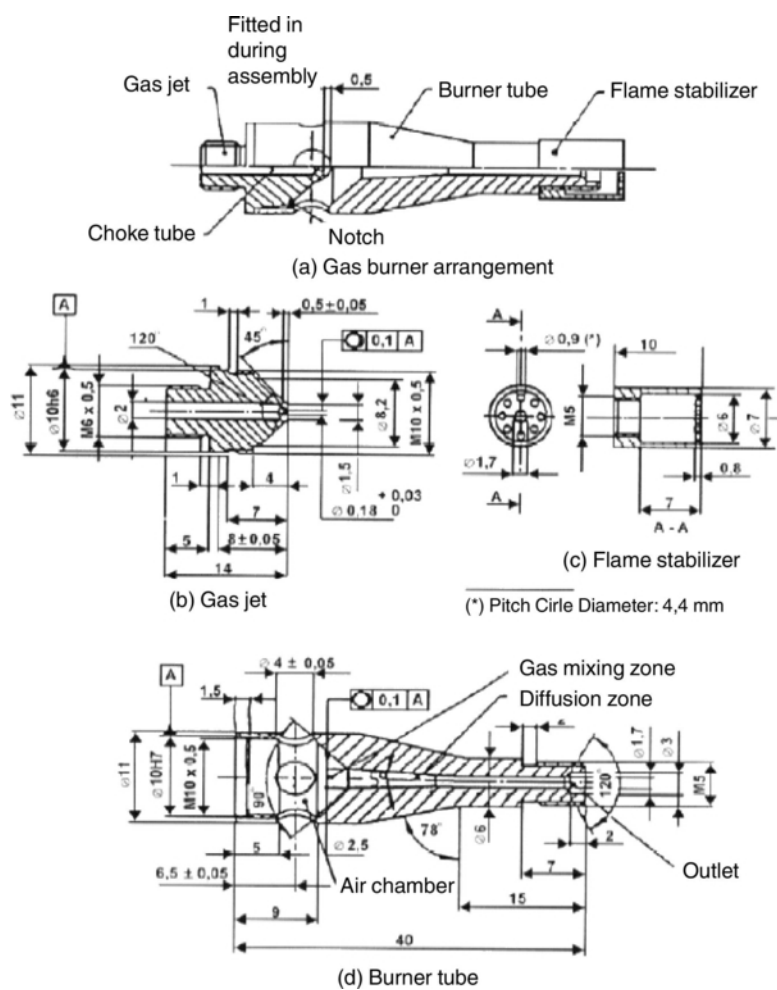
Burner ignition location

Figure 3

Gas burner

(Dimensions in millimetres)



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/wp29docsts.html>

Regulation No 121 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of vehicles with regard to the location and identification of hand controls, tell-tales and indicators

Incorporating all valid text up to:

Supplement 3 to the original version of the Regulation — Date of entry into force: 24 October 2009

CONTENTS

REGULATION

1. Scope
2. Definitions
3. Application for approval
4. Approval
5. Specifications
6. Modifications of the vehicle type or of any aspect of specification for controls, tell-tales and indicators and extension of approval
7. Conformity of production
8. Penalties for non-conformity of production
9. Production definitely discontinued
10. 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 a type of vehicle with regard to the location and identification of motor vehicle hand controls, tell-tales and indicators, pursuant to Regulation No 121
- Annex 2 — Arrangements of approval marks

1. SCOPE

This Regulation applies to vehicles of categories M and N ⁽¹⁾. It specifies requirements for the location, identification, colour, and illumination of motor vehicle hand controls, tell-tales and indicators. It is designed to ensure the accessibility and visibility of vehicle controls, tell-tales, and indicators and to facilitate their selection under daylight and night-time conditions, in order to reduce the safety hazards caused by the diversion of the driver's attention from the driving task and by mistakes in selecting controls.

⁽¹⁾ Categories M and N 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 purpose of this Regulation

- 2.1. 'Control' means that hand-operated part of a device that enables the driver to bring about a change in the state or functioning of a vehicle or vehicle's subsystem.
- 2.2. 'Device' means an element or an assembly of elements used to perform one or more functions.
- 2.3. 'Indicator' means a device that shows the magnitude of the physical characteristics that the instrument is designed to sense.
- 2.4. 'Common space' means an area on which two or more information functions (e.g. symbol) may be displayed but not simultaneously.
- 2.5. 'Tell-tale' means an optical signal that, when alight, indicates the actuation of a device, a correct or defective functioning or condition, or a failure to function.
- 2.6. 'Adjacent' means that no control, tell-tale, indicator, or other potential source of distraction appears between the identifying symbol and the tell-tale, indicator, or control which that symbol identifies.
- 2.7. 'Manufacturer' means the person or body who is responsible to the approval authority for all aspects of the type approval process and for ensuring conformity of production. It is not essential that the person or body is directly involved in all stages of the construction of the vehicle, system, component or separate technical unit which is the subject of the approval process.
- 2.8. 'Vehicle type' means motor vehicles, which do not differ in respect of the internal arrangements, which may affect the identification of symbols for controls, tell-tales, and indicators and operation of controls.
- 2.9. 'Approval of a vehicle' means the approval of a vehicle type with regard to the mode of installation, graphical design, legibility, colour, and brightness of controls, tell-tales, and indicators.

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval of a vehicle type with regard to the specification for controls, tell-tales and indicators shall be submitted by the manufacturer or his duly accredited representative.
- 3.2. It shall be accompanied by the following documents and particulars in triplicate:
 - 3.2.1. a description of the vehicle type;
 - 3.2.2. a list of items specified by this Regulation in table 1 and prescribed by the manufacturer for the vehicle as controls, tell-tales or indicators;
 - 3.2.3. graphical design of symbols identifying controls, tell-tales and indicators; and
 - 3.2.4. drawings and/or photographs showing the layout of controls and location of tell-tales and indicators in the vehicle;

- 3.3. A vehicle or representative part thereof fitted with a complete set of controls, tell-tales and indicators, as prescribed in paragraph 3.2.2 above, representing the vehicle type to be approved shall be submitted to the technical service responsible for conducting approval evaluation.
4. APPROVAL
- 4.1. If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of the Regulation, approval of that vehicle 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 this number to another vehicle type or to the same vehicle type submitted with equipment not specified in the list referred to in paragraph 3.2.2 above, subject to the provisions of paragraph 6 of this Regulation.
- 4.3. Notice of approval or of extension or refusal of approval or production definitely discontinued of a vehicle type/part pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation.
- 4.4. An international approval mark 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. Such international approval mark shall consist of:
- 4.4.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽²⁾;
- 4.4.2. The number of this Regulation, followed by the letter 'R', a dash and the approval number to the right of the circle prescribed in paragraph 4.4.1.
- 4.5. If the vehicle conforms to a vehicle type approved, under one or more other Regulations annexed to the Agreement, in the country which has granted approval under this Regulation, the symbol prescribed in paragraph 4.4.1 need not be repeated; in such a case the Regulation and approval numbers and the additional symbols of all the Regulations under which approval has been granted in the country which has granted approval under this Regulation shall be placed in vertical columns to the right of the symbol prescribed in paragraph 4.4.1.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. The approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.8. Annex 2 to this Regulation gives examples of arrangements of approval marks.

⁽²⁾ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for the Czech Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal, 22 for the Russian Federation, 23 for Greece, 24 for Ireland, 25 for Croatia, 26 for Slovenia, 27 for Slovakia, 28 for Belarus, 29 for Estonia, 30 (vacant), 31 for Bosnia and Herzegovina, 32 for Latvia, 33 (vacant), 34 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 the Republic of South Africa, 48 for New Zealand, 49 for Cyprus, 50 for Malta and 51 for the Republic of Korea. Subsequent numbers shall be assigned to other countries in the chronological order in which they ratify the Agreement concerning the Adoption for 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.

5. SPECIFICATIONS

A vehicle fitted with a control, a tell-tale or an indicator, listed in table 1, shall meet the prescribed requirements of this Regulation for the location, identification, colour, and illumination of such control, tell-tale or indicator.

5.1. Location

5.1.1. The controls to be used by a driver while driving the vehicle shall be located so that they are operable by this driver under the conditions of paragraph 5.6.2.

5.1.2. The tell-tales and indicators, shall be located so that they are visible and recognisable to a driver during night and day under the conditions of paragraphs 5.6.1 and 5.6.2. Tell-tales and indicators need not be visible or recognisable when not activated.

5.1.3. The identifications of tell-tales, indicators and controls shall be placed on or adjacent to the tell-tales, indicators and controls that they identify. In the case of multifunction control, the identifications need not be immediately adjacent. Nonetheless, they shall be as close as practicable to such multifunction control.

5.1.4. Notwithstanding paragraphs 5.1.1, 5.1.2 and 5.1.3 the tell-tale for 'passenger airbag off', if fitted, must be located within the interior of the vehicle and forward of and above the design H-point of both the driver's and the front passenger(s) seat in their forward most seating positions. The tell-tale which alerts front seat occupants that the passenger airbag is switched off must be visible to the driver and front passenger(s) under all driving conditions.

5.2. Identification

5.2.1. Where fitted, the controls, tell-tales and indicators, listed under the heading Column 3 of table 1, shall be identified by symbols designated for them in column 2 of table 1. This requirement does not apply to the horn (an audible warning signal) control, when it is activated by a narrow ring-type control or by a lanyard. If a symbol is used for identifying a control, tell-tale or indicator not listed in table 1, it is recommended to use a symbol designated for the purpose in standard ISO 2575:2000 where one exists and where that symbol is suitable for the application concerned.

5.2.2. To identify a control, a tell-tale or an indicator not included in table 1 or ISO 2575:2000, the manufacturer may use a symbol of its own conception. Such symbol may include internationally recognised alphabetic or numeric indications. All symbols used shall follow the design principles laid down in paragraph 4 of ISO 2575:2000.

5.2.3. If necessary for clarity, supplementary symbols may be used in conjunction with any symbol specified in table 1 or ISO 2575:2000.

5.2.4. Each additional or supplementary symbol used by the manufacturer must not cause confusion with any symbol specified in this Regulation.

5.2.5. Where a control, an indicator or a tell-tale for the same function are combined, one symbol may be used to identify such combination.

5.2.6. Except as provided in paragraph 5.2.7, all identifications of tell-tales, indicators and controls listed in table 1 or ISO 2575:2000 must appear to the driver perceptually upright. In case of rotating control, this paragraph applies to it when such control is in its 'off' position.

- 5.2.7. The identification of the following need not appear to the driver perceptually upright:
- 5.2.7.1. a horn control,
 - 5.2.7.2. any control, tell-tale or indicator located on the steering wheel, when the steering wheel is positioned for the motor vehicle to travel in other than a straight forward direction, and
 - 5.2.7.3. any rotating control that does not have an off position.
- 5.2.8. Each control for the automatic vehicle speed system (cruise control) and each control for heating and air-conditioning system(s) shall have identification provided for each function of each such system.
- 5.2.9. When fitted each control that regulates a system function over a continuous range shall have identification provided for the limits of the adjustment range of any such function.

If colour coding is used to identify the limits of the adjustment range of a temperature function, the hot limit shall be identified by the colour red and the cold limit by the colour blue. If the status or limit of a function is shown by an indicator separated from and not adjacent to the control for that function, both the control and the indicator must be independently identified in compliance with paragraph 5.1.3.

5.3. Illumination

- 5.3.1. The identifications of controls for which the word 'Yes' is indicated in column 4 of table 1 shall be capable of being illuminated whenever the position lamps are activated. This does not apply to controls located on the floor, floor console, steering wheel, or steering column, or in the area of wind-screen header, or to controls for a heating and air-conditioning system if the system does not direct air directly upon the windscreen.
- 5.3.2. The indicators and their identifications for which the word 'Yes' is indicated in column 4 of table 1 shall be illuminated whenever the device which starts and/or stops the engine is in a position which makes it possible for the engine to operate and the position lamps are activated.
- 5.3.3. The indicators, their identifications and the identifications of controls need not be illuminated when the headlamps are being flashed or operated as daytime running lamps.
- 5.3.4. At the manufacturer's discretion any control, indicator or their identifications may be capable of being illuminated at any time.
- 5.3.5. A tell-tale shall not emit light except when identifying the malfunction or vehicle condition for whose indication it is designed or during a bulb check.
- 5.3.6. Brightness of tell-tale illumination

Means shall be provided for making tell-tales and their identification visible and recognisable to the driver under all driving conditions.

5.4. Colour

- 5.4.1. Light of each tell-tale listed in table 1 shall be of the colour shown in column 5 of this table.
- 5.4.1.1. Nevertheless if already fitted on the vehicle as specified in table 1 with the colour specification of column 5, each symbol with the footnote 18 may be shown in other colours, in order to convey different meanings, according to the general colour coding as proposed in paragraph 5 of standard ISO 2575:2004.

- 5.4.2. Indicators and tell-tales and identifications of indicators and controls not listed in table 1 may be of any colour chosen by the manufacturer, however, such colour must not interfere with or mask the identification of any tell-tale, control, or indicator specified in table 1. The colour to be selected shall follow the guidelines specified in paragraph 5 of standard ISO 2575:2000.
- 5.4.3. Each symbol used for identification of tell-tale, control or indicator shall stand out clearly against the background.
- 5.4.4. The dark part of any symbol may be replaced by its outline.
- 5.5. Common space for displaying multiple information
 - 5.5.1. A common space may be used to show information from any source, subject to the following requirements:
 - 5.5.1.1. The tell-tales and indicators in the common space shall provide relevant information at the initiation of any underlying condition.
 - 5.5.1.2. When the underlying condition exists for actuation of two or more tell-tales, the information shall be either
 - 5.5.1.2.1. repeated automatically in sequence, or
 - 5.5.1.2.2. indicated by visible means and capable of being selected for viewing by the driver under the conditions of paragraph 5.6.2.
 - 5.5.1.3. The tell-tales for the brake system malfunction, headlamp driving beam, direction indicator and seat belt shall not be shown in the same common space.
 - 5.5.1.4. If tell-tale for the brake system malfunction, headlamp driving beam, direction indicator or seat belt is displayed in a common space it must displace any other symbol in such common space if the underlying condition exists for its activation.
 - 5.5.1.5. With the exception of tell-tales for the brake system malfunction, headlamp driving beam, direction indicator or seat belt, the information may be cancellable automatically or by the driver.
 - 5.5.1.6. Unless prescribed in a specific Regulation, the colour requirements regarding tell-tales do not apply when tell-tales appear in a common space.
 - 5.6. Conditions
 - 5.6.1. The driver has adapted to the ambient light conditions.
 - 5.6.2. The driver is restrained by the installed crash protection system, adjusted in accordance with the manufacturer's instructions, and is free to move within constraints of that system.
- 6. MODIFICATIONS OF THE VEHICLE TYPE OR OF ANY ASPECT OF SPECIFICATION FOR CONTROLS, TELL-TALES AND INDICATORS AND EXTENSION OF APPROVAL
 - 6.1. Every modification of the vehicle type, or of any aspect of specification for controls, tell-tales and indicators, or of the list referred to in paragraph 3.2.2 above, shall be notified to the administrative department which approved that vehicle 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 vehicle still meets the requirements; or
 - 6.1.2. Require a further evaluation report from the technical services responsible for conducting the evaluation.

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 applying 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 and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

7. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2) with the following requirements:

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

7.2. The 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.

8. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

8.1. The approval granted in respect of a type of vehicle pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a vehicle bearing the approval mark does not conform to the type approved.

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

9. 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 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 example in Annex 1 to this Regulation.

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

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

11. INTRODUCTORY PROVISIONS

11.1. As from the date of entry into force of this Regulation, Contracting Parties applying this Regulation shall not:

- (a) refuse to grant ECE approval for a vehicle type under this Regulation;
- (b) prohibit the sale or entry into service of a type of vehicle with regard to the specification for controls, tell-tales and indicators;

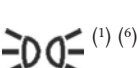
if the vehicle type complies with the requirements of this Regulation.

- 11.2. Until 2 years after entry into force of this Regulation, Contracting Parties applying this Regulation shall not refuse to grant national approval of a vehicle type with regard to the specification for controls, tell-tales and indicators if the vehicle type does not comply with the requirements of this Regulation.

Table 1

Symbols, their illumination and colours

No	Column 1	Column 2	Column 3	Column 4	Column 5
	Item	Symbol ⁽²⁾	Function	Illumination	Colour
1.	Master lighting switch	 ⁽¹⁾	Control	No	—
	Tell-tale may not act as the tell-tale for the position (side) lamps.		Tell-tale ⁽¹²⁾	Yes	Green
2.	Headlamp dipped beams	 ^{(1) (6) (13)}	Control	No	—
			Tell-tale	Yes	Green
3.	Headlamp high beams	 ^{(1) (13)}	Control	No	—
			Tell-tale	Yes	Blue
4.	Headlamp cleaning device (with separate operating control)	 ⁽¹³⁾	Control	No	
5.	Direction indicator	 ^{(1) (3)}	Control	No	
			Tell-tale	Yes	Green
6.	Hazard warning signal	 ⁽¹⁾	Control	Yes	
			Tell-tale ⁽⁴⁾	Yes	Red
7.	Front fog lamps	 ⁽¹⁾	Control	No	
			Tell-tale	Yes	Green
8.	Rear fog lamp	 ⁽¹⁾	Control	No	
			Tell-tale	Yes	Yellow
9.	Fuel level	 ⁽¹⁸⁾ or 	Tell-tale	Yes	Yellow
			Indicator	Yes	
10.	Engine oil pressure	 ^{(5) (18)}	Tell-tale	Yes	Red
			Indicator	Yes	
11.	Engine coolant temperature	 ^{(5) (18)}	Tell-tale	Yes	Red
			Indicator	Yes	
12.	Electrical charging	 ⁽¹⁸⁾	Tell-tale	Yes	Red
	Condition		Indicator	Yes	
13.	Windscreen wiping system (continuous)		Control	Yes	

No	Column 1	Column 2	Column 3	Column 4	Column 5
	Item	Symbol ⁽²⁾	Function	Illumination	Colour
14.	Power window lock	 or 	Control	No	
15.	Windscreen washing system		Control	Yes	
16.	Windscreen washing and wiping system		Control	Yes	
17.	Windscreen defrosting and defogging system (with separate operating control)		Control	Yes	
			Tell-tale	Yes	Yellow
18.	Rear window defrosting and defogging system (with separate operating control)		Control	Yes	
			Tell-tale	Yes	Yellow
19.	Position, side marker, and/or end-outline marker lamps	 ⁽¹⁾ ⁽⁶⁾	Control	No	
			Tell-tale ⁽¹²⁾	Yes ⁽⁶⁾	Green
20.	Parking lamps		Control	No	
			Tell-tale	Yes	Green
21.	Seat belt	 or 	Tell-tale	Yes	Red
22.	Airbag malfunction	 ⁽⁸⁾	Tell-tale	Yes	Yellow and/or Red
23.	Side airbag malfunction	 ⁽⁷⁾ ⁽⁸⁾	Tell-tale	Yes	Yellow and/or Red
24.	Passenger Airbag off		Tell-tale	Yes	Yellow
25.	Brake system malfunction	 ⁽⁸⁾	Tell-tale	Yes	see brake Reg.
26.	Antilock brake system malfunction	 ⁽⁹⁾	Tell-tale	Yes	Yellow
27.	Speedometer	km/h, if kilometres are shown or mph, if miles are shown ⁽¹⁴⁾	Indicator	Yes	

No	Column 1	Column 2	Column 3	Column 4	Column 5
	Item	Symbol ⁽²⁾	Function	Illumination	Colour
28.	Parking brake applied	 ⁽⁹⁾	Tell-tale	Yes	Red
29.	Horn		Control	No	
30.	Engine on-board diagnostics or engine malfunction		Tell-tale	Yes	Yellow
31.	Diesel pre-heat		Tell-tale	Yes	Yellow
32.	Choke (cold starting device)		Control	No	
			Tell-tale		Yellow
33.	Air-conditioning system	 or A/C	Control	Yes	
34.	Automatic (park) transmission (reverse) control (neutral) position (drive)	P R N D ⁽¹⁰⁾	Indicator	Yes	
35.	Engine Start	 ⁽¹¹⁾ ⁽¹⁹⁾	Control	No	
36.	Engine Stop	 ⁽¹¹⁾ ⁽¹⁹⁾	Control	Yes	
37.	Brake lining wear-out condition	 ⁽⁹⁾	Tell-tale	Yes	Yellow
38.	Heating system		Control	Yes	
39.	Heating and/or air-conditioning fan	 ⁽¹⁾	Control	Yes	
40.	Headlamp levelling	 or  and  ⁽¹³⁾	Control	No	
41.	Odometer	km, if kilometres are shown or miles, if miles are shown ⁽¹⁵⁾	Indicator	Yes	

No	Column 1	Column 2	Column 3	Column 4	Column 5
	Item	Symbol ⁽²⁾	Function	Illumination	Colour
42a	Low tyre pressure (including malfunction)	 ⁽¹⁶⁾	Tell-tale	Yes	Yellow
42b	Low tyre pressure (including malfunction) that identifies affected tyre	 ⁽¹⁶⁾ ⁽¹⁷⁾	Tell-tale	Yes	Yellow

⁽¹⁾ Framed areas of the symbol may be solid.

⁽²⁾ The symbols included in this Regulation are substantially identical to symbols described in ISO 2575:2000. Proportional dimensional characteristics specified in ISO 2575:2000 shall be maintained.

⁽³⁾ The pair of arrows is a single symbol. When the controls or tell-tales for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly.

⁽⁴⁾ Not required when arrows of turn signal tell-tales that otherwise operate independently flash simultaneously as hazard warning tell-tale.

⁽⁵⁾ Combination of the engine oil pressure symbol and the engine coolant temperature symbol in a single tell-tale is permitted.

⁽⁶⁾ Separate identification not required if function is combined with master lighting switch.

⁽⁷⁾ If a single tell-tale is used to indicate an airbag malfunction, the airbag malfunction symbol (22) must be used.

⁽⁸⁾ Contracting Parties which, at the date of coming into force of this Regulation, allowed or required the use of text for this function may, until sixty months after the date of coming into force of this Regulation, continue to allow or require the text in addition to the prescribed symbols for vehicles to be registered in their country.

⁽⁹⁾ If a single tell-tale is used to indicate more than one brake system condition, the brake system malfunction symbol must be used.

⁽¹⁰⁾ Letter 'D' may be replaced or supplemented by other alphanumeric character(s) or symbol(s) chosen by the manufacturer to indicate additional selection modes.

⁽¹¹⁾ Use when engine control is separate from the key locking system.

⁽¹²⁾ Not required if instrument panel lights are lit automatically on activation of the master lighting switch.

⁽¹³⁾ Symbols employing five lines instead of four (and vice versa) may also be used.

⁽¹⁴⁾ The required text identification can be displayed in uppercase and/or lowercase letters.

⁽¹⁵⁾ The required text identification must be displayed in lowercase letters. If miles are shown, an abbreviation may be used.

⁽¹⁶⁾ Additionally, either of the low tyre pressure tell-tales may be used to indicate a tyre pressure monitoring system (TPMS) malfunction.

⁽¹⁷⁾ The vehicle outline shown is not intended to be restrictive, but is the recommended outline. Alternative vehicle outlines may be used in order to better represent the actual outline of a given vehicle.

⁽¹⁸⁾ Symbol may be shown in other colours than specified in column 5 in order to convey different meanings according to the general colour coding as proposed in paragraph 5 of standard ISO.

⁽¹⁹⁾ The functions 'start' and 'stop' may be combined in one control. As an alternative to the prescribed symbol(s) it is allowed to use the text 'START' and/or 'STOP' or a combination of symbols and text. Text can be displayed in uppercase and/or lowercase letters.

ANNEX 1

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

concerning ⁽²⁾: APPROVAL GRANTED
 APPROVAL EXTENDED
 APPROVAL REFUSED
 APPROVAL WITHDRAWN
 PRODUCTION DEFINITELY DISCONTINUED

of a type of vehicle with regard to the location and identification of motor vehicle hand controls, tell-tales and indicators, pursuant to Regulation No 121.

Approval No Extension No

1. Trade name or mark of the vehicle:
2. Manufacturer's name for the type of vehicle:
3. Manufacturer's name and address:
4. If applicable, name and address of the 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. Concise description:

	Hand controls, tell-tales and indicators on the vehicle	Conformance
9.1.		yes/no ⁽²⁾
9.2.		yes/no ⁽²⁾
...		yes/no ⁽²⁾

10. Comments

.....

.....

.....

.....

11. Position of the approval mark:
12. Reason(s) for extension (if applicable):
.....
13. Approval granted/extended/refused/withdrawn ⁽²⁾
14. Place:
15. Date:
16. Signature:
17. The following documents, bearing the approval number shown above, are available on request:
.....
.....

⁽¹⁾ Distinguishing number of the country which has granted, extended, refused or withdrawn approval (see approval provisions in the Regulation).

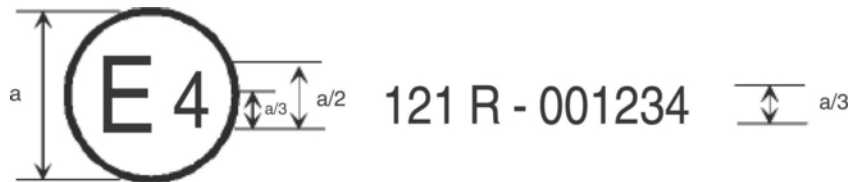
⁽²⁾ Strike out what does not apply.

ANNEX 2

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

(see paragraph 4.4 of this Regulation)

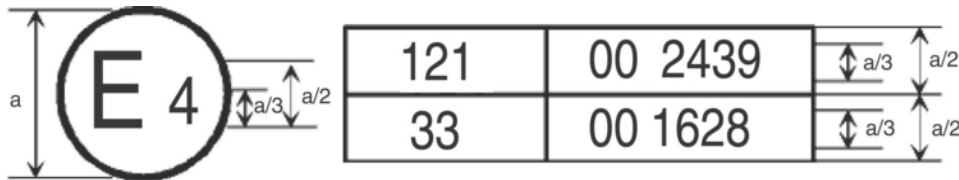


a = 8 mm min.

The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to the location and identification of hand controls, tell-tales and indicators, been approved in the Netherlands (E4) pursuant to Regulation No 121 under the approval No 001234. The first two digits (00) of the approval number indicated that the approval was granted in accordance with the requirements of Regulation No 121 in its original form.

MODEL B

(see paragraph 4.5 of this Regulation)



a = 8 mm min.

The above approval mark affixed to a vehicle shows that the vehicle type concerned has been approved in the Netherlands (E4) pursuant to Regulation No 121 and Regulation No 33 ⁽¹⁾. The approval number indicates that, at the dates when the respective approvals were given, Regulation No 121 was in its original form and Regulation No 33 was still in its original form.

⁽¹⁾ The number is given merely as an example.

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