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Price: EUR 9

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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.

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II

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

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at:

<http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>

**Regulation No 61 of the Economic Commission for Europe of the United Nations (UN/ECE) —
Uniform provisions for the approval of commercial vehicles with regard to their external
projections forward of the cab's rear panel**

Incorporating all valid text up to:

Supplement 1 to the original version of the Regulation — Date of entry into force: 10 October 2006

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1. FIELD OF APPLICATION AND SCOPE

- 1.1. This Regulation applies to the external projection of goods vehicles of categories N₁, N₂ and N₃ ⁽¹⁾, limited to the 'external surface' as defined below.

It does not apply to the exterior rear-view mirrors, including their support, or to the accessories such as aerials and luggage racks.

- 1.2. The purpose of this Regulation is to reduce the risk or the severity of injuries sustained by a person coming into contact with the external surface of the vehicle in the event of an impact.

2. DEFINITIONS

For the purposes of this Regulation:

- 2.1. 'External surface' means that part of the vehicle forward of the cab rear panel as defined in paragraph 2.5 below, with the exception of the rear panel itself, and includes such items as the front wings, front bumpers and front wheels;
- 2.2. 'Vehicle approval' means the approval of a vehicle type with regard to its external projections;
- 2.3. 'Vehicle type' means motor vehicles which do not differ in such essential respects as the 'external surface';
- 2.4. 'Cab' means that part of the bodywork which constitutes the driver and passenger compartment, including the doors;
- 2.5. 'Cab rear panel' means the rearmost part of the external surface of the driver and passenger compartment. Where it is not possible to determine the position of the rear cab panel, for the purposes of this Regulation it would be deemed to be the vertical transversal plane situated 50 cm to the rear of the 'R' point of the driver seat, with the seat, if adjustable, located at its rearmost driving position (see Annex 3). However, the manufacturer may, with the agreement of the technical services, request an alternative distance if 50 cm can be shown as being inappropriate for a particular vehicle ⁽²⁾;
- 2.6. 'Reference plane' means a horizontal plane passing through the centre of the front wheels or a horizontal plane situated at the height of 50 cm above the ground, whichever is lower;
- 2.7. 'Floor line' means a line determined as follows:

When a vertical-axis cone of undetermined height having its side at an angle of 15° to the vertical is moved about the external surface of the loaded vehicle so as to remain in contact with the external surface of the body at its lowest point, the floor line is the geometrical trace of the points of contact.

In determining the floor line, no account shall be taken of the exhaust pipes or wheels, or of functional mechanical features attached to the under-body such as jacking points, suspension mountings or attachments for use in towing or in case of breakdown. In the spaces at the outside of wheel arches an imaginary surface extending the adjacent external surfaces without change of position shall be assumed. The front bumpers shall be taken into account in determining the floor line. Depending on the type of vehicle, the trace of the floor line may be at either the outer edge of the bumper profile or at the body panel below the bumper. Where there are two or more points of contact at the same time, the lowest point of contact shall be used to determine the floor line,

- 2.8. 'Radius of curvature' means the radius of the arc of a circle which comes closest to the rounded form of the component under consideration.

⁽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⁾ The use of this option does not modify the scope of this Regulation.

3. APPLICATION FOR APPROVAL
 - 3.1. The application for approval of a vehicle type with regard to external projections shall be submitted by the vehicle manufacturer or by his duly accredited representative.
 - 3.2. It shall be accompanied by the under mentioned documents in triplicate:
 - 3.2.1. photographs of the front and side parts of the vehicle,
 - 3.2.2. such drawings of the 'external surface' which in the opinion of the technical service responsible for conducting the tests are required in order to demonstrate compliance with the provisions of paragraphs 5 and 6 below.
 - 3.3. The applicant shall submit to the technical service responsible for conducting the approval test:
 - 3.3.1. either a vehicle representative of the type to be approved or the part(s) of the vehicle deemed essential to carry out the checks and tests required in this Regulation,
 - 3.3.2. certain parts and samples of the materials used, if so required by the technical service.
4. APPROVAL
 - 4.1. If the vehicle submitted for approval pursuant to this Regulation meets the requirements of paragraphs 5 and 6 below, 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 the same number to the same vehicle type having a different external structure or to another vehicle type.
 - 4.3. Notice of approval or of refusal of approval of a vehicle type pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation and of drawings and photographs cited in paragraphs 3.2.1 and 3.2.2 supplied by the applicant for approval, in a format not exceeding A4 (210 × 297 mm) or folded to that format and on an appropriate scale.
 - 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation an international approval mark consisting of:
 - 4.4.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ⁽¹⁾,
 - 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.

⁽¹⁾ 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 the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, or in which they accede to that Agreement, and the numbers thus assigned shall be communicated by the Secretary-General of the United Nations to the Contracting Parties to the Agreement.

- 4.6. The approval mark and the additional symbol 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.

5. GENERAL SPECIFICATIONS

- 5.1. The provisions of this Regulation shall not apply to those parts of the 'external surface' of the vehicle which, with the vehicle in the unladen condition, with doors, windows, access lids, etc., in the closed position are either:
 - 5.1.1. outside a zone having as its upper limit a horizontal plane situated 2,00 m above the ground and as its lower limit either the reference plane defined in paragraph 2.6 or the floor line defined in paragraph 2.7 as selected by the manufacturer, or
 - 5.1.2. located so that, in static condition, they cannot be contacted by a sphere 100 mm in diameter.
 - 5.1.3. Where the reference plane is the lower limit of the zone, account shall be taken only of the parts of the vehicle falling between two vertical planes, one touching the external surface of the vehicle and the other parallel to it at a distance of 80 mm towards the interior of the vehicle.
- 5.2. The 'external surface' of the vehicle shall not exhibit, directed outwards, any part likely to catch on pedestrians, cyclists or motor cyclists.
- 5.3. Any components specified in paragraph 6 below, shall not exhibit, directed outwards, any pointed or sharp parts or any projections of such shape, dimensions, direction or hardness as to be likely to increase the risk or seriousness of bodily injury to a person hit by the external surface or brushing against it in the event of a collision.
- 5.4. Projecting parts of the outer surface having a hardness of not more than 60 Shore A, may have a radius of curvature lower than the values prescribed under paragraph 6 below.

6. SPECIFIC REQUIREMENTS

- 6.1. Ornaments, commercial symbols, letters and numbers of commercial markings
 - 6.1.1. Ornaments, commercial symbols, letters and numbers of commercial markings shall not have any radius of curvature of less than 2,5 mm. This requirement does not apply to those parts if they do not protrude more than 5 mm from the surrounding surface; however, in this case their edges directed outwards shall be blunted.
 - 6.1.2. Ornaments, commercial symbols, letters and numbers of commercial markings, which project more than 10 mm from the surrounding surface shall retract, become detached or bend over under a force of 10 daN exerted at their most salient point in any direction in a plane approximately parallel to the surface on which they are mounted.

To apply 10 daN force a flat-ended ram of not more than 50 mm diameter shall be used. Where this is not possible, an equivalent method shall be used. After the ornaments are retracted, detached or bent over, the remaining portion shall not project more than 10 mm and shall not have any pointed, sharp or cutting edges.

- 6.2. Headlamp visors and rims
 - 6.2.1. Projecting visors and rims shall be permitted on headlamps provided that their projection as measured in relation to the external transparent surface of the headlamp does not exceed 30 mm and their radius of curvature is at least 2,5 mm throughout.
 - 6.2.2. Retracting headlamps shall meet the requirements of paragraph 6.2.1 above in both operative and retracted positions.

- 6.2.3. The provisions of paragraph 6.2.1 above shall not apply to headlamps recessed in the body, or where the headlamp is overhung by the body, provided the bodywork conforms to the requirements of paragraph 5.2 above.
- 6.3. Grilles
- Parts of grilles shall exhibit a radius of curvature of:
- not less than 2,5 mm if the distance between adjacent parts is more than 40 mm,
 - not less than 1 mm if the distance is between 25 mm and 40 mm,
 - not less than 0,5 mm if the distance is less than 25 mm.
- 6.4. Windscreen and headlamp cleaning devices
- 6.4.1. The above-mentioned devices shall be such that the wiper shafts have a protective covering with a radius of curvature of not less than 2,5 mm and a surface area of not less than 150 mm² measured in the projection of a section not further than 6,5 mm from the most protruding point.
- 6.4.2. Nozzles for windscreen washer and headlamp cleaning devices shall have a radius of curvature of not less than 2,5 mm. Those protruding less than 5 mm shall have blunted outward facing edges.
- 6.5. Protective devices (bumpers)
- 6.5.1. The ends of front protective devices shall be turned in towards the external surface of the body.
- 6.5.2. The components of the front protective devices shall be so designed that all rigid surfaces facing outwards have a radius of curvature of not less than 5 mm.
- 6.5.3. Equipment such as towing hitches and winches shall not protrude beyond the foremost surface of the bumper. However, winches may protrude beyond the foremost surface of the bumper provided they are covered when not in use by a suitable protective covering having a radius of curvature of not less than 2,5 mm.
- 6.5.4. The requirements of paragraph 6.5.2 shall not apply to parts of the bumper or parts mounted on or inset in the bumper which project less than 5 mm. The edges of devices projecting less than 5 mm shall be blunted. With respect to devices mounted on the bumpers and referred to in other paragraphs of this Regulation, the particular requirements contained in this Regulation shall remain applicable.
- 6.6. Handles, hinges, pushbuttons of doors, luggage compartments bonnets, vents, access flaps and grab handles
- 6.6.1. The above parts shall not protrude more than: 30 mm in the case of pushbuttons, 70 mm in the case of grab handles and bonnet-fasteners, and 50 mm in all other cases. They shall have radii of curvature of not less than 2,5 mm.
- 6.6.2. If lateral door handles rotate to operate, they shall meet one or other of the following requirements:
- 6.6.2.1. In the case of handles which rotate parallel to the plane of the door the open end of handles must be directed towards the rear. The end of such handles shall be turned back towards the plane of the door and fitted into a protective surround or be recessed;
- 6.6.2.2. Handles which pivot outwards in any direction which are not parallel to the plane of the door shall, when in the closed position, be enclosed in a protective surround or be recessed. The open end shall face either rearwards or downwards.

Nevertheless, handles which do not comply with this last condition may be accepted if:

- they have an independent return mechanism,
- should the return mechanisms fail, they cannot project more than 15 mm,
- they, in such opened position, have a radius of curvature not less than 2,5 mm (this requirement does not apply if in maximum opened position the projection is less than 5 mm, in which case the angles of the parts facing outwards shall be blunted),
- their end surface area, when measured not more than 6,5 mm from the point projecting furthest, is not less than 150 mm².

6.7. Running boards and steps

The edges of running boards and steps shall be rounded.

6.8. Lateral air and rain deflectors and window anti-smear air deflectors

Edges capable of being directed outwards shall have a radius of curvature of not less than 1 mm.

6.9. Sheet metal edges

Sheet metal edges are permitted provided that the edge is folded back towards the body so that it cannot be touched by a sphere of 100 mm diameter or is provided with a protective covering having a radius of curvature of not less than 2,5 mm.

6.10. Wheel nuts, hub caps and protective devices

6.10.1. The wheel nuts, hub caps and protective devices shall not exhibit any fin-shaped projections.

6.10.2. When the vehicle is travelling in a straight line, no part of the wheels, other than the tyres, situated above the horizontal plane, passing through their axis of rotation, shall project beyond the vertical projection in a horizontal plane, of the body panel edge above the wheel. However, if functional requirements so warrant, the protective devices which cover wheel nuts and hubs may project beyond the vertical projection of the body panel edge above the wheel, on condition that radius of curvature of the surface of the projection part is not less than 5 mm and that the projection beyond the vertical projection of the body panel edge above the wheel in no case exceeds 30 mm.

6.10.3. Protective device(s) conforming to paragraph 6.10.2 above shall be fitted if bolts or nuts protrude beyond the projection of the outside surface of the tyre (the part of the tyre situated above the horizontal plane passing through the axis of rotation of the wheel).

6.11. Jacking points and exhaust pipe(s)

6.11.1. The jacking points (if any) and exhaust pipe or pipes shall not project more than 10 mm beyond the vertical projection of the floor line or the vertical projection of the intersection of the reference plane with the external surface of the vehicle.

6.11.2. Notwithstanding the above requirement, an exhaust pipe may project more than 10 mm provided that its edges are rounded at the end to a radius of curvature of not less than 2,5 mm.

7. MODIFICATION OF VEHICLE TYPE

7.1. Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:

7.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that, in any case, the vehicle 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 4.3 above to the Parties to the Agreement applying this Regulation.

8. CONFORMITY OF PRODUCTION

8.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform, with regard to external projections, to the vehicle type approved.

8.2. In order to verify conformity as prescribed in paragraph 8.1 above a sufficient number of random checks shall be made on serially manufactured vehicles bearing the approval mark required by this Regulation.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 6 above are not complied with or if the vehicle has failed to pass the test prescribed in Annex 3.

9.2. 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 copy of the approval form bearing at the end, in large letters, the signed and dated annotation 'APPROVAL WITHDRAW'.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle approved in accordance with this Regulation, he shall so inform the authority which granted the approval. 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'.

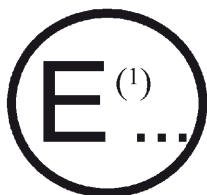
11. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the Agreement 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 refusal or withdrawal of approval, issued in other countries, are to be sent.

ANNEX I

COMMUNICATION

(maximum format: A4 (210 × 297 mm))



issued by: Name of administration:

.....

.....

.....

Communication concerning ⁽²⁾: THE APPROVAL
 THE REFUSAL OF APPROVAL
 THE EXTENSION OF APPROVAL
 THE APPROVAL WITHDRAWN
 THE PRODUCTION DEFINITELY DISCONTINUED

of a vehicle type with regard to its external projections, pursuant to Regulation No 61

Approval No

1. Trade name or mark of the motor vehicle:
2. Vehicle type:
3. Manufacturer's name and address:
4. Name and address of manufacturer's representative (if applicable):
5. Vehicle 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. Approval granted/refused ⁽²⁾:
10. Position of approval mark on the vehicle:
11. Position of cab rear panel with reference to 'R' point of the driver's seat where applicable (see paragraph 2.5):
12. Lower limit of the zone specified in paragraph 5.1.1:
Reference plane/floor line ⁽²⁾
13. Place:
14. Date:
15. Signature:
16. Photographs of the front, rear and side parts of the cab forward of the rear panel, bearing the approval number shown above, are annexed to this communication.

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

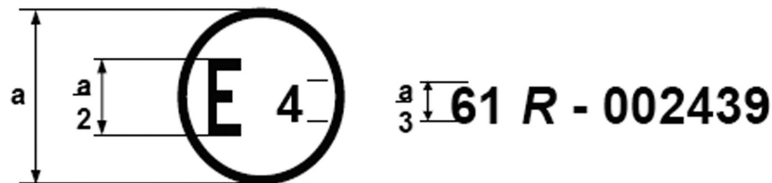
⁽²⁾ Strike out what does not apply.

ANNEX 2

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

(See paragraph 4.4 of this Regulation)

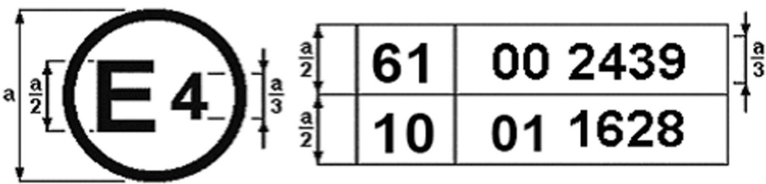


a = 8 mm min.

The above approval mark affixed to a commercial vehicle shows that the vehicle type concerned has, with regard to external projections, been approved in the Netherlands (E 4) pursuant to Regulation No 61 under approval number 002439. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No 61 in its original form.

MODEL B

(See paragraph 4.5 of this Regulation)



a = 8 mm min.

The above approval mark affixed to a commercial vehicle shows that the vehicle type concerned has been approved in the Netherlands (E 4) pursuant to Regulations No 61 and No 10 (*). The approval numbers indicate that, at the dates when the respective approvals were given, Regulation No 61 had not been modified and Regulation No 10 already included the 01 series of amendments.

(*) The latter number is given as an example only.

ANNEX 3

Procedure for determining the 'H' point and the actual seat-back angle and for verifying their relationship to the 'R' point and the design seat-back angle**1. DEFINITIONS**

- 1.1. The 'H' point, which indicates the position of a seated occupant in the passenger compartment, is the trace, in a longitudinal vertical plane, of the theoretical axis of rotation between the legs and the torso of a human body represented by the manikin described in paragraph 3 below.
- 1.2. The 'R' point or 'seating reference point' is the reference point specified by the manufacturer which:
 - 1.2.1. has coordinates determined in relation to the vehicle structure;
 - 1.2.2. corresponds to the theoretical position of the point of torso/legs rotation ('H' point) for the lowest and most rearward normal driving position or position of use given to each seat provided by the vehicle manufacturer.
- 1.3. 'Seat-back angle' means the inclination of the seat back in relation to the vertical.
- 1.4. 'Actual seat-back angle' means the angle formed by the vertical through the 'H' point with the torso reference line of the human body represented by the manikin described in paragraph 3 below.
- 1.5. 'Design seat-back angle' means the angle prescribed by the manufacturer which:
 - 1.5.1. determines the seat-back angle for the lowest and most rearward normal driving position or position of use given to each seat by the vehicle manufacturer;
 - 1.5.2. is formed at the 'R' point by the vertical and the torso reference line;
 - 1.5.3. corresponds theoretically to the actual seat-back angle.

2. DETERMINATION OF 'H' POINTS AND ACTUAL SEAT-BACK ANGLES

- 2.1. An 'H' point and an 'actual seat-back angle' shall be determined for each seat provided by the manufacturer. If the seats in the same row can be regarded as similar (bench seat, identical seats, etc.) only one 'H' point and one 'actual seat-back angle' shall be determined for each row of seats, the manikin described in paragraph 3 below being seated in a place regarded as representative for the row. This place shall be:
 - 2.1.1. in the case of the front row, the driver's seat;
 - 2.1.2. in the case of the rear row or rows, an outer seat.
- 2.2. When an 'H' point and an 'actual seat-back angle' are being determined, the seat considered shall be placed in the lowest and most rearward normal driving position or position of use provided for it by the manufacturer. The seat back shall, if its inclination is adjustable, be locked as specified by the manufacturer or, in the absence of any specification, to an actual seat-back angle as near as possible to 25° from the vertical.

3. DESCRIPTION OF THE MANIKIN

- 3.1. A three-dimensional manikin of a mass and contour corresponding to these of an adult male of average height shall be used. Such a manikin is depicted in figures 1 and 2 below.
- 3.2. The manikin shall comprise:
 - 3.2.1. Two components, one simulating the back and the other the seat of the body, pivoting on an axis representing the axis of rotation between the torso and the thigh; the trace of this axis on the side of the manikin is the manikin's 'H' point;
 - 3.2.2. Two components simulating the legs and pivotally attached to the component simulating the seat; and
 - 3.2.3. Two components simulating the feet and connected to the legs by pivotal joints simulating ankles.
- 3.2.4. In addition, the component simulating the seat of the body shall be provided with a level enabling its transverse orientation to be verified.
- 3.3. Body-segment mass shall be attached at appropriate points representing the corresponding centres of gravity so as to bring the total mass of the manikin up to about 75,6 kg. Details of the various masses are given in the table in figure 2 of the Appendix to this Annex.

- 3.4. The torso reference line of the manikin is taken into account by a straight line passing through the joint between the leg and the pelvis and the theoretical joint between the neck and the thorax (see figure 1 of the Appendix to this Annex).

4. SETTING UP THE MANIKIN

The three-dimensional manikin shall be set up in the following manner:

- 4.1. The vehicle shall be placed on a horizontal plane and the seats adjusted as prescribed in paragraph 2.2 above;
- 4.2. The seat to be tested shall be covered with a piece of cloth to facilitate the correct setting-up of the manikin;
- 4.3. The manikin shall be placed on the seat concerned, its pivotal axis being perpendicular to the longitudinal plane of symmetry of the vehicle;
- 4.4. The feet of the manikin shall be placed as follows:
- 4.4.1. In the front seats, in such a way that the level verifying the transverse orientation of the seat of the manikin is brought to the horizontal;
- 4.4.2. In the rear seats, so far as possible in such a way as to be in contact with the front seats. 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 point and the other foot shall be so arranged that the level enabling the transverse orientation of the seat of the manikin to be verified is brought to the horizontal;
- 4.4.3. If the 'H' point is being determined at a centre seat, the feet shall be placed one on each side of the tunnel;
- 4.5. The masses shall be placed on the thighs, the level verifying the transverse orientation of the seat of the manikin shall be brought to the horizontal, and the weights shall be placed on the component representing the seat of the manikin;
- 4.6. The manikin shall be moved away from the seat back by means of the knee-pivot bar and the back of the manikin shall be pivoted forwards. The manikin shall be repositioned on the seat of the vehicle by being slid backwards on its seat until resistance is encountered, the back of the manikin then being replaced against the seat back;
- 4.7. A horizontal load of approximately 10 ± 1 daN shall be applied to the manikin twice. The direction and point of application of the load are shown by a black arrow in figure 2;
- 4.8. The masses shall be installed on the right and left sides and the torso weights shall then be placed in position. The transverse level of the manikin shall be kept horizontal;
- 4.9. The transverse level of the manikin being kept horizontal, the back of the manikin shall be pivoted forwards until the torso weights are above the 'H' point, so as to eliminate any friction with the seat back;
- 4.10. The back of the manikin shall be gently moved rearwards so as to complete the setting-up operation. The transverse level of the manikin shall be horizontal. If it is not, the procedure described above shall be repeated.

5. RESULTS

- 5.1. When the manikin has been set up as described in paragraph 4 above, the 'H' point and the actual seat-back angle of the vehicle seat in question are constituted by the 'H' point and the angle of inclination of the manikin's torso reference line.
- 5.2. The coordinates of the 'H' point in relation to three mutually perpendicular planes, and the actual seat-back angle, shall be measured for comparison with the data supplied by the vehicle manufacturer.
- #### 6. VERIFYING THE RELATIVE POSITIONS OF THE 'R' AND 'H' POINTS AND THE RELATIONSHIP BETWEEN THE DESIGN SEAT-BACK ANGLE AND THE ACTUAL SEAT-BACK ANGLE
- 6.1. The results of the measurements carried out in conformity with paragraph 5.2 for the 'H' point and the actual seat-back angle shall be compared with the coordinates of the 'R' point and the design seat-back angle as supplied by the vehicle manufacturer.
- 6.2. The relative positions of the 'R' point and the 'H' point and the relationship between the design seat-back angle and the actual seat-back angle shall be considered satisfactory for the seat in question if the 'H' point, as defined by its coordinates, lies within a square of 50 mm side whose diagonals intersect at the 'R' point, and if the actual seat-back angle is within 5° of the design seat-back angle.
- 6.2.1. If these conditions are met, the 'R' point and the design seat-back angle shall be used for the test and, if necessary, the manikin shall be so adjusted that the 'H' point coincides with the 'R' point and the actual seat-back angle coincides with the design seat-back angle.

- 6.3. If the 'H' point or the actual seat-back angle does not satisfy the requirements of paragraph 6.2 above, the 'H' point or the actual seat-back angle shall be determined twice more (three times in all). If the results of two of these three operations satisfy the requirements, the result of the test shall be considered satisfactory.
- 6.4. Unless at least two of the three test results satisfy the requirements of paragraph 6.2, the result of the test shall be considered to be not satisfactory.
- 6.5. If the situation described in paragraph 6.4 above arises, or if verification cannot be effected because the manufacturer has failed to supply information regarding the position of the 'R' point or regarding the design seat-back angle, the average of the results of the three determinations may be used and be regarded as applicable in all cases where the 'R' point or the design seat-back angle is referred to in this Regulation.
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Appendix

COMPONENTS OF THREE-DIMENSIONAL MANIKIN

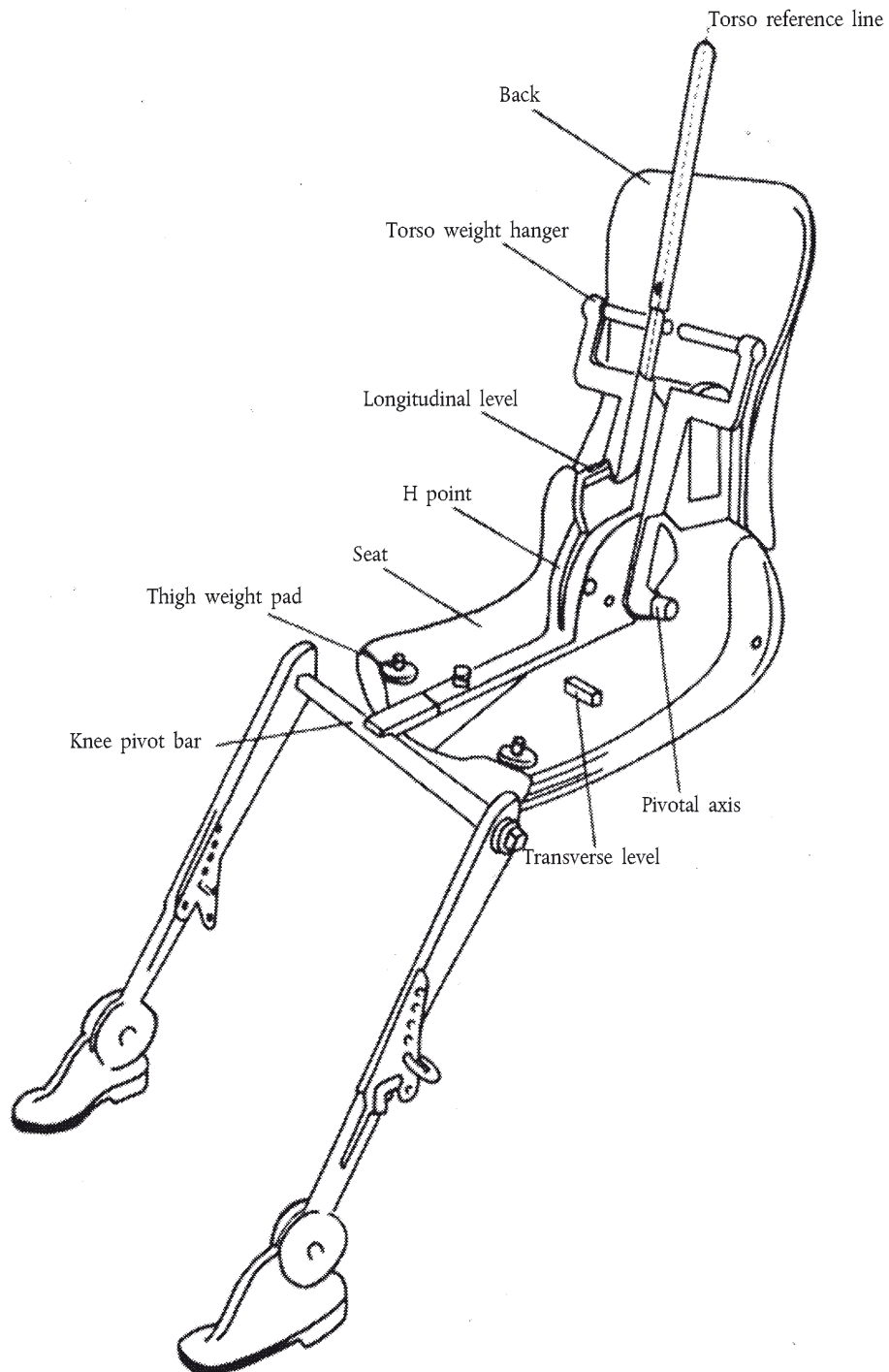


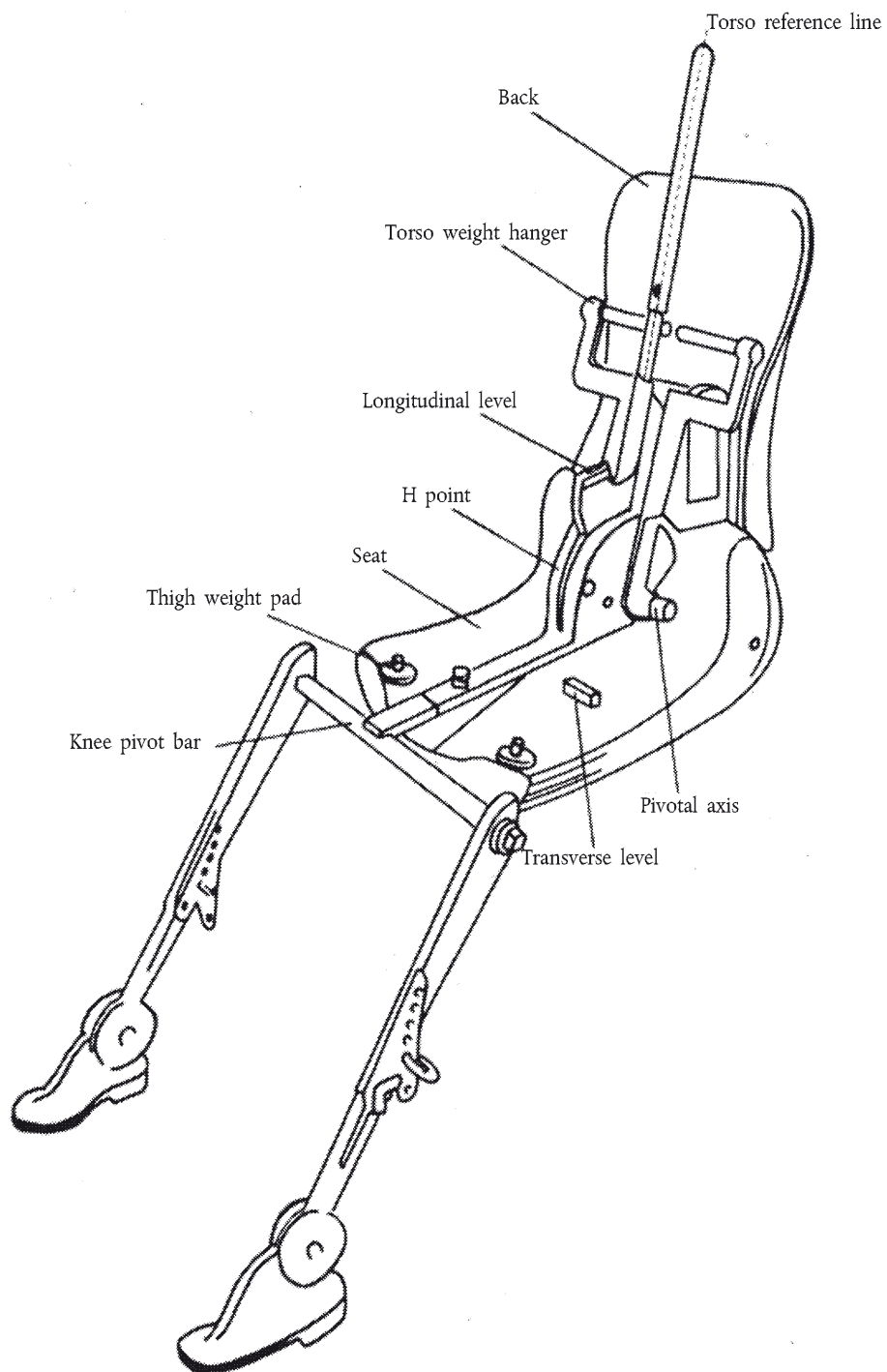
Figure 1

DIMENSIONS AND MASS OF MANIKIN

Mass of manikin

	kg
Components simulating back and seat of body	16,6
Torso mass	31,2
Seat mass	7,8
Thigh mass	6,8
Leg mass	13,2
Total	75,6

Figure 2



ANNEX 4

MEASUREMENT OF PROJECTIONS AND DISTANCES

1. METHOD OF DETERMINING THE DIMENSIONS OF THE PROJECTION OF A PART FITTED ON THE EXTERNAL SURFACE

1.1. The dimensions of the projection of a part mounted on a convex panel may be determined either directly or by reference to a drawing of an appropriate section of the part in the fitted position.

1.2. If the Projection of a part mounted on a panel other than convex cannot be determined by simple measurement, it shall be determined by the maximum variation in the distance between the reference line of the panel and the centre of a sphere of 100 mm diameter when the sphere is moved in constant contact with the part. An example of the use of this method is given in figure 1.

1.3. For grab handles, the projection shall be measured in relation to a plane passing through the points of attachment. An example is given in figure 2.

2. METHOD OF DETERMINING THE PROJECTION OF HEADLAMP VISORS AND RIMS

2.1. The projection from the outer surface of the headlamp shall be measured horizontally from the point of contact of a sphere of 100 mm diameter, as shown in figure 3.

3. METHOD OF DETERMINING THE DISTANCE BETWEEN PARTS OF A GRILLE

3.1. The distance between parts of a grille shall be the distance between two planes passing through the points of contact of the sphere and perpendicular to the line joining the points of contact. Examples of the use of this method are given in figures 4 and 5.

Figure 1

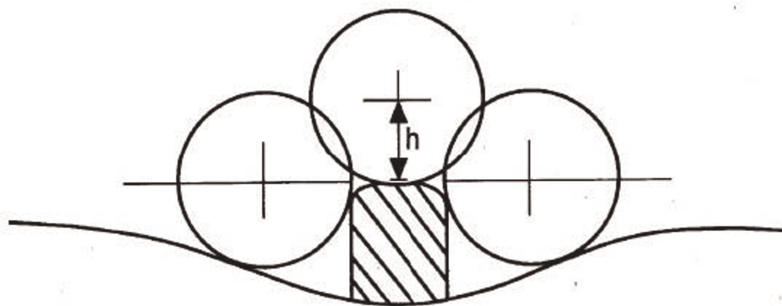


Figure 2

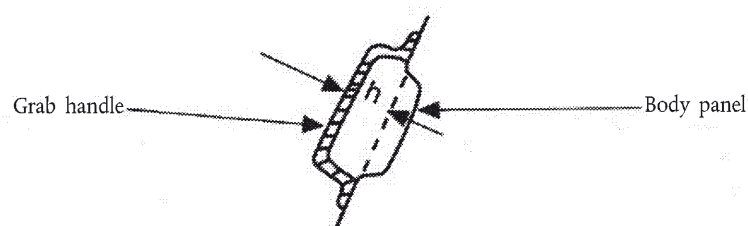
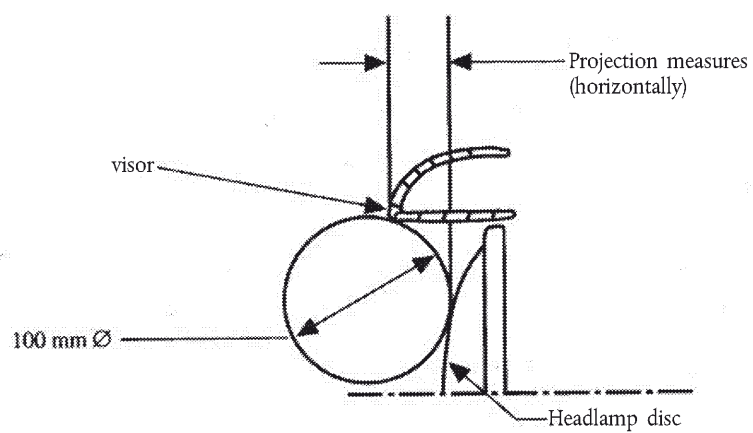
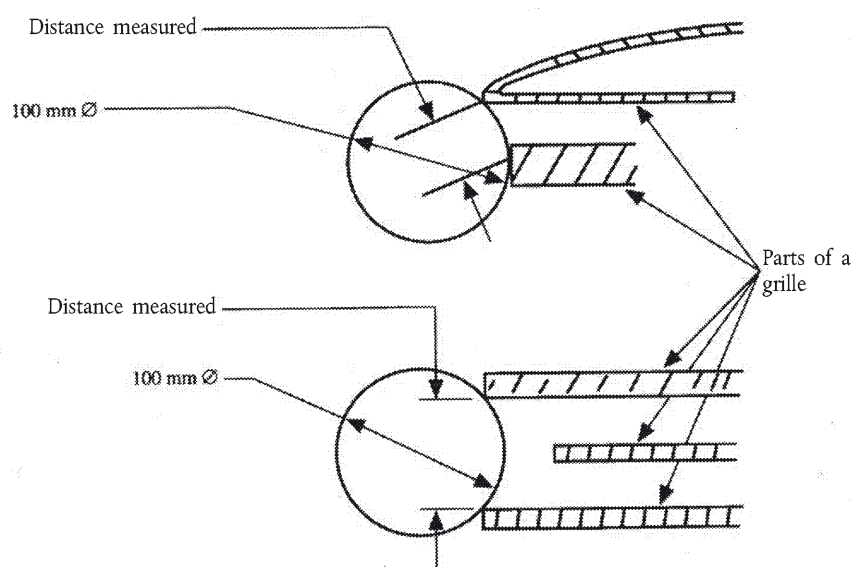


Figure 3



Figures 4 and 5



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 80 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of seats of large passenger vehicles and of these vehicles with regard to the strength of the seats and their anchorages

Incorporating all valid text up to:

Supplement 3 to the 01 series of amendments — Date of entry into force: 18 June 2007

Corrigendum 1 to the 01 series of amendments — Date of entry into force: 12 November 2008

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ANNEXES

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1. SCOPE
- 1.1. This Regulation applies to:
 - (a) Passenger seats for forward facing installation in vehicles of categories M₂ and M₃, of Classes II, III and B ⁽¹⁾;
 - (b) Vehicles of categories M₂ and M₃ of Classes II, III and B ⁽¹⁾ in respect of their passenger seat anchorages and seat installation.
- 1.2. At the request of the manufacturer, vehicles of category M₂ ⁽¹⁾ approved to Regulation No 17 shall be deemed to meet the requirements of this Regulation.
- 1.3. Vehicles where some seats benefit from the derogation provided in paragraph 7.4 to Regulation No 14 shall be approved to this Regulation.
2. DEFINITIONS
- 2.1. 'Approval of a seat' means an approval of a seat type as a component in relation to the protection of the occupants of forward-facing seats with regard to their strength and the design of the seat backs;
- 2.2. 'Approval of a vehicle' means an approval of a vehicle type with regard to the strength of the parts of the vehicle structure to which seats are to be secured, and with regard to the installation of seats;
- 2.3. 'Seat type' means seats which do not differ essentially with respect to the following characteristics likely to affect their strength and their aggressiveness:
 - 2.3.1. Structure, shape, dimensions and materials of the load bearing parts;
 - 2.3.2. Types and dimensions of the seat back adjustment and locking system;
 - 2.3.3. Dimensions, structure and materials of the attachments and supports (e.g. legs);
- 2.4. 'Vehicle type' means vehicles which do not differ essentially in respect of:
 - 2.4.1. the constructional features relevant to this Regulation; and,
 - 2.4.2. the type or types of type approved seat(s) fitted to the vehicle, if any.
- 2.5. 'Seat' means a structure likely to be anchored to the vehicle structure, including its trim and attachment fittings, intended to be used in a vehicle, and to seat one or more adult persons;
- 2.6. 'Individual seat' means a seat designed and constructed for the accommodation of one seated passenger;
- 2.7. 'Double seat' means a seat designed and constructed for the accommodation of two seated passengers side by side; two seats side by side and having no interconnection shall be regarded as two individual seats;
- 2.8. 'Row of seats' means a seat designed and constructed for the accommodation of three or more seated passengers side by side; several individual or double seats arranged side by side shall not be regarded as a row of seats;
- 2.9. 'Seat cushion' means the part of the seat which is arranged almost horizontally and designed to support a seated passenger;
- 2.10. 'Seat-back' means the part of the seat that is almost vertical, designed to support the passenger's back, shoulders and, possibly, his head;
- 2.11. 'Adjustment system' means the device by which the seat or its parts can be adjusted to a position suited to the seated occupant;

⁽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 Amendment 4.

- 2.12. 'Displacement system' means a device enabling the seat or one of its parts to be displaced laterally or longitudinally without a fixed intermediate position of the seat or one of its parts, to facilitate access by passengers;
- 2.13. 'Locking system' means a device ensuring that the seat and its parts are maintained in the position of use;
- 2.14. 'Anchorage' means a part of the floor or of the body of a vehicle to which a seat may be fixed;
- 2.15. 'Attachment fittings' means bolts or other components used to attach the seat to the vehicle;
- 2.16. 'Trolley' means the test equipment made and used for dynamic reproduction of road accidents involving frontal collision;
- 2.17. 'Auxiliary seat' means a seat for the manikin mounted on the trolley to the rear of the seat to be tested. This seat shall be representative of the seat to be used in the vehicle behind the seat to be tested.
- 2.18. 'Reference plane' means the plane passing through the points of contact of the heels of the manikin, used for the determination of the H point and the actual angle of torso for the seating position of motor vehicles according to the prescriptions of annex 4;
- 2.19. 'Reference height' means the height of the top of the seat above the reference plane;
- 2.20. 'Manikin', a manikin corresponding to the specifications for HYBRID II or III ⁽¹⁾
- 2.21. 'Reference zone' means the space between two vertical longitudinal planes, 400 mm apart and symmetrical with respect to the H-point, and defined by rotation from vertical to horizontal of the headform apparatus, described in Regulation No 21, annex 1. The apparatus shall be positioned as described in that annex of Regulation No 21 and set to its maximum length of 840 mm and its minimum length of 736 mm for residual limitation of said space.
- 2.22. '3-point belt' for the purposes of this Regulation also includes belts with more than three anchorage points.
- 2.23. 'Seat spacing' means, in the case of seats facing in the same direction, the distance between the front of a seat squab and the back of the seat squab of the seat preceding it, measured horizontally at the height of 620 mm above the floor.
3. APPLICATION FOR APPROVAL
- 3.1. The application for approval of a seat shall be submitted by the seat manufacturer or by his duly accredited representative.
- 3.2. The application for approval of the vehicle shall be submitted by the vehicle manufacturer or by his duly accredited representative.
- 3.3. The application for approval of a seat or a vehicle shall be accompanied by the following documents in triplicate and the following particulars:
- 3.3.1. For approval of a seat:
- 3.3.1.1. A detailed description of the seat, its attachment fittings and its adjustment, displacement and locking systems;
- 3.3.1.2. Drawings, on an appropriate scale and in sufficient detail, of the seat, its attachment fittings and adjustment, displacement and locking systems;

⁽¹⁾ The technical specifications and detailed drawings of HYBRID II and III, corresponding to the principal dimensions of the fiftieth percentile male of the United States of America, and the specifications for its adjustment for this test are deposited with the Secretary-General of the United Nations and may be consulted on request at the secretariat of the Economic Commission for Europe, Palais des Nations, Geneva, Switzerland.

- 3.3.2. For approval of a vehicle:
- 3.3.2.1. A detailed description of the parts of the structure of the vehicle used as anchorages;
- 3.3.2.2. Drawings, on an appropriate scale and in sufficient detail, of the parts of the vehicle used as anchorages.
- 3.4. The following shall be submitted to the technical service responsible for the approval tests:
- 3.4.1. Two seats representative of the type to be approved, in the case of approval of a seat,
- 3.4.2. A part of the vehicle structure, in the case of approval of a vehicle.
4. APPROVAL
- 4.1. If the seat submitted for approval under this Regulation meets the relevant requirements of paragraph 5 below, approval of that seat type shall be granted.
- 4.2. If the vehicle submitted for approval under this Regulation meets the relevant requirements of paragraphs 6 and 7 below, approval of that vehicle type shall be granted.
- 4.3. An approval number shall be assigned to each type approved. Its first two digits (at present 01, corresponding to the 01 series of amendments) 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 any other seat type or any other vehicle type.
- 4.4. Notice of approval or of extension or refusal of approval of a seat type and/or a vehicle type 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 and/or annex 2 to this Regulation.
- 4.5. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every seat conforming to a seat type approved under this Regulation and to every vehicle conforming to a vehicle type approved under this Regulation an international approval mark consisting of:
- 4.5.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval;⁽¹⁾
- 4.5.2. The number of this Regulation, followed by the letter R, a dash and the approval number, placed to the right of the circle prescribed in paragraph 4.5.1;
- 4.6. The approval mark shall be clearly legible and shall be indelible.
- 4.7. As the case may be, the approval mark shall be placed on the seat or seats or on, or close to, the data plate affixed to the vehicle by the manufacturer.
- 4.8. Examples of arrangements of approval marks are given in annex 3.

⁽¹⁾ 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) and 56 for Montenegro. 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.

5. REQUIREMENTS FOR SEATS

- 5.1. Each type of seat shall be subject to the test requirements of either appendix 1 (dynamic test) or appendices 5 and 6 (static test) at the request of the manufacturer.
- 5.2. The tests which the seat type has passed shall be recorded in the communication form concerning the approval of a seat type and conforming to the model in annex 1.
- 5.3. Every adjustment and displacement system provided shall incorporate a locking system, which shall operate automatically.
- 5.4. The adjustment and locking systems shall not be required to be in full working order after the test.

6. REQUIREMENTS FOR SEAT ANCHORAGES OF A VEHICLE TYPE

- 6.1. The anchorages for the seats of the vehicle shall be capable of withstanding:
 - 6.1.1. either the test described in appendix 2;
 - 6.1.2. or, if a seat is mounted on the part of the vehicle structure being tested, the tests prescribed in appendix 1. The seat need not to be an approved seat provided that it satisfies the requirements of paragraph 3.2.1 of the above mentioned appendix.
- 6.2. Permanent deformation, including breakage, of an anchorage or of the surrounding area shall be permissible provided that the prescribed force has been sustained throughout the prescribed period.
- 6.3. When there is more than one type of anchorage on a vehicle, each variant shall be tested in order to obtain an approval for the vehicle.
- 6.4. One test may be used to approve simultaneously a seat and a vehicle.
- 6.5. In the case of vehicles of category M3, seat anchorages shall be deemed to comply with the requirements of paragraphs 6.1 and 6.2 if the safety-belt anchorages of the corresponding seating positions are fitted directly to the seats to be installed and these belt anchorages comply with the requirements of Regulation No 14, if necessary with the derogation provided in paragraph 7.4.

7. REQUIREMENTS FOR INSTALLATION OF SEATS IN A VEHICLE TYPE

- 7.1. All forward-facing seats installed shall be approved to the requirements of paragraph 5 of this Regulation and subject to the following conditions:
 - 7.1.1. the seat shall have a reference height of at least 1 m; and
 - 7.1.2. the H-point of the seat immediately behind shall be less than 72 mm higher than the H-point of the seat in question or, if the seat behind has the H-point more than 72 mm higher, the seat in question shall be tested and approved for installation in such a position.
- 7.2. When approved to appendix 1, test 1 and 2 shall apply, except as follows:
 - 7.2.1. Test 1 shall not apply where the rear of the seat cannot be struck by an unrestrained passenger (i.e. there is no forward-facing seat directly behind the seat to be tested).
 - 7.2.2. Test 2 shall not apply
 - 7.2.2.1. if the rear of the seat cannot be struck by a restrained passenger; or
 - 7.2.2.2. if the seat behind is fitted with a 3-point belt with anchorages that comply fully with Regulation No 14 (without derogation); or
 - 7.2.2.3. if the seat fulfils the requirements of appendix 6 to this Regulation.

- 7.3. When approved to appendices 5 and 6, all tests shall apply, except as follows:
- 7.3.1. The test of appendix 5 shall not apply if the rear of the seat cannot be struck by an unrestrained passenger (i.e. there is no forward-facing seat directly behind the seat to be tested).
- 7.3.2. The test of appendix 6 shall not apply:
- 7.3.2.1. if the rear of the seat cannot be struck by a restrained passenger; or
- 7.3.2.2. if the seat behind is fitted with a 3-point belt with anchorages that comply fully with Regulation No 14 (without derogation).
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. Seats and/or vehicles approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraphs 5, 6 and 7 above.
- 8.2. In order to verify that the requirements of paragraph 8.1 are met, suitable controls of the production shall be carried out. In this case, suitable controls means checking the dimensions of the product as well as the existence of procedures for the effective control of the quality of products.
- 8.3. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit and carry out on samples any test deemed necessary among the tests carried out for the approval. The normal frequency of these verifications shall be once a year.
9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 9.1. The approval granted in respect of a seat type and/or a vehicle 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 model in annex 1 and/or annex 2 to this Regulation.
10. MODIFICATION AND EXTENSION OF APPROVAL OF THE SEAT TYPE AND/OR THE VEHICLE TYPE
- 10.1. Every modification of the seat type and/or the vehicle type shall be notified to the administrative department which approved the seat type and/or the vehicle type. The department may then either:
- 10.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the seat and/or the vehicle still complies with the requirements; or
- 10.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 10.2. Confirmation or refusal of approval, specifying the alterations shall be communicated by the procedure specified in paragraph 4.4 above to the Parties to the Agreement applying this Regulation.
- 10.3. 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 and/or annex 2 to this Regulation.

11. 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 1 and or annex 2 to this Regulation.

12. TRANSITIONAL PROVISIONS

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

12.2. As from 1 October 1999 for vehicles of category M₂ with a maximum mass not exceeding 3 500 kg, and as from the sixtieth day after the entry into force of the 01 series of amendments to this Regulation for vehicles of category M₃, Contracting Parties applying this Regulation shall grant ECE approvals only if the requirements of this Regulation, as amended by the 01 series of amendments, are satisfied.

12.3. As from 1 October 2001 for vehicles of category M₂ with a maximum mass not exceeding 3 500 kg, and as from 1 October 1999 for vehicles of category M₃, Contracting Parties applying this Regulation may refuse to recognize approvals which were not granted in accordance with the 01 series of amendments to this Regulation.

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

The Parties to the 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.

*Appendix 1***Test procedures for seats according to paragraph 5 and/or anchorages according to paragraph 6.1.2**

1. Requirements
 - 1.1. The tests are to determine:
 - 1.1.1. If the seat occupant(s) is (are) correctly retained by the seat(s) in front of him (them) and/or by the use of a safety belt.
 - 1.1.1.1. This requirement shall be considered satisfied if the forward movement of any part of the trunk and the head of the manikin does not pass beyond the transversal vertical plane situated at 1,6 m from the R point of the auxiliary seat;
 - 1.1.2. If the seat occupant(s) is (are) not seriously injured.
 - 1.1.2.1. This requirement shall be considered satisfied if the following biomechanical acceptability criteria for the instrumented manikin, determined in accordance with Appendix 4, are met; that is:
 - 1.1.2.1.1. the head acceptability criterion HAC is less than 500;
 - 1.1.2.1.2. the thorax acceptability criterion (ThAC) is less than 30 g except for periods totalling less than 3 ms ($g = 9,81 \text{ m/s}^2$);
 - 1.1.2.1.3. the femur acceptability criterion (FAC) is less than 10 kN and the value of 8 kN is not exceeded for periods totalling more than 20 ms;
 - 1.1.3. If the seat and the seat mountings are strong enough.
 - 1.1.3.1. This requirement shall be considered satisfied if:
 - 1.1.3.1.1. no part of the seat, the seat mountings or the accessories becomes completely detached during the test;
 - 1.1.3.1.2. the seat remains firmly held, even if one or more anchorages are partly detached, and all the locking systems remain locked during the whole duration of the test;
 - 1.1.3.1.3. after the test no structural part of the seat or accessories has any fracture or sharp or pointed edges or corners likely to cause any bodily injury.
 - 1.2. All fittings forming part of the back of the seat or accessories thereto shall be such as to be unlikely to cause any bodily injury to a passenger during impact. This requirement shall be considered satisfied if any part contactable by a sphere 165 mm in diameter presents a radius of curvature of at least 5 mm.
 - 1.2.1. If any part of the fittings and accessories referred to above is made of a material of hardness less than 50 Shore A on a rigid backing, the requirements set out in paragraph 1.2 above shall apply only to the rigid backing.
 - 1.2.2. The parts of the back of the seat such as adjustment devices for the seat and accessories shall not be subject to any requirements of paragraph 1.2 if in the position of rest they are situated below a horizontal plane 400 mm above the reference plane, even if the occupant might enter into contact with them.
2. Preparation of the seat to be tested
 - 2.1. The seat to be tested shall be mounted:
 - 2.1.1. either on a testing platform representative of the body of a vehicle,
 - 2.1.2. or on a rigid testing platform.
 - 2.2. The anchorage on the testing platform provided for the test seat(s) shall be identified to or have the same characteristics as that used in vehicle(s) in which the seat is intended to be used.
 - 2.3. The seat to be tested shall be complete with all upholstery and accessories. If the seat is fitted with a table, it shall be in the stowed position.
 - 2.4. If adjustable laterally, the seat shall be positioned for maximum extension.

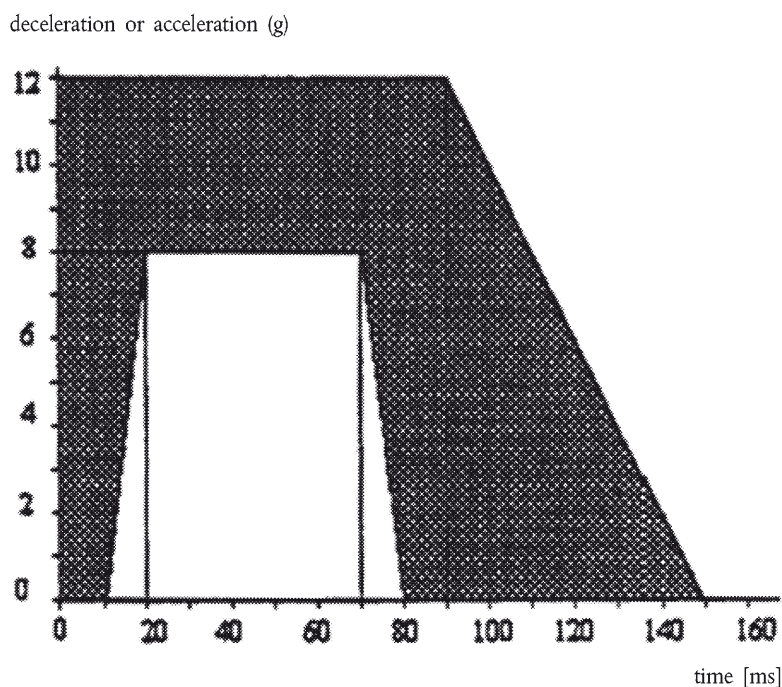
- 2.5. If adjustable, the seat back shall be adjusted so that the resulting inclination of the torso of the manikin used for determining the H-point and the actual torso angle for seating positions in motor vehicles is as close as possible to that recommended by the manufacturer for normal use or, in the absence of any particular recommendation by the manufacturer, as near as possible to 25° towards the rear in relation to the vertical.
- 2.6. If the seat back is equipped with a head restraint adjustable for height, it shall be in its lowest position.
- 2.7. Safety-belts of an approved type, conforming to Regulation No 16 and mounted on anchorages installed according to Regulation No 14 (including, if appropriate, the derogation provided in paragraph 7.4 to that Regulation) shall be fitted to both the auxiliary seat and the seat to be tested.
3. Dynamic tests
 - 3.1. Test 1

The testing platform shall be mounted on a trolley.
 - 3.2. Auxiliary seat

The auxiliary seat may be of the same type as the seat being tested and shall be located parallel to and directly behind the seat being tested. The two seats shall be at the same height, adjusted identically and on a seat spacing of 750 mm.

 - 3.2.1. If an auxiliary seat of a different type is used this shall be mentioned in the communication form concerning the approval of a seat type and conformity to the model in annex 1 to this Regulation.
 - 3.3. Manikin
 - 3.3.1. The manikin shall be placed unrestrained on the auxiliary seat so that its plane of symmetry corresponds to the plane of symmetry of the seating position in question.
 - 3.3.2. The manikin's hands shall rest on its thighs with the elbows touching the seat back; the legs shall be extended to the maximum and shall, if possible, be parallel; the heels shall touch the floor.
 - 3.3.3. Each manikin required shall be installed on a seat in accordance with the following procedure:
 - 3.3.3.1. the manikin shall be placed on the seat as close as possible to the desired position,
 - 3.3.3.2. a flat rigid surface 76 mm × 76 mm in area shall be placed as low as possible against the front of the manikin's torso,
 - 3.3.3.3. the flat surface shall be pressed horizontally against the manikin's torso at a load of between 25 and 35 daN:
 - 3.3.3.3.1. the torso shall be drawn forward by the shoulders to the vertical position, then laid back against the seat back. This operation shall be performed twice;
 - 3.3.3.3.2. without the torso moving, the head shall be placed in a position such that the platform supporting the measuring instruments contained in the head is horizontal and that the median sagittal plane of the head is parallel to that of the vehicle.
 - 3.3.3.4. the flat surface be carefully removed,
 - 3.3.3.5. the manikin shall be moved forward on the seat and the installation procedure described above repeated,
 - 3.3.3.6. if necessary, the position of the lower members shall be corrected,
 - 3.3.3.7. the measuring instruments installed shall not in any way affect the movement of the manikin during impact,
 - 3.3.3.8. the temperature of the system of measuring instruments shall be stabilised before the test and maintained so far as possible within a range between 19° and 26° C.
 - 3.4. Impact simulation
 - 3.4.1. The total velocity change of the trolley simulating the impact shall be between 30 and 32 km/h.
 - 3.4.2. The deceleration or, at the choice of the applicant, acceleration of the trolley during the impact simulation shall be in accordance with the provisions shown in Figure 1 below. Except for intervals totalling less than 3 ms, the curve of the trolley's deceleration or acceleration as function of time shall remain between the limit curves shown in Figure 1.

- 3.4.3. Furthermore, the average deceleration or acceleration shall be comprised between 6,5 and 8,5 g.
- 3.5. Test 2
- 3.5.1. Test 1 shall be repeated with a manikin seated in the auxiliary seat: the manikin shall be restrained by a safety-belt fitted and adjusted in accordance with the manufacturer's instructions. The number of safety-belt anchorage points for the purpose of Test 2 shall be recorded in the communication form concerning the approval of a seat type and conforming to the model in annex 1 to this Regulation.
- 3.5.2. The auxiliary seat shall be either of the same type as the seat being tested or of a different type, the details of which shall be recorded in the communication form concerning the approval of a seat type and conforming to the model in annex 1 to this Regulation.
- 3.5.3. In the case where Test 2 is conducted with the manikin restrained by a 3-point belt and the injury criteria are not exceeded, the auxiliary seat shall be considered to have met the requirements relating to the static test loads and movement of the upper anchorage during the test specified in Regulation No 14 with regard to this installation.

Figure 1

*Appendix 2***Test procedure for the anchorages of a vehicle in application of paragraph 6.1.1**

1. Test apparatus
 - 1.1. A rigid structure sufficiently representative of the seat intended for use on the vehicle is fixed by the means of fixation (bolts, screws, etc.) provided by the manufacturer to the parts of the structure submitted to the tests.
 - 1.2. If several seat types differing from one another in respect of the distance between the front and back ends of their feet can be mounted on the same anchorage, the test shall be carried out with the shortest footing. This footing shall be described on the type-approval certificate.
2. Test procedure
 - 2.1. A force F shall be applied.
 - 2.1.1. at a height of 750 mm above the reference plane and on the vertical line containing the geometrical centre of the surface bounded by the polygon having the different anchorage points as apexes or, if applicable, the extreme anchorages of the seat, by the rigid structure as defined in paragraph 1.1 above;
 - 2.1.2. in the horizontal direction and directed to the front of the vehicle;
 - 2.1.3. in a delay as short as possible and for a duration of at least 0,2 s.
 - 2.2. The force F shall be determined either
 - 2.2.1. by the following formula: $F = (5\,000 \pm 50) \times i$

where:

F is given in N and i represents the number of seating positions of the seat for which the anchorages to be tested are to be approved; or, if requested by the manufacturer,
 - 2.2.2. in accordance with the representative loads measured during dynamic tests as described in appendix 1 to this Regulation.

*Appendix 3***MEASUREMENTS TO BE MADE**

1. All measurements necessary shall be made with measurement systems corresponding to the specifications of International Standard ISO 6487:1987 entitled 'Measurement techniques in impact tests: Instrumentation'.
2. Dynamic test
 - 2.1. Measurements to be made on the trolley

The characteristics of the deceleration or acceleration of the trolley shall be measured, from the decelerations or accelerations measured on the rigid frame of the trolley, with measurement systems with a CFC of 60.
 - 2.2. Measurements to be made on manikins

The readings of the measuring devices shall be recorded through independent data channels of the following CFC:

 - 2.2.1. Measurements in the head of the manikin

The resultant triaxial acceleration referring to the centre of gravity (γ_r) ⁽¹⁾ shall be measured with a CFC of 600.
 - 2.2.2. Measurements in the thorax of the manikin

The resultant acceleration at the centre of gravity shall be measured with a CFC of 180.
 - 2.2.3. Measurements in the femur of the manikin

The axial compression force shall be measured with a CFC of 600.

⁽¹⁾ Expressed in g (= 9,81 m/s²) the scalar value of which is calculated according to the following formula:

$$\gamma_r^2 = \gamma_l^2 + \gamma_v^2 + \gamma_t^2$$

where: γ_l = value of instant longitudinal acceleration;
 γ_v = value of instant vertical acceleration;
 γ_t = value of instant transversal acceleration.

*Appendix 4***DETERMINATION OF ACCEPTABILITY CRITERIA**

1. Head acceptability criterion (HAC)

- 1.1. This injury criterion (HAC) is calculated on the basis of the resultant triaxial acceleration measured according to appendix 3, paragraph 2.2.1 by the following expression:

$$HAC = (t_2 - t_1) \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} \gamma_r dt \right]^{2,5}$$

in which t_1 and t_2 are any values of time during the test, HAC being maximum value for and interval t_1 , t_2 . The values of t_1 and t_2 are expressed in seconds.

2. Thorax acceptability criterion (ThAC)

- 2.1. This criterion is determined by the absolute value of resultant acceleration, expressed in g and measured according to Appendix 3, paragraph 2.2.2, and by the acceleration period, expressed in ms.

3. Femur acceptability criterion (FAC)

This criterion is determined by the compression load expressed in kN, transmitted axially on each femur of the manikin and measured according to appendix 3, paragraph 2.2.3, and by the duration of the compression load, expressed in ms.

Appendix 5

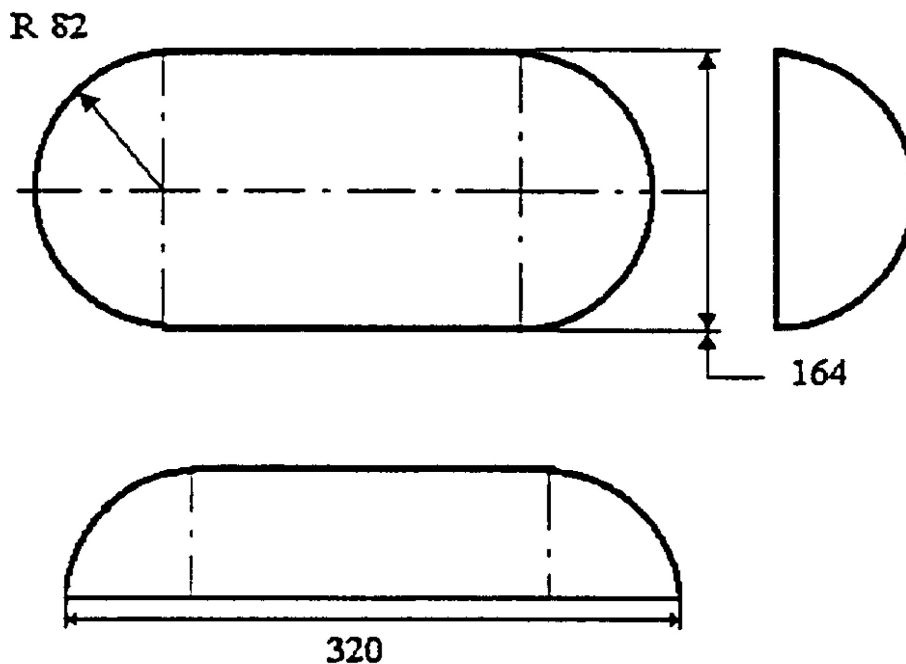
STATIC TEST REQUIREMENTS AND PROCEDURE

1. Requirements
 - 1.1. The requirements for seats tested according to this appendix are to determine:
 - 1.1.1. If the seat occupants are correctly retained by the seats in front of them;
 - 1.1.2. If the seat occupants are not seriously injured; and
 - 1.1.3. If the seat and the seat mountings are strong enough.
 - 1.2. The requirements of paragraph 1.1.1 above shall be considered satisfied if the maximum displacement of the central of application of each force prescribed in paragraph 2.2.1 measured in the horizontal plane and in the longitudinal median plane of the relevant seating position does not exceed 400 mm.
 - 1.3. The requirements of paragraph 1.1.2 above shall be considered satisfied if the following characteristics are met:
 - 1.3.1. The maximum displacement of the central point of application of each of the forces prescribed in paragraph 2.2.1, measured as described in paragraph 1.2, is not less than 100 mm;
 - 1.3.2. The maximum displacement of the central point of application of each of the forces prescribed in paragraph 2.2.2, measured as described in paragraph 1.2; is not less than 50 mm.
 - 1.3.3. All fittings forming part of the back of the seat or accessories thereto shall be such as to be unlikely to cause any bodily injury to a passenger during impact. This requirement shall be considered satisfied if any part contactable by a sphere 165 mm in diameter presents a radius of curvature of at least 5 mm.
 - 1.3.4. If any part of the fittings and accessories referred to above is made of a material of hardness less than 50 shore A on a rigid backing, the requirements set out in paragraph 1.3.3 above shall apply only to the rigid backing.
 - 1.3.5. The parts of the back of the seat such as adjustment devices for the seat and accessories shall not be subject to any requirements of paragraph 1.3.3 if in the position of rest they are situated below a horizontal plane 400 mm above the reference plane, even if the occupant might enter into contact with them.
 - 1.4. The requirements of paragraph 1.1.3 shall be considered satisfied if:
 - 1.4.1. No part of the seat, the seat mountings or the accessories becomes completely detached during the test;
 - 1.4.2. The seat remains firmly held, even if one or more anchorages is(are) partly detached, and all the locking systems remain locked during the whole duration of the test;
 - 1.4.3. After the test no structural part of the seat or accessories has any fracture or sharp or pointed edges or corners likely to cause any bodily injury.
2. Static tests
 - 2.1. Test apparatus
 - 2.1.1. This consists of cylindrical surfaces with a radius of curvature equal to 82 ± 3 mm and a width:
 - 2.1.1.1. at least equal to the width of the seat-back of each seating position of the seat to be tested for the upper form,
 - 2.1.1.2. equal to $320 - 0/+ 10$ mm for the lower form as shown in Figure 1 of this appendix.
 - 2.1.2. The surface resting against the parts of the seat shall be made of a material the hardness of which is not less than 80 Shore A.
 - 2.1.3. Each cylindrical surface shall be equipped with at least one force transducer able to measure the forces applied in the direction defined in paragraph 2.2.1.1.
 - 2.2. Test procedure
 - 2.2.1. A test force equal to $\frac{1\ 000}{H1} \pm 50$ N shall be applied using a device, conforming to paragraph 2.1 above, to the rear part of the seat corresponding to each seating position of the seat.

- 2.2.1.1. The direction of application of the force shall be situated in the vertical median plane of the seating position concerned; it shall be horizontal and from the rear towards the front of the seat.
- 2.2.1.2. This direction shall be situated at the height H1 which shall be between 0,70 m and 0,80 m and above the reference plane. The exact height shall be determined by the manufacturer.
- 2.2.2. A test force equal to $\frac{2\,000}{H2} \pm 100$ N shall be applied simultaneously to the rear part of the seat corresponding to each seating position of the seat in the same vertical plane and in the same direction at the height H2 which shall be between 0,45 and 0,55 m above the reference plane, with a device conforming to paragraph 2.1 above. The exact height shall be determined by the manufacturer.
- 2.2.3. The test form shall be maintained as far as possible in contact with the rear of the seat during the application of the forces specified in paragraphs 2.2.1 and 2.2.2 above. They shall be able to pivot in a horizontal plane.
- 2.2.4. Where a seat consists of more than one seating position, the forces corresponding to each seating position shall be applied simultaneously and there shall be as many upper and lower forms as seating positions.
- 2.2.5. The initial position of each seating position of each of the forms shall be determined by bringing the test devices into contact with the seat with a force equal to at least 20 N.
- 2.2.6. The forces indicated in paragraphs 2.2.1 and 2.2.2 above shall be applied as rapidly as possible and shall be maintained together at the specified value, whatever the deformation, for at least 0,2 seconds,
- 2.2.7. If the test has been carried out with one or more forces but not with all forces greater than those specified in paragraphs 2.2.1 and 2.2.2 above and if the seat complies with the requirements, the test shall be considered to be satisfied.

Figure 1

Static test apparatus



*Appendix 6***Energy absorption characteristics of the rear part of seat backs**

1. Elements of the rear part of seat backs situated in the reference zone, as defined in paragraph 2.21 of this Regulation, shall be verified at the request of the manufacturer according to the energy absorbing requirements set out in annex 4, to Regulation No 21. For this purpose, all accessories fitted shall be tested in all positions of use, except tables which shall be considered in the stowed position.
 2. This test shall be referred to in the communication form concerning the approval of a seat type conforming to the model in annex 1 to this Regulation. A drawing showing the area of the part of the seat back, verified by the energy dissipation test, shall be enclosed.
-

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 seat type or types with regard to its (their) strength pursuant to Regulation No 80

Approval No Extension No

1. Trade name or mark of the seat:
2. Seat Type:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Additional information:
 - 5.1. Brief description of the seat type, its attachment fittings and its adjustment, displacement and locking systems including the minimum distance between fitting points:
 - 5.2. Position and arrangement of seats:
 - 5.3. Seats, if any, which incorporate a safety belt anchorage:
 - 5.4. Energy absorption test of the rear part of the seat-back: yes/no ⁽²⁾
 - 5.5. Drawings showing the area of the rear part of the seat-back verified for energy dissipation:
 - 5.6. Seat approved in accordance with Paragraph 5.1 of this Regulation (dynamic test): yes/no ⁽²⁾
 - 5.6.1. Test 1 according to Appendix 1: yes/no ⁽²⁾:
 - 5.6.2. Test 2 according to Appendix 1: yes/no ⁽²⁾
 - 5.6.3. Description of the safety-belts and anchorages used for the purpose of Test 2:
 - 5.6.4. Type of auxiliary seat used for Test 2 (if different from the type of seat approved)
 - 5.7. Seat approved in accordance with paragraph 5.1 of this Regulation (static test): yes/no ⁽²⁾
 - 5.8. Test according to Appendix 5: yes/no ⁽²⁾
 - 5.9. Test according to Appendix 6: yes/no ⁽²⁾
6. Seat submitted for approval on:
7. Type of device: deceleration/acceleration ⁽²⁾
8. Technical service, responsible for the approval test:
9. Date of report issued by that service:
10. Number of report issued by that service:
11. Approval: granted/refused/extended/withdrawn ⁽²⁾:

12. Position of approval mark on the seat:
13. Place:
14. Date:
15. Signature:
16. The following documents, bearing the approval number shown above, are available on request:

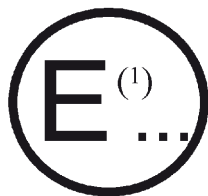
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

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: vehicle with regard to the strength of the seat anchorages pursuant to Regulation No 80

Approval No Extension No

1. Trade name or mark of the vehicle:
2. Vehicle Type:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Additional information:
- 5.1. Brief description of the vehicle type according to its anchorages and minimum value of the distance between the anchorages:
- 5.2. Make and type of type approved seats (if any):
- 5.3. For each row of seats: individual/bench, fixed/adjustable, fixed back/adjustable back, tipping back/inclining back ⁽²⁾:
- 5.4. Position and arrangement of seats (type approved seats and other seats):
- 5.5. Seats, if any, which incorporate a safety belt anchorages:
6. Vehicle submitted for approval on:
7. Technical service, responsible for the approval test:
8. Date of report issued by that service:
9. Number of report issued by that service:
10. Approval granted/refused/extended/withdrawn ⁽²⁾:
11. Location of approval mark on the vehicle:
12. Place:
13. Date:
14. Signature:
15. The following documents, bearing the approval number shown above, are available on request:

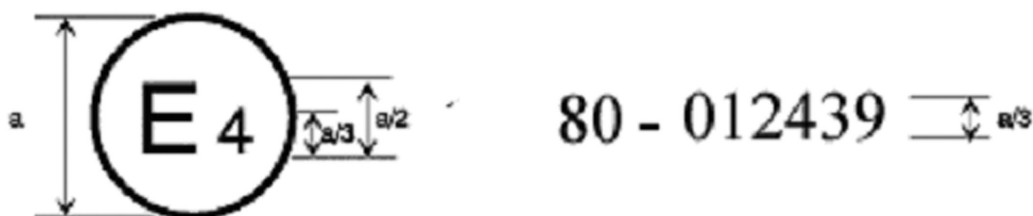
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

ANNEX 3

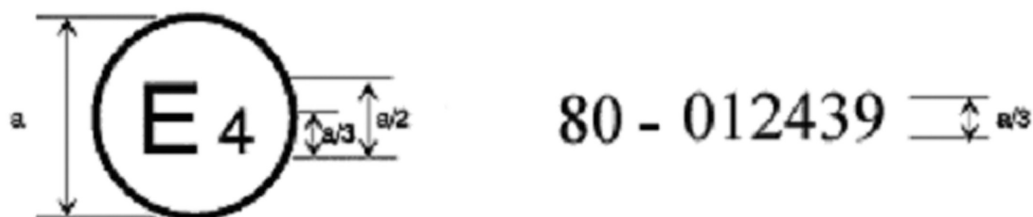
ARRANGEMENTS OF APPROVAL MARKS

1. Arrangement in the approval mark for a seat



The above approval mark affixed to a seat shows that the seat type concerned has, with regard to the strength of the seats, been approved in the Netherlands (E4) under number 012439. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No 80 as amended by the 01 series of amendments.

2. Arrangement of the approval mark for a vehicle type



The above approval mark, affixed to a vehicle, shows that this type of vehicle has been approved in the Netherlands (E4) under number 012439 with regard to the strength of the anchorages on the vehicle. The approval number indicates that the approval was granted in accordance with the requirements of Regulation No 80 as amended by the 01 series of amendments.

ANNEX 4

Procedure for determining the 'H' point and the actual torso angle for seating position 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 DH 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 DH 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 DH 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 the 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 DH 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 DH 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 DH 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 ° of the design torso angle;

3.2.3. If these conditions are met, the 'R' point and the design torso angle, shall be used to demonstrate compliance with the provisions of this Regulation;

3.2.4. If the 'H' point or the actual torso angle does not satisfy the requirements of 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 pre-conditioned at the manufacturer's discretion, at a temperature of 20 ± 10 °C to ensure that the seat material reaches room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for one minute to flex the cushion and back. At the manufacturer's request, all seat assemblies shall remain unloaded for a minimum period of 30/min. prior to installation of the 3 DH 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 DH 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 ⁽¹⁾ as the floor of the vehicle in which the seat is intended to be used;

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

- 4.5. Place the seat and back assembly of the 3 DH machine so that the centreplane of the occupant (C/LO) coincides with the centreplane of the 3 DH machine. At the manufacturer's request, the 3 DH machine may be moved inboard with respect to the C/LO if the 3 DH machine is located so far outboard that the seat edge will not permit levelling of the 3 DH 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 DH 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 DH machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3 DH 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 DH machine;
- 4.9. Tilt the back pan forward against the forward stop and draw the 3 DH machine away from the seat-back using the T-bar. Reposition the 3 DH machine on the seat by one of the following methods:
- 4.9.1. If the 3 DH machine tends to slide rearward, use the following procedure. Allow the 3 DH 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 DH machine does not tend to slide rearward, use the following procedure. Slide the 3 DH 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 DH 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/DH machine from sliding forward;
- 4.11. Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3 DH machine level;

- 4.12. Tilt the back pan forward to release the tension on the seat-back. Rock the 3 DH 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 DH machine and the seat;

During the rocking action, the T-bar of the 3 DH 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 DH machine to ensure that no inadvertent exterior loads are applied in a vertical or fore and aft direction;

The feet of the 3 DH 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 DH 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 DH machine's seat pan on the seat;

- 4.13. Holding the T-bar to prevent the 3 DH 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 DH machine. If another level adjustment of the 3 DH machine is necessary, rotate the back pan forward, re-level, and repeat the procedure from 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 DH machine with the probe in its fully rearward position;

- 4.15. If a re-run of the installation of the 3 DH machine is desired, the seat assembly should remain unloaded for a minimum period of 30 min prior to the re-run. The 3 DH 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 DH 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 (*)

(3 DH machine)

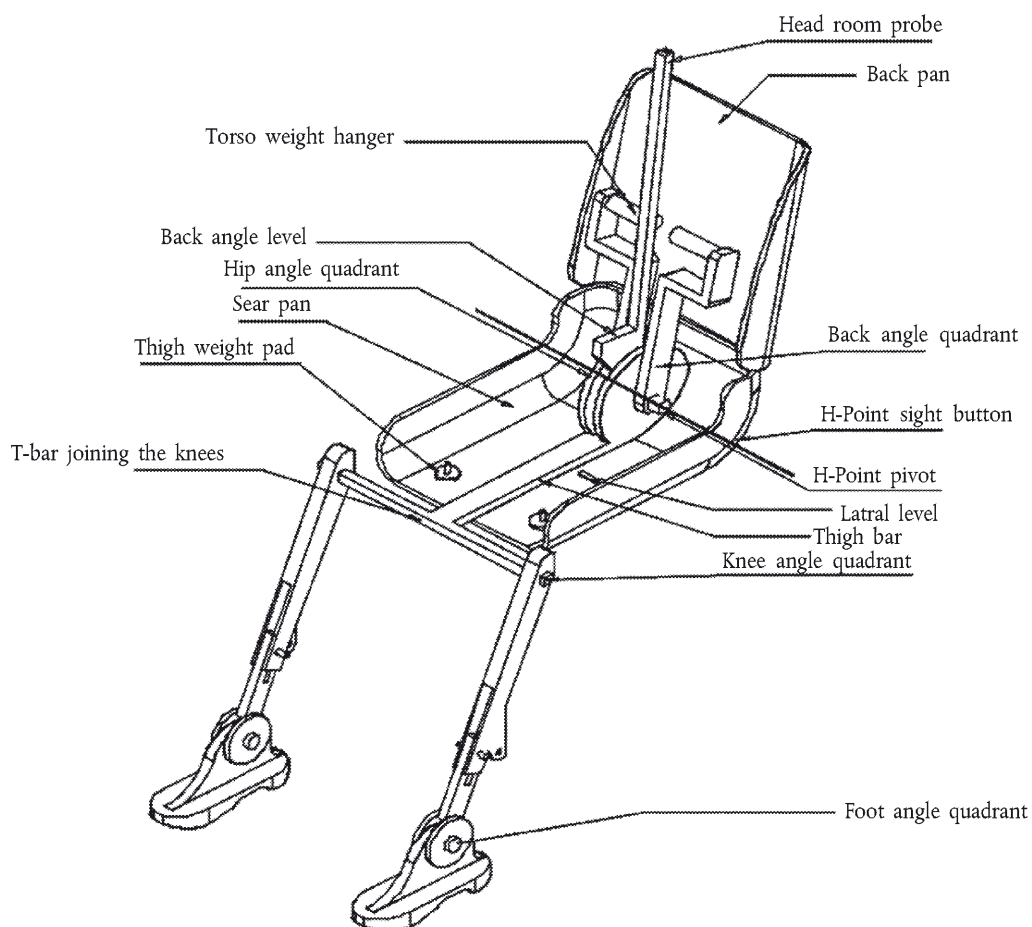
1. Back and seat pans

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

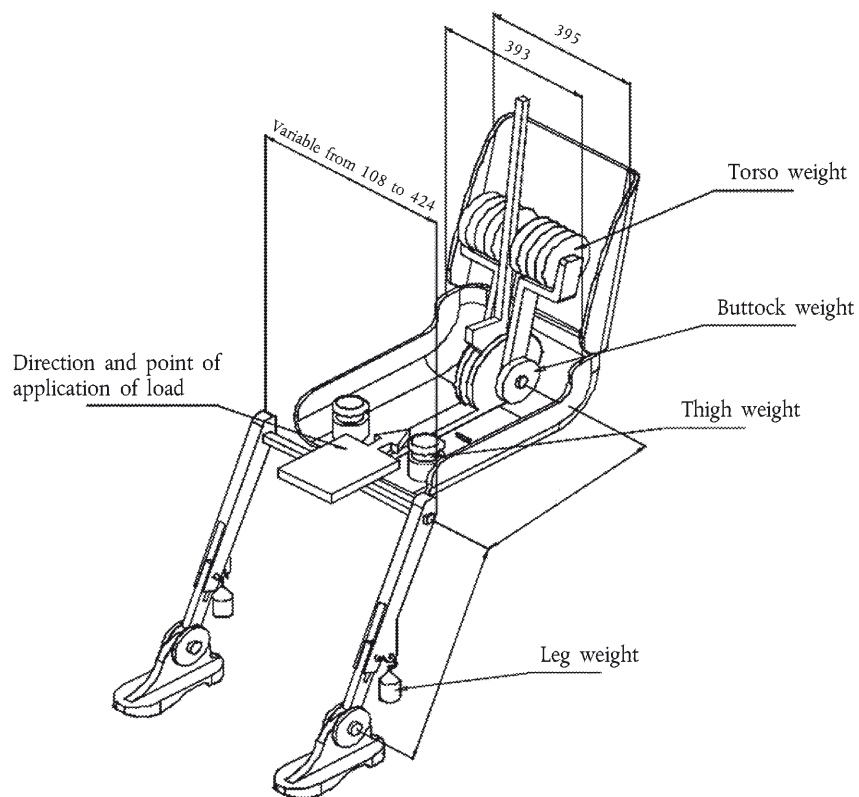
Lower leg segments are connected to the seat pan assembly at the T-bar joining the knees, which is a lateral extension of the adjustable thigh bar. Quadrants are incorporated in the lower leg segments to measure knee angles. Shoe and foot assemblies are calibrated to measure the foot angle. Two spirit 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 DH machine should be checked for free movement without encountering noticeable friction.

Figure 1

3 DH machine elements designation

(*) For details of the construction of the 3 DH 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

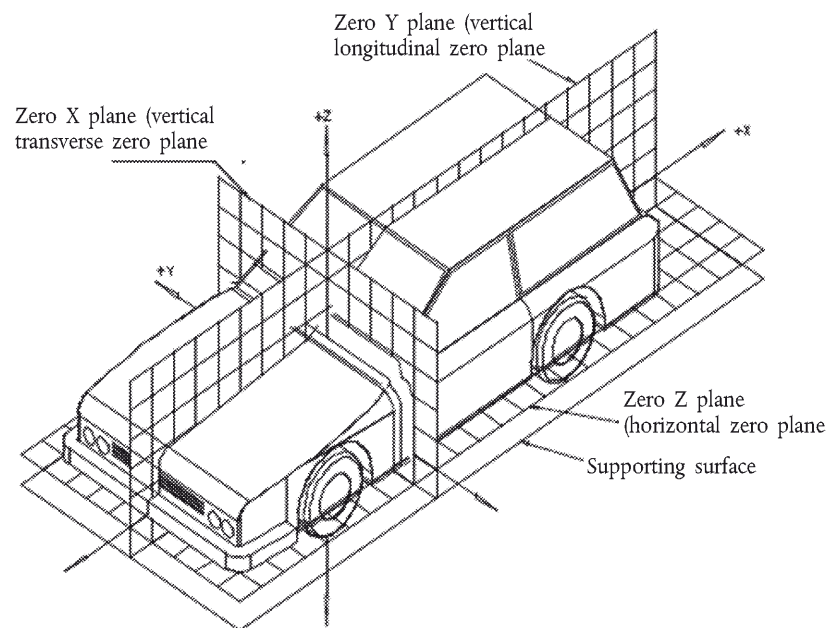
Dimensions of the 3 HD machine elements and load distribution

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) (*).
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

(*) 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 (*)

horizontal:

vertical:

angular:

torso angle:

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

(*) Strike out what does not apply.

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 87 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of daytime running lamps for power-driven vehicles

Incorporating all valid text up to:

Supplement 14 to the original version of the Regulation — Date of entry into force: 24 October 2009

Correction 1 to Revision 2 — Date of entry into force: 11 November 2009

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ANNEXES

Annex 1 — Communication concerning the approval or refusal or extension or withdrawal of approval or production definitely discontinued of a type of daytime running lamp, pursuant to Regulation No 87

Annex 2 — Example of arrangement of the approval mark

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1. SCOPE

This Regulation applies to daytime running lamps for vehicles of category L, M, N and T ⁽¹⁾.

2. DEFINITIONS

For the purpose of this Regulation:

⁽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. 'Daytime running lamp' means a lamp facing in a forward direction used to make the vehicle more easily visible when driving during daytime;
- 2.2. 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;
- 2.3. 'Daytime running lamps 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.);

A change of the colour of the filament lamp or the colour of any filter does not constitute a change of type.

- 2.4. 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.

3. APPLICATION FOR APPROVAL

- 3.1. The application for approval shall be transmitted by the holder of the trade name or mark or his duly accredited representative.

At the choice of the applicant, it will 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.

- 3.2. For each type of daytime running lamp, the application shall be accompanied by:
 - 3.2.1. drawings (three copies) in sufficient detail to permit identification of the type of the daytime running lamp and showing geometrically the position(s) in which the daytime running lamp 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; and the illuminating surface,
 - 3.2.2. 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.

- 3.2.3. two lamps.

4. MARKINGS

Daytime running lamps submitted for approval shall,

- 4.1. bear on the lens the trade name or mark of the applicant; this marking must be clearly legible and be indelible,
- 4.2. 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.

- 4.3. in the case of lamps with an electronic light source control gear 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.
- 4.4. provide adequate space for the approval mark and for the additional symbols prescribed in paragraph 5.2 below; the said space shall be shown in the drawings referred to in paragraph 3.2.1 above.
- 4.5. In the case of lamps with light source module(s), the light source module(s) shall bear:
 - 4.5.1. the trade name or mark of the applicant; this marking must be clearly legible and indelible;
 - 4.5.2. 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 5.2.1.1 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 3.2.1 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.
 - 4.5.3. the marking of the rated voltage and rated wattage.
- 4.6. Lamps operating at voltages other than the nominal rated voltages of 6 V, 12 V or 24 V respectively, by the application of an electronic light source control gear being not part of the lamp, must also bear a marking denoting the rated secondary design voltage.
- 4.7. An electronic light source control gear being part of the lamp but not included into the lamp body shall bear the name of the manufacturer and its identification number.

5. APPROVAL

5.1. General

- 5.1.1. If the two lamps which are submitted in pursuance of paragraph 3.2.3 above satisfy the requirements to this Regulation, approval shall be granted.
- 5.1.2. 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.
- 5.1.3. 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 type of lamp covered by this Regulation.
- 5.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of lamp pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation.

- 5.1.5. Every lamp conforming to a type approved under this Regulation shall bear, in the space referred to in paragraphs 4.4 above, an approval mark as described in paragraphs 5.2 and 5.3 below.
- 5.1.6. The mark and symbols mentioned in paragraph 5.2 shall be indelible and clearly legible even when the lamp is mounted on the vehicle.
- 5.2. Composition of the approval mark
- The approval mark shall consist of:
- 5.2.1. an international approval marking, comprising:
- 5.2.1.1. a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval⁽¹⁾,
- 5.2.1.2. an approval number,
- 5.2.2. the additional symbol 'RL'.
- 5.2.3. The two digits of the approval number which indicate the series of amendments in force at the time of issue of the approval, may be marked close to the above additional symbols.
- 5.3. Arrangement of the approval mark
- 5.3.1. Independent lamps
- Annex 2, Figure 1, to this Regulation gives an example of arrangement of the approval mark with the above-mentioned additional symbols.
- 5.3.2. Grouped, combined or reciprocally incorporated lamps
- 5.3.2.1. 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:
- 5.3.2.1.1. it is visible after their installation;
- 5.3.2.1.2. 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.
- 5.3.2.2. 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:

⁽¹⁾ 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.

- 5.3.2.2.1. either on the appropriate illuminating surface,
- 5.3.2.2.2. or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified.
- 5.3.2.3. 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.
- 5.3.2.4. 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.
- 5.3.2.5. Annex 2, Figure 2, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.
- 5.3.3. Lamps reciprocally incorporated with other lamps, of which the lens may also be used for other types of devices
The provisions laid down in paragraph 5.3.2 above are applicable.
- 5.3.3.1. 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 device, even if it cannot be separated from the lens, also comprises the space described in paragraph 4.4 above and bears the approval marks of the actual functions.
- If different types of devices comprise the same main body, the latter may bear the different approval marks.
- 5.3.3.2. Annex 2, Figure 3, to this Regulation gives examples of arrangements of approval marks relating to the above case.
6. GENERAL SPECIFICATIONS
- 6.1. Each lamp shall conform to the specifications set forth in the paragraphs below.
- 6.2. Daytime running lamps shall be so designed and constructed that in normal use, despite the vibration to which they may then be subjected, they continue to function satisfactorily and retain the characteristics prescribed by this Regulation.
- 6.3. In the case of light source modules, it shall be checked that:
- 6.3.1. 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.
- 6.3.2. The light source module(s) shall be tamperproof.

- 6.4. Light source module
- 6.4.1. The design of the light source module(s) shall be such that even in darkness the light source module(s) can be fitted in no other position, but the correct one.
- 6.4.2. The light source module(s) shall be tamperproof.
- 6.5. In the case of replaceable filament lamp(s):
- 6.5.1. 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.
- 6.5.2. The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one.
- 6.5.3. 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.
7. INTENSITY OF LIGHT
- 7.1. The luminous intensity of the light emitted by each lamp shall not be less than 400 cd in the axis of reference.
- 7.2. Outside the reference axis and within the angular fields defined in the arrangement diagram in Annex 6 to this Regulation, the intensity of the light emitted by each lamp must:
- 7.2.1. In each direction corresponding to the points in the table of standard light distribution reproduced in Annex 3 to this Regulation, be not less than the minimum specified in paragraph 7.1 above, multiplied by the percentage specified in the said table of the direction in question, and
- 7.2.2. not exceed 1 200 cd in any direction the lamp is visible.
- 7.3. Moreover, throughout the field defined in the diagram in Annex 6, the intensity of the light emitted must not be less than 1,0 cd.
- 7.4. In the case of a lamp containing more than one light source the lamp shall comply with the minimum intensity required when any one light source has failed and when all light sources are illuminated the maximum intensity shall not be exceeded.
- 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.
8. APPARENT SURFACE
- The area of the apparent surface in the direction of the axis of reference of the lamp shall be not less than 25 cm² and not more than 200 cm².
9. COLOUR OF LIGHT
- The colour of the light shall be white. It shall be measured under the conditions as prescribed in paragraph 10 below.
10. TEST PROCEDURE
- 10.1. All measurements, photometric and colorimetric, shall be made with a colourless standard filament lamp of the category prescribed for the device, the supply voltage being so regulated as to produce the reference luminous flux required for that category of lamp, when not supplied by an electronic light source control gear.

- 10.2. In the case of a system that uses an electronic light source control gear being part of the lamp ⁽¹⁾, all measurements, photometric and colorimetric, shall be made applying at the input terminals of the lamp a voltage of 6,75 V, 13,5 V or 28,0 V respectively.
- 10.3. In the case of a system that uses an electronic light source control gear not being part of the lamp the voltage declared by the manufacturer shall be applied to the input terminals of the lamp. The test laboratory shall require from the manufacturer the light source control gear needed to supply the light source and the applicable functions. The voltage to be applied to the lamp shall be noted in the communication form in Annex 1 of this Regulation.
- 10.4. For any lamp except those equipped with filament lamps, the luminous intensities, measured after one minute and after 30 minutes of operation, shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 minutes of operation by applying at each test point the ratio of luminous intensities measured at HV after one minute and after 30 minutes of operation.
- 10.5. The limits of the apparent surface in the direction of the reference axis of a light-signalling device shall be determined.
11. HEAT RESISTANCE TEST
- 11.1. The lamp must be subjected to a one-hour test of continuous operation following a warm-up period of 20 minutes. The ambient temperature shall be $23\text{ }^{\circ}\text{C} \pm 5^{\circ}$. The filament lamp used shall be a filament lamp of the category specified for the lamp, and shall be supplied with a current at a voltage such that it gives the specified average power at the corresponding test voltage. However, for lamps equipped with non-replaceable light sources (filament lamps and other), the test shall be made with the light sources present in the lamp, in accordance with paragraph 10.2 of this Regulation.
- 11.2. Where only the maximum power is specified, the test shall be carried out by regulating the voltage to obtain a power equal to 90 per cent of the specified power. The specified average or maximum power referred to above shall in all cases be chosen from the voltage range of 6, 12 or 24 V at which it reaches the highest value; for lamps equipped with non-replaceable light sources (filament lamps and other) the test conditions set in paragraph 10.2 of this Regulation shall be applied.
- 11.3. After the lamp has been stabilised at the ambient temperature, no distortion, deformation, cracking or colour modification shall be perceptible. In case of doubt the intensity of light according to paragraph 7 above shall be measured. At that measurement the values shall reach at least 90 per cent of the values obtained before the heat resistance test on the same device.
12. MODIFICATIONS OF A TYPE OF DAYTIME RUNNING LAMP AND EXTENSION OF APPROVAL
- 12.1. Every modification of the type of lamp shall be notified to the Administrative Departments which approved the type of lamp. The department may then either:
- 12.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the lamp still complies with the requirements; or
- 12.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 12.2. Confirmation or refusal of approval, specifying the alterations shall be communicated by the procedure specified in paragraph 5.1.4 above to the Parties to the Agreement applying this Regulation.

⁽¹⁾ 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, from the lamp body but supplied by the lamp manufacturer as part of the lamp system.

- 12.3. 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 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
13. 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:
- 13.1. 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, 7, 8 and 9 above.
- 13.2. The minimum requirements for conformity of production control procedures set forth in Annex 4 to this Regulation shall be complied with.
- 13.3. The minimum requirements for sampling by an inspector set forth in Annex 5 to this Regulation shall be complied with.
- 13.4. 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.
14. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 14.1. The approval granted in respect of a type of daytime running lamp pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a daytime running lamp bearing the approval mark does not conform to the type approved.
- 14.2. 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 model in Annex 1 to this Regulation.
15. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of daytime running 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 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
16. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Administrative Departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.
-

ANNEX I

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 daytime running lamp pursuant to Regulation No 87

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:
 By category of lamp:
 Number, category and kind of light source(s): ⁽³⁾
 Voltage and wattage:
 Application of an electronic light source control gear:
 (a) being part of the lamp yes/no ⁽²⁾
 (b) being not part of the lamp yes/no ⁽²⁾
 Input voltage supplied by an electronic light source control gear:
 Electronic light source control gear manufacturer and identification number (when the light source control gear is part of the lamp but is not included into the lamp body):
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 following documents, bearing the approval number shown above, are available on request:

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

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

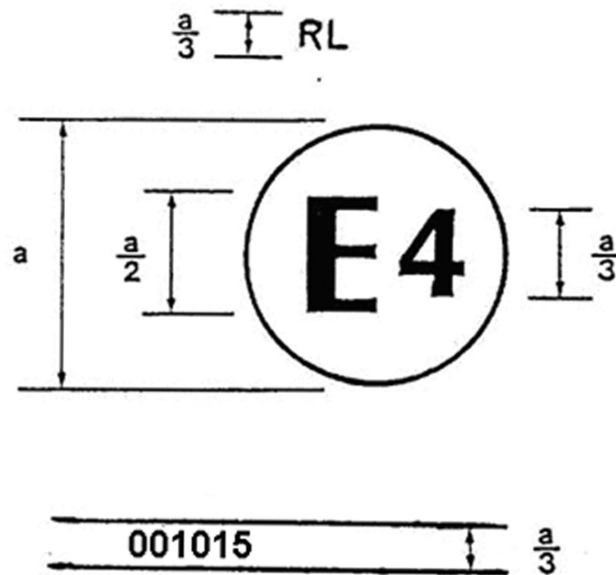
⁽²⁾ Strike out what does not apply.

⁽³⁾ For daytime running lamps with non-replaceable light sources indicate the number and total wattage of the light sources used.

ANNEX 2

EXAMPLE OF ARRANGEMENT OF THE APPROVAL MARK

Figure 1



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

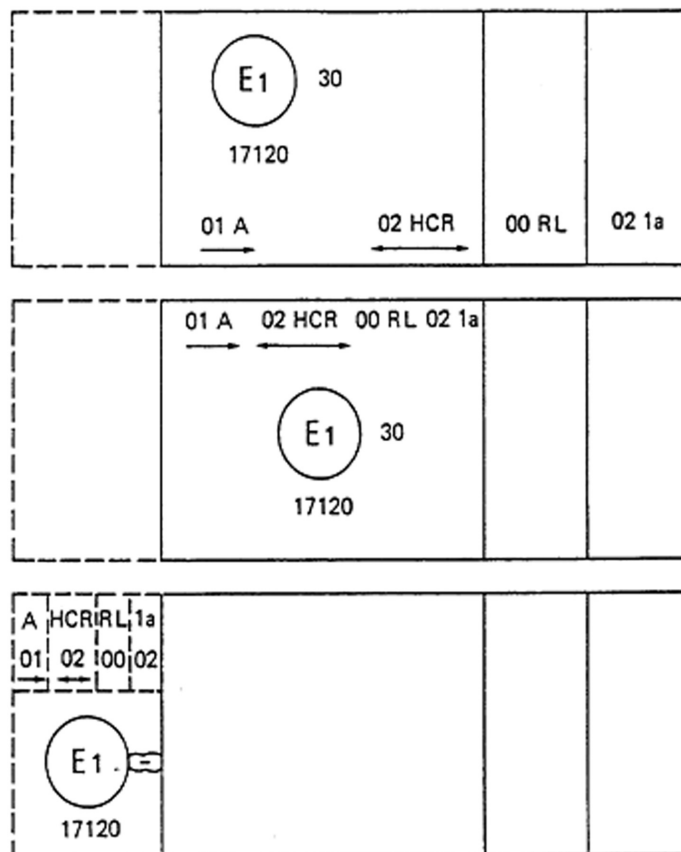
The daytime running lamp bearing the approval mark shown above has been approved in the Netherlands (E4) under number 001015. The approval number indicates that the approval was granted according to the requirements of this Regulation in its original (unamended) form.

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 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 lamps situated at the front of the vehicle

Figure 2

The vertical and horizontal lines schematise the shape of the lighting device. These are not part of the approval mark.



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;

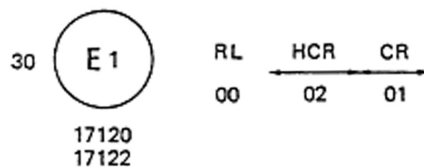
A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in accordance with the 02 series of amendments to Regulation No 8;

A daytime running lamp approved in accordance with Regulation No 87 in its original form;

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 3



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 02 series of amendments,

which is reciprocally incorporated with

a daytime running lamp approved in accordance with Regulation No 87 in its original form;

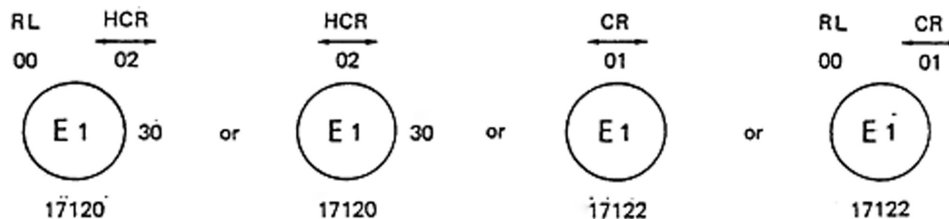
or: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No 1 as amended by 01 series of amendments,

which is reciprocally incorporated with

the same daytime running 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:



ANNEX 3

PHOTOMETRIC MEASUREMENTS

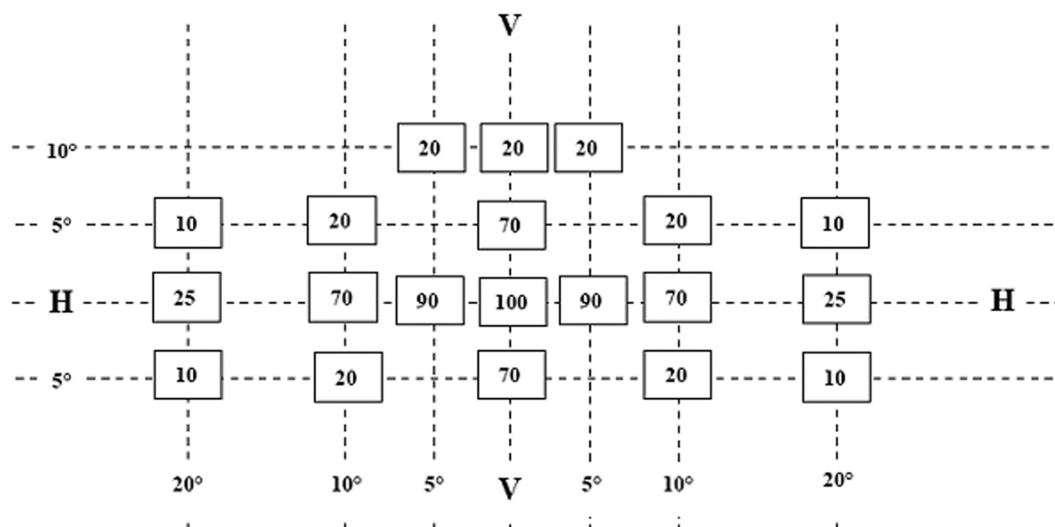
1. When photometric measurements are taken, stray reflections shall be avoided by appropriate masking.
2. In the event that the results of measurements are challenged, measurements shall be taken in such way as to meet the following requirements:
 - 2.1. the distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;
 - 2.2. the measuring equipment shall be such that the angle subtended by the receiver from the reference centre of the light is between 10' and 1°;
 - 2.3. the intensity requirement for a particular direction of observation shall be satisfied if the required intensity is obtained in a direction deviating by not more than one-quarter of a degree from the direction of observation.
3. In the case where the daytime running lamp 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 in the field of the reference axis specified by the manufacturer.
4. Photometric measurement of lamps

The photometric performance shall be checked:

 - 4.1. For non-replaceable light sources (filament lamps or other):

with the light sources present in the lamp, in accordance with paragraph 10 of this Regulation.
 - 4.2. 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.
 - 4.3. For any daytime running lamp except those equipped with filament lamp(s), the luminous intensities, measured after one minute and after 30 minutes of operation, shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 minutes of operation by applying at each test point the ratio of luminous intensities measured at HV after one minute and after 30 minutes of operation.
5. Table of standard light distribution



- 5.1. 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 table give, for the various directions of measurement, the minimum intensities as a percentage of the minimum required in the axis for each lamp (in the direction $H = 0^\circ$ and $V = 0^\circ$).
- 5.2. Within the field of light distribution of paragraph 3 above 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.

Figure 4

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

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 and equipped with a standard filament lamp, or when the lamps are equipped with non-replaceable light sources (filament lamps or other), and when all measurements are made at 6,75 V, 13,5 V or 28,0 V respectively:
 - 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 lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on lamps shall be repeated using another standard filament lamp.
- 1.3. The chromaticity coordinates shall be complied with when the lamp is equipped with a standard filament lamp, or for lamps equipped with non-replaceable light sources (filament lamps or other), when the colorimetric characteristics are verified with the light source present in the lamp.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of 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 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 lamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of 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 lamp shall be subjected to photometric measurements for the minimum values at the points listed in Annex 3 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 13.1 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 5 (first sampling) would be 0,95.

ANNEX 5

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 lamps shall not be contested if, when testing photometric performances of any lamp chosen at random and equipped with a standard filament lamp, or when the lamps are equipped with non-replaceable light sources (filament lamps or other), and when all measurements are made at 6,75 V, 13,5 V or 28,0 V respectively:
- 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 lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on lamps shall be repeated using another standard filament lamp.
- 1.2.3. Lamps with apparent defects are disregarded.
- 1.3. The chromaticity coordinates shall be complied with when the lamp is equipped with a standard filament lamp, or for lamps equipped with non-replaceable light sources (filament lamps or other), when the colorimetric characteristics are verified with the light source present in the lamp.

2. FIRST SAMPLING

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

2.1.1.1. sample A

A1:	one lamp	0 per cent
	one lamp not more than	20 per cent
A2:	both 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 lamps	0 per cent
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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 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 lamps are:

2.2.1.1. sample A

A3:	one lamp not more than	20 per cent
	one 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 lamp more than	0 per cent
	but not more than	20 per cent
	one lamp not more than	20 per cent
B3:	in the case of A2	
	one lamp	0 per cent
	one lamp 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 14 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the lamps are:

2.3.1. sample A

A4:	one lamp not more than	20 per cent
	one lamp more than	30 per cent
A5:	both lamps more than	20 per cent

2.3.2. sample B

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

B5:	in the case of A2	
	both lamps more than	20 per cent
B6:	in the case of A2	
	one lamp	0 per cent
	one lamp 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 lamps and fourth sample D of two lamps, 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 lamps shall not be contested if the deviations of the measured values of the lamps are:

3.1.1.1. sample C

C1:	one lamp	0 per cent
	one lamp not more than	20 per cent
C2:	both 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 lamps	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 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 lamps are:

3.2.1.1. sample D

D2:	in the case of C2	
	one lamp more than	0 per cent
	but not more than	20 per cent
	one lamp 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 lamps are:

3.3.1. sample C

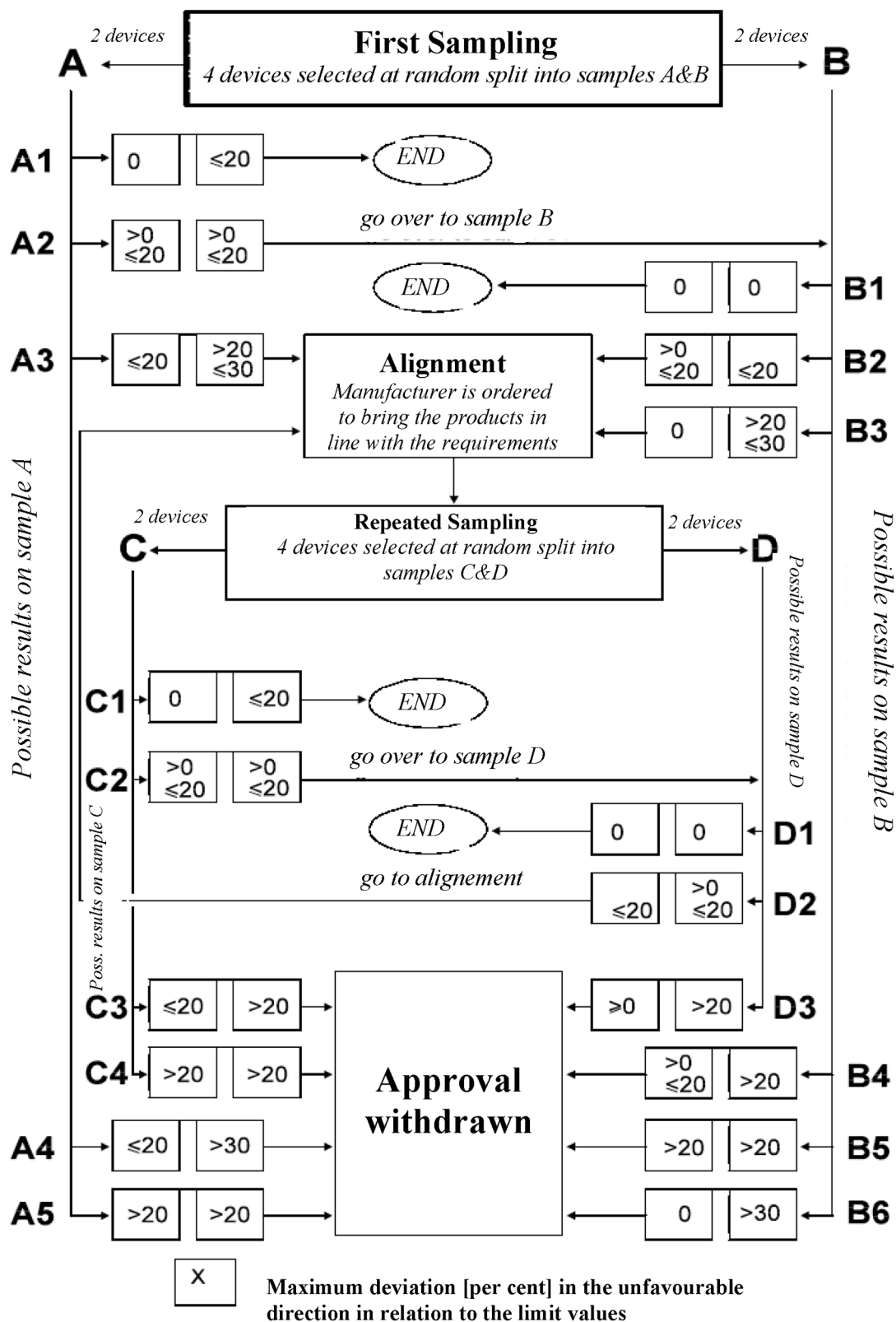
C3:	one lamp not more than	20 per cent
	one lamp more than	20 per cent
C4:	both lamps more than	20 per cent

3.3.2. sample D

D3:	in the case of C2	
	one lamp 0 or more than	0 per cent
	one lamp 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

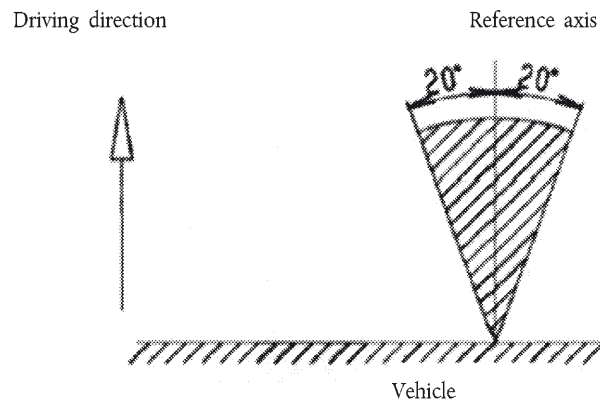


ANNEX 6

MINIMUM ANGLES REQUIRED FOR LIGHT DISTRIBUTION IN SPACE

In all cases, the minimum vertical angles of light distribution in space are 10° above and 5° below the horizontal for DRL devices included in the Regulation.

Minimum horizontal angles of light distribution in space:



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 91 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of side-marker lamps for motor vehicles and their trailers

Incorporating all valid text up to:

Supplement 11 to the original version of the Regulation — Date of entry into force: 15 October 2008

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1. SCOPE

This Regulation applies to side-marker lamps for vehicles of category M, N, O and T ⁽¹⁾.

⁽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. DEFINITIONS

2.1. The definitions given in Regulation No 48 and the series of amendments in force at the time of application for the type of approval shall apply to this Regulation.

2.2. 'Side-marker lamp' means a lamp used to indicate the presence of the vehicle when viewed from the side;

2.3. 'Side-marker lamps 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 (level of intensity, light distribution angles, category of filament lamp, light source module, etc.).

A change of the colour of the filament lamp or the colour of any filter does not constitute a change of type.

2.4. 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.

3. APPLICATION FOR APPROVAL

3.1. The application for approval shall be submitted by the holder of the trade name or mark or by his duly accredited representative.

At the choice of the applicant, it will 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. It shall specify:

3.1.1. whether the side-marker lamp is intended to emit amber or red light.

3.2. For each type of side-marker lamp the application shall be accompanied by:

3.2.1. Drawings in triplicate, sufficiently detailed to permit identification of the type of lamp and showing geometrically in what position(s) it 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 $V = 0^\circ$); the point to be taken as the centre of reference in the said tests; the vertical and horizontal tangents to the illuminating surface and their distances from the centre of reference of the lamp. The drawings shall show the position intended for the approval number and the additional symbols in relation to the circle of the approval mark.

3.2.2. 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.

3.2.3. Two samples; if the application is made for side-marker lamps which are not identical but are symmetrical and suitable for mounting one on the left and one on the right side of the vehicle and/or, alternatively, one towards the front and one towards the rear, 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 and/or, alternatively, only towards the front or only towards the rear.

4. MARKINGS

4.1. Side-marker lamps submitted for approval:

4.2. Must bear the trade name or mark of the applicant; this marking must be clearly legible and indelible;

4.3. With the exception of lamps with non-replaceable light sources must 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.

4.4. Must comprise a space of sufficient size for the approval marking and the additional symbols prescribed in paragraph 5.4 below; this space shall be shown in the drawings mentioned in paragraph 3.2.1 above;

4.5. In the case of lamps with non-replaceable light sources or light source module(s), shall bear the marking of rated voltage or the range of voltages, and the rated wattage.

4.6. In the case of lamps with light source module(s), the light source module(s) shall bear:

4.6.1. the trade name or mark of the applicant; this marking must be clearly legible and indelible;

4.6.2. 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 5.4.1.1 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 3.2.1 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.

4.6.3. the marking of the rated voltage (and rated wattage).

5. APPROVAL

5.1. If the two side-marker lamps submitted for approval pursuant to paragraph 3.2.3 above satisfy the provisions of this Regulation, approval shall be granted.

5.2. An approval number shall be assigned to each type approved. Its first two digits 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 type of side-marker lamp covered by this Regulation except in the case of the extension of the approval to a side-marker lamp differing only in the colour of the light emitted.

5.3. Notice of approval or of extension or of refusal of approval of a type of side-marker lamp shall be communicated to the Parties to the Agreement which apply this Regulation, by means of a form conforming to the model in Annex 2 to this Regulation.

5.4. Every side-marker lamp conforming to a type approved under this Regulation shall bear, in the space referred to in paragraph 4.4 above, and in addition to the markings prescribed in paragraphs 4.2 and 4.3 or 4.4 respectively:

- 5.4.1. an international approval mark consisting of:
 - 5.4.1.1. a circle surrounding the letter 'E' followed by distinguishing number of the country which has granted the approval ⁽¹⁾, and
 - 5.4.1.2. the approval number prescribed in paragraph 5.2 above.
- 5.4.2. The additional symbol 'SM1' or 'SM2'.
- 5.4.3. The two digits of the approval number which indicate the series of amendments in force on the date of issue of the approval may be marked close to the above additional symbol.
- 5.4.4. On devices with reduced light distribution in conformity to paragraph 2.5 in Annex 4 to this Regulation a vertical arrow starting from a horizontal segment and directed downwards.
- 5.5. The marks and symbols mentioned in paragraphs 5.4.1 to 5.4.3 above shall be indelible and clearly legible even when the device is mounted on the vehicle.
- 5.6. 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 such lamps are not grouped, combined or reciprocally incorporated with a lamp or lamps not satisfying any one of those Regulations.
 - 5.6.1. The approval mark shall consist of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval; an approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps provided that:
 - 5.6.1.1. It is visible after their installation;
 - 5.6.1.2. 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.
- 5.7. 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 approval shall be marked;
 - 5.7.1. either on the appropriate light-emitting surface, or
 - 5.7.2. in a group, in such a way that each lamp may be clearly identified (see three possible models in example 2 shown in Annex 3).

⁽¹⁾ 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.

- 5.8. 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 the approval was granted.
- 5.9. An approval number shall be assigned to each type approved. The same Contracting Party shall not assign the same number to another type of assembly covered by this Regulation.
- 5.10. Annex 3 to this Regulation gives examples of arrangements of approval marks for a single lamp (example 1) and for an assembly (example 2).
- 5.11. Lamps grouped with a type of headlamp of which the lens is also used for another type of headlamp. The provisions laid down in paragraphs 5.6 to 5.9 above are applicable.
- 5.11.1. However, if different types of headlamps or units of lamps including a headlamp comprise the same lens, the latter may bear the different approval marks relating to these types of headlamp or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, 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.
- 5.11.2. Annex 3 to this Regulation gives examples of approval marks relating to lamps which are grouped with a headlamp (example 3).
- 5.12. 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.
6. GENERAL SPECIFICATIONS
- 6.1. Each side-marker lamp submitted for approval shall conform to the specifications set out in paragraphs 7 and 8 of this Regulation.
- 6.2. Side-marker lamps shall be so designed and made 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.
- 6.3. In the case of light source modules, it shall be checked that:
- 6.3.1. 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.
- 6.3.2. The light source module(s) shall be tamperproof.
- 6.4. In the case of replaceable filament lamp(s):
- 6.4.1. 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.
- 6.4.2. The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one.
- 6.4.3. 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.

7. INTENSITY OF LIGHT EMITTED

7.1. The intensity of the light emitted by each of the two samples submitted shall be:

Side-marker lamp category		SM1	SM2
7.1.1. Minimum intensity	In the axis of reference	4,0 cd	0,6 cd
	Within the specified angular field, other than above	0,6 cd	0,6 cd
7.1.2. Maximum intensity	Within the specified angular field ⁽¹⁾	25,0 cd	25,0 cd
7.1.3. Angular field	Horizontal	± 45 deg.	± 30 deg.
	Vertical	± 10 deg.	± 10 deg.

7.1.4. In the case of a lamp containing more than one light source:

the lamp shall comply with the minimum intensity required when any one light source has failed;

when all light sources are illuminated the maximum intensity specified may not be exceeded.

All light sources which are connected in series are considered to be one light source.

7.2. Outside the reference axis and within the angular fields defined in the diagrams in Annex 1 to this Regulation, the intensity of the light emitted by each of the two side-marker lamps supplied must:

7.2.1. In each direction corresponding to the points in the light distribution table reproduced in Annex 4 to this Regulation, be not less than the product of the minimum specified in paragraph 7.1 above by the percentage specified in the said table for the direction in question;

7.2.2. In no direction within the space from which the side-marker lamp is visible, exceed the maximum specified in paragraph 7.1 above;

7.2.3. The provisions of paragraph 2.2 of Annex 4 to this Regulation on local variations of intensity must be observed.

7.3. Annex 4, to which reference is made in paragraph 7.2.1 above, gives particulars of the measurement methods to be used.

8. COLOUR OF LIGHT EMITTED

8.1. The side-marker lamp must emit amber light; however it can emit red, if the rearmost side-marker lamp is grouped or combined or reciprocally incorporated with the rear position lamp, the rear end-outline marker lamp, the rear fog lamp, the stop lamp, or is grouped with or has part of the light emitting surface in common with the rear retro-reflector.

8.2. The colour of the light emitted inside the field of the light distribution grid defined at paragraph 2 of Annex 4 must be within the limits of the trichromatic coordinates prescribed for the colour in question when measured in accordance with Annex 5 to this Regulation. Outside this field no sharp variation of colour shall be observed.

9. TEST PROCEDURE

9.1. Measurements shall be carried out with a colourless standard filament lamp of the type recommended for the side-marker lamp and so regulated as to produce the reference luminous flux prescribed for this type of lamp, taking into account the provisions of paragraph 9.2 below.

⁽¹⁾ In addition, for red side-marker lamp, in the angular field from 60° to 90° in horizontal direction and ± 20° in vertical direction towards the front of the vehicle, the maximum intensity is limited to 0,25 cd.

- 9.2. All measurements on lamps equipped with non-replaceable light sources (filament lamps and other) shall be made at 6,75 V, 13,5 V or 28,0 V respectively.

In the case of light sources supplied by a special power supply, the above test voltages shall be applied to the input terminals of that power supply. The test laboratory may require from the manufacturer the special power supply needed to supply the light sources.

- 9.3. The limits of the apparent surface in the direction of the reference axis of a light-signalling device shall be determined.

10. MODIFICATION OF SIDE-MARKER LAMP TYPE AND EXTENSION OF APPROVAL

- 10.1. Any modification of a side-marker lamp type shall be notified to the administration authority which approved the lamp. The authority may then either:

- 10.1.1. consider that the modifications are unlikely to have an appreciable adverse effect and that, in any case, the side-maker lamp still meets the requirements; or

- 10.1.2. require a further test report from the technical service responsible for conducting the tests.

- 10.2. 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.

- 10.3. 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 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

11. 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:

- 11.1. Any side-marker lamp approved according to this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 7 and 8 above.

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

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

- 11.4. 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.

12. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 12.1. The approval granted in respect of a side-marker lamp may be withdrawn if the foregoing conditions are not satisfied.

- 12.2. 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 model in Annex 2 to this Regulation.

13. PRODUCTION DEFINITELY DISCONTINUED

If the holder of an approval completely ceases to manufacture a side-marker 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 the other Parties to the Agreement applying this Regulation, by means of a communication form conforming to the model in Annex 2 to this Regulation.

14. 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 communication forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

15. TRANSITIONAL PROVISIONS

15.1. As from the official date of entry into force of Supplement 3 to the Regulation, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by Supplement 3.

15.2. As from 24 months after the date of entry into force of Supplement 3 to the Regulation, Contracting Parties applying this Regulation shall grant ECE approvals only if the type of side-marker lamp to be approved meets the requirements of this Regulation as amended by Supplement 3.

15.3. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to this Regulation in its original form and the subsequent supplements.

15.4. Contracting Parties applying this Regulation shall continue to grant approvals to those types of side-marker lamps which comply with the requirements of this Regulation in its original form and the subsequent supplements during the 12 months period which follows the date of entry into force of Supplement 3 to this Regulation.

15.5. 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 this Regulation in its original form and the subsequent supplements granted subsequently, shall remain valid indefinitely. When the type of side-marker lamp approved to this Regulation in its original form and the subsequent supplements meets the requirements of this Regulation as amended by Supplement 3, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.

15.6. No Contracting Party applying this Regulation shall refuse a type of side-marker lamp approved to Supplement 3 to this Regulation.

15.7. Until 36 months after the date of entry into force of Supplement 3 to this Regulation, no Contracting Party applying this Regulation shall refuse a type of side-marker lamp approved to the this Regulation in its original form and the subsequent supplements.

15.8. Starting 36 months after the date of entry into force of Supplement 3 to this Regulation, Contracting Parties applying this Regulation may refuse the sale of a type of side-marker lamp which does not meet the requirements of Supplement 3 to this Regulation unless the side-marker lamp is intended as a replacement for fitting on vehicles in use.

15.9. Contracting Parties applying this Regulation shall continue to issue approvals for side-marker lamps on the basis of any previous supplement to the Regulation, provided that these side-marker lamps are intended as replacements for fitting to vehicles in use.

15.10. As from the official date of entry into force of Supplement 3 to the Regulation, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of a side-marker lamp approved under this Regulation as amended by Supplement 3 to this Regulation.

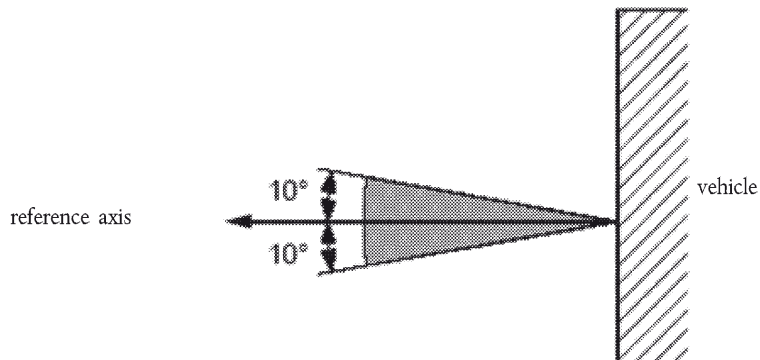
15.11. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of a side-marker lamp approved to this Regulation in its original form and the subsequent supplements during the 48 months period which follows the date of entry into force of Supplement 3 to the 00 series of amendments.

- 15.12. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 3 to this Regulation, Contracting Parties applying this Regulation may prohibit the fitting of a side-marker lamp which does not meet the requirements of this Regulation as amended by Supplement 3 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 3.
 - 15.13. 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 side-marker lamp which does not meet the requirements of this Regulation as amended by Supplement 3 on a new vehicle first registered more than 60 months after the date of entry into force of Supplement 3 to this Regulation.
-

ANNEX 1

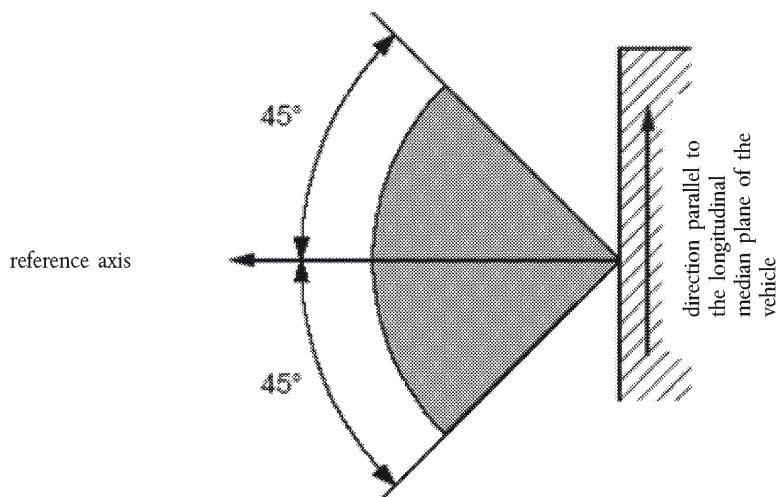
MINIMUM ANGLES REQUIRED FOR LIGHT DISTRIBUTION IN SPACE

Minimum vertical angles, SM1 and SM2:

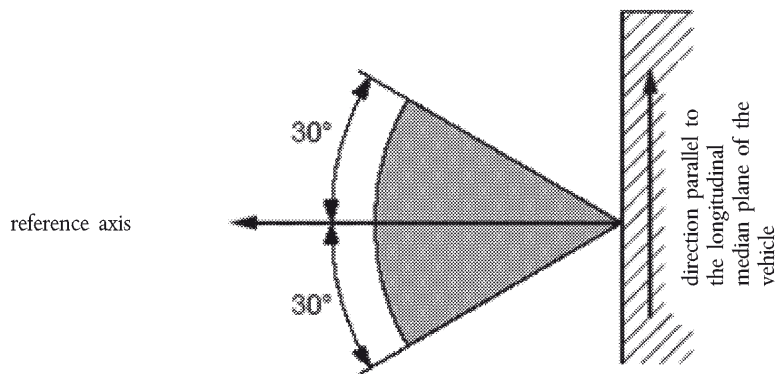


The angle of 10° below the horizontal may be reduced to 5° in case of lamps with a mounting height of equal to or less than 750 mm above the ground.

Minimum horizontal angles, SM1:



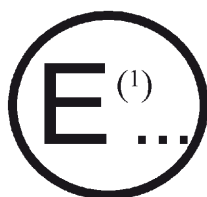
Minimum horizontal angles, SM2:



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 side-marker lamp marked SM1/SM2 ⁽²⁾ pursuant to Regulation No 91

Approval No Extension No

1. Trade name or mark of the side-marker lamp:
2. manufacturer's name for the type of side-marker lamp:
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 ⁽³⁾:
 Colour of light emitted: amber/red ⁽²⁾
 Number and category(ies) of filament lamp(s):
 Light source module: yes/no ⁽²⁾
 Light source module specific identification code:
 Geometrical conditions of installation and relating variations, if any:
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).

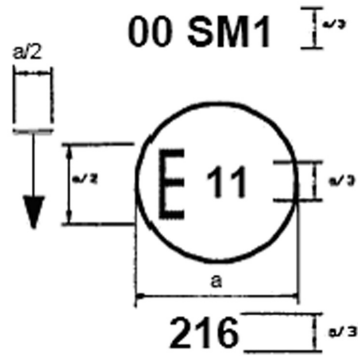
⁽²⁾ Strike out what does not apply.

⁽³⁾ For lamps with non-replaceable light sources indicate the number and the total wattage of the light sources.

ANNEX 3

ARRANGEMENTS OF APPROVAL MARKS

Example 1(a)

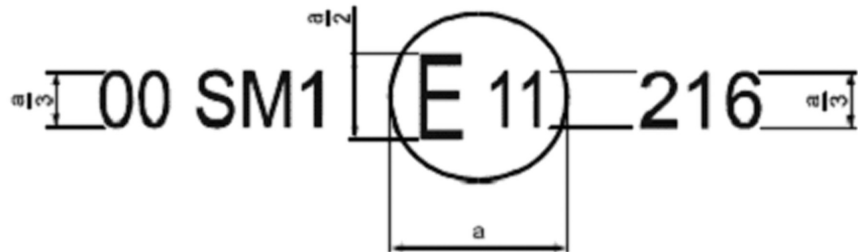


a = 5 mm min.

The device bearing the approval mark shown above is a side-marker lamp, approved in the United Kingdom (E11) pursuant to Regulation No 91 under the number 216. 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.

Note: The number mentioned close to the symbol ‘SM1’ indicates that the approval was granted in accordance with the requirements of this Regulation in its original form.

Example 1(b)



a = 5 mm min.

Example 2

Simplified marking for an assembly of several lamps that are part of the same unit

MODEL A

	3333 E1	IA 02	2a 01	A 01	SM1 00
		F 01	AR 01	S1 01	IA 02

MODEL B

		IA 2a A SM1 02 01 01 00 F AR S1 IA 01 01 01 02 3333		
				

MODEL C

IA 02	2a 01	A 01	SM1 00
F 01	AR 01	S1 01	IA 02

3333

E₁

Note: The three examples of approval mark, models A, B, and C represent three possible variants of marking of a light-signalling device when two or more lamps are part of the same unit of grouped, combined or reciprocally incorporated lamps.

The approval mark shows that the device was approved in the Netherlands (E4) under 3333 and comprises:

A rear and a side retro-reflector of a class IA approved in accordance with Regulation No 3, 02 series of amendments;

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

A rear position lamp (R) approved in accordance with Regulation No 7, 01 series of amendments;

A rear fog lamp (F) approved in accordance with Regulation No 38, 01 series of amendments;

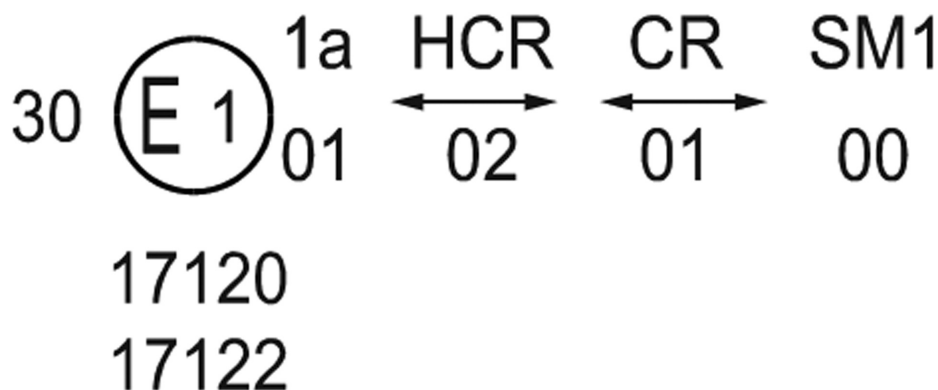
A reversing lamp (AR) approved in accordance with Regulation No 23, 01 series of amendments;

A stop lamp (S1) approved in accordance with Regulation No 7, 01 series of amendments;

A side-marker lamp (SM1) approved in conformity with the present Regulation in its original form.

Lamp reciprocally incorporated as grouped with a headlamp

Example 3



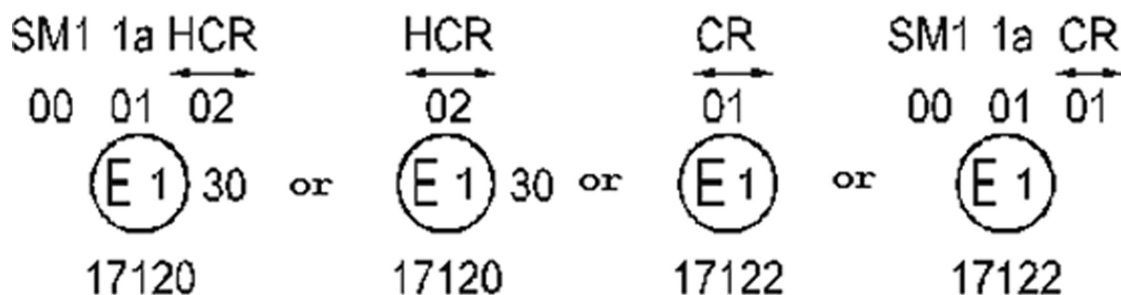
The above example corresponds to the marking of a lens intended to be used in different types of headlamps, namely:

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 02 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 and grouped with a side-marker lamp in accordance with this Regulation in the original form,

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 and the same side-marker 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:



Example 4

Light source modules

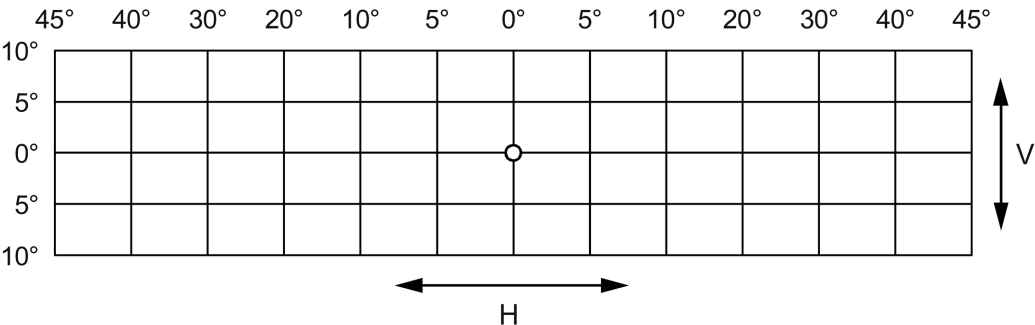
MD E3 17325

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

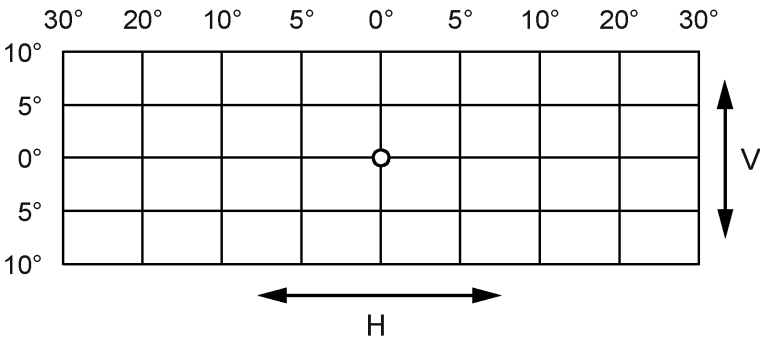
PHOTOMETRIC MEASUREMENTS

1. Measurement methods
- 1.1. During photometric measurement 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 lamp is comprised between 10 minutes 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.
- 1.4. The direction $H = 0^\circ$ and $V = 0^\circ$ corresponds to the reference axis. (On the vehicle it is horizontal, perpendicular to the median longitudinal plane of the vehicle and oriented in the required direction of visibility.) It passes through the centre of reference.
2. Tables of light distribution
- 2.1. SM1 category of side-marker lamps



- 2.1.1. Minimum values:
- 0,6 cd at any point other than the reference axis, at which it shall be 4,0 cd.
- 2.1.2. Maximum values:
- 25,0 cd at any point

- 2.2. SM2 category of side-marker lamps



2.2.1. Minimum values:

0,6 cd, at any point

2.2.2. Maximum values:

25,0 cd, at any point

2.3. For SM1 and SM2 category of side-marker lamps it may be sufficient to check only five points selected by the test authority.

2.4. Within the field of light distribution shown above as a grid the light pattern should be substantially uniform, i.e. the light intensity in every direction within a part of the field formed by the grid lines shall meet at least the lowest minimum value applicable to the respective grid lines.

2.5. However, in the case where the 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.

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 paragraph 9.2 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 signalling lamp except those equipped with filament lamp(s), the luminous intensities, measured after one minute and after 30 minutes of operation, shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 minutes of operation by applying at each test point the ratio of luminous intensities measured at HV after one minute and after 30 minutes of operation.

ANNEX 5

Colour of light emitted: lights for chromaticity coordinates

For checking the colorimetric characteristics, a source of light at a colour temperature of 2 856 K, corresponding to illuminant A of the International Commission on Illumination (CIE), shall be used. 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 paragraph 9.2 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 side-marker lamps shall not be contested if, when testing photometric performances of any side-marker lamp chosen at random and equipped with a standard filament lamp, or when the side-marker lamps are equipped with non-replaceable light sources (filament lamps or other), and when all measurements are made at 6,75 V, 13,5 V or 28,0 V respectively:
 - 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 side-marker lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on side-marker lamps shall be repeated using another standard filament lamp.
- 1.3. The chromaticity coordinates shall be complied with when the side-marker lamp is equipped with a standard filament lamp, or for side-marker lamps equipped with non-replaceable light sources (filament lamps or other), when the colorimetric characteristics are verified with the light source present in the side-marker lamp.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of side-marker 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 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 side-marker lamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of side-marker 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 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 11.1 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 performance, the conformity of mass-produced side-marker lamps shall not be contested if, when testing photometric performances of any side-marker lamp chosen at random and equipped with a standard filament lamp, or when the side-marker lamps are equipped with non-replaceable light sources (filament lamps or other), and when all measurements are made at 6,75 V, 13,5 V or 28,0 V respectively:
 - 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 side-marker lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on side-marker lamps shall be repeated using another standard filament lamp.
 - 1.2.3. Side-marker lamps with apparent defects are disregarded.
- 1.3. The chromaticity coordinates shall be complied with when the side-marker lamp is equipped with a standard filament lamp, or for the side-marker lamps equipped with non-replaceable light sources (filament lamps or other), when the colorimetric characteristics are verified with the light source present in the side-marker lamp.

2. FIRST SAMPLING

In the first sampling four side-marker lamps 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 side-marker lamps shall not be contested if the deviations of the measured values of the side-marker lamps in the unfavourable directions are:

2.1.1.1. sample A

A1: one side-marker lamp	0 per cent
one side-marker lamp not more than	20 per cent
A2: both side-marker 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 side-marker lamps	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 side-marker 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 side-marker lamps are:

2.2.1.1. sample A

A3: one side-marker lamp not more than	20 per cent
one side-marker 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 side-marker lamp more than	0 per cent
but not more than	20 per cent
one side-marker lamp not more than	20 per cent
B3: in the case of A2	
one side-marker lamp	0 per cent
one side-marker lamp 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 12 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the side-marker lamps are:

2.3.1. sample A

A4: one side-marker lamp not more than	20 per cent
one side-marker lamp more than	30 per cent
A5: both side-marker lamps more than	20 per cent

2.3.2. sample B

B4: in the case of A2	
one side-marker lamp more than	0 per cent
but not more than	20 per cent
one side-marker lamp more than	20 per cent
B5: in the case of A2	
both side-marker lamps more than	20 per cent
B6: in the case of A2	
one side-marker lamp	0 per cent
one side-marker lamp 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 side-marker lamps and fourth sample D of two side-marker lamps, 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 side-marker lamps shall not be contested if the deviations of the measured values of the side-marker lamps are:

3.1.1.1. sample C

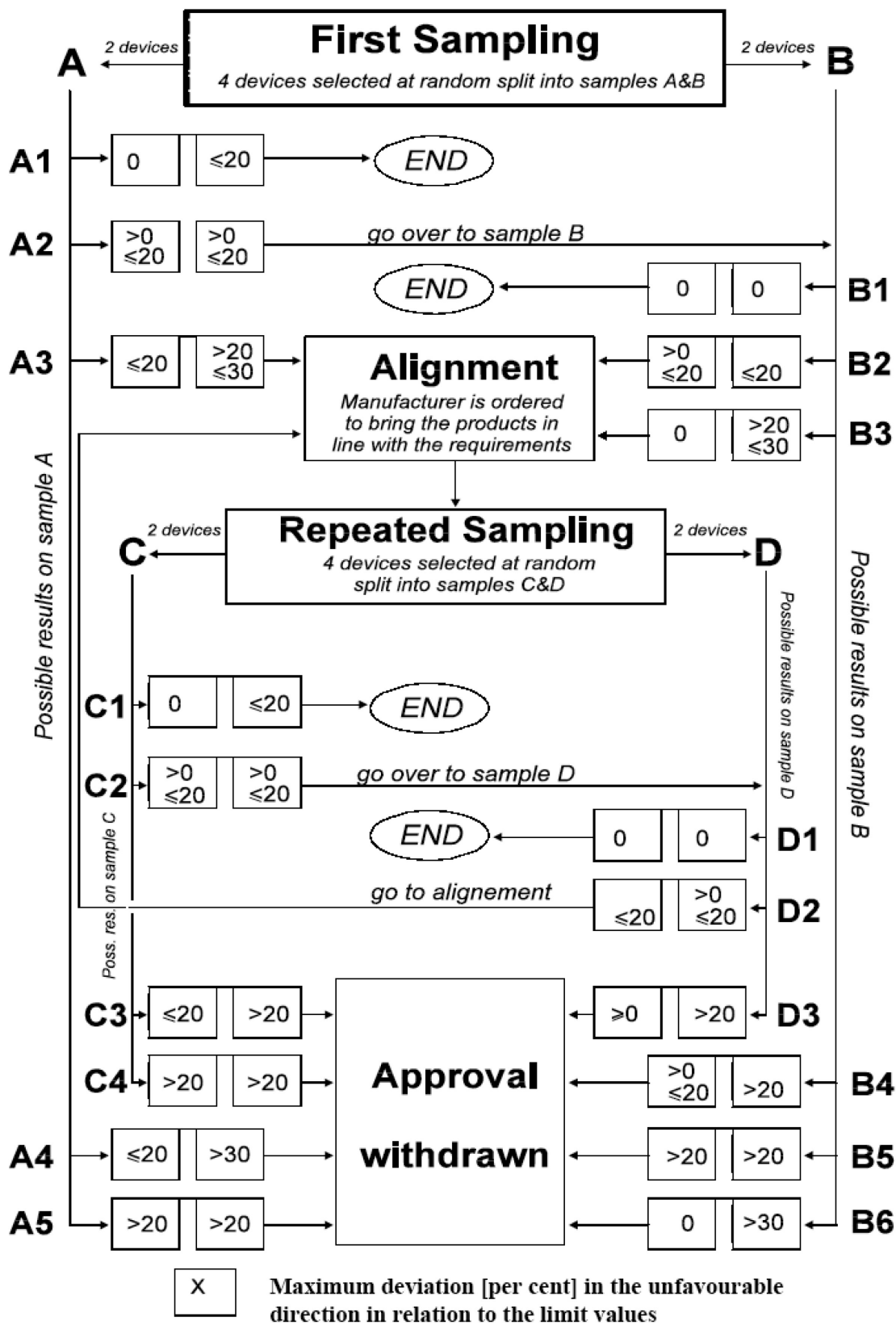
C1: one side-marker lamp	0 per cent
one side-marker lamp not more than	20 per cent
C2: both side-marker lamps more than	0 per cent
but not more than	20 per cent
go to sample D	

3.1.1.2. sample D

D1: in the case of C2	
both side-marker lamps	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 side-marker 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 side-marker lamps are:
- 3.2.1.1. sample D
- | | |
|------------------------------------|-------------|
| D2: in the case of C2 | |
| one side-marker lamp more than | 0 per cent |
| but not more than | 20 per cent |
| one side-marker lamp 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 12 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the side-marker lamps are:
- 3.3.1. sample C
- | | |
|--|-------------|
| C3: one side-marker lamp not more than | 20 per cent |
| one side-marker lamp more than | 20 per cent |
| C4: both side-marker lamps more than | 20 per cent |
- 3.3.2. sample D
- | | |
|-------------------------------------|-------------|
| D3: in the case of C2 | |
| one side-marker lamp 0 or more than | 0 per cent |
| one side-marker lamp 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/wp29fdocsts.html>

Regulation No 98 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor vehicle headlamps equipped with gas-discharge light sources

Incorporating all valid text up to:

Supplement 13 to the original version of the Regulation — Date of entry into force: 19 August 2010

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Annex 3 — Measuring screens

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Appendix 1 — Chronological order of approval tests

Appendix 2 — Method of measurement of the diffusion and transmission of light

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Annex 6 — Centre of reference

Annex 7 — Voltage markings

Annex 8 — Minimum requirements for conformity of production control procedures

Annex 9 — Minimum requirements for sampling by an inspector

Annex 10 — Instrumental verification of the 'cut-off' for passing beam headlamps

Annex 11 — Requirements for LED modules and headlamps including LED modules

A. ADMINISTRATIVE PROVISIONS

0. SCOPE ⁽¹⁾

This Regulation applies to:

(a) headlamps; and

(b) distributed lighting systems;

utilising gas-discharge light sources, for vehicles of categories, M, N and L₃.

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 headlamp (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. 'Ballast' means the electrical supply of the gas-discharge light source. This ballast may be partly or completely inside or outside the headlamp;

1.5. 'Matched pair' means the set of lamps of the same function on the left- and right-hand side of the vehicle;

1.6. Headlamps of different 'types' are headlamps which differ in such essential respects as:

1.6.1. the trade name or mark;

1.6.2. the characteristics of the optical system;

⁽¹⁾ Nothing in this Regulation shall prevent a Contracting Party to the Agreement applying this Regulation from prohibiting the combination of a headlamp approved 'PL' (Plastic Lens) under this Regulation with a mechanical headlamp-cleaning device (i.e. with wipers) on vehicles which it registers.

- 1.6.3. the inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation;
- 1.6.4. suitability for right-hand or left-hand or for both traffic systems;
- 1.6.5. the kind of beam produced (passing beam or driving beam or both);
- 1.6.6. the materials constituting the lenses and coating, if any;
- 1.6.7. However, a device intended for the installation on the left side of the vehicle and the corresponding device intended for the installation on the right side of the vehicle shall be considered to be of the same type.
- 1.7. References made in this Regulation to standard (étalon) filament lamp(s) and gas-discharge light source(s) shall refer to Regulations No 37 and No 99 respectively, and to their series of amendments in force at the time of application for type approval.

2. APPLICATION FOR APPROVAL OF A HEADLAMP ⁽¹⁾

- 2.1. The application for approval shall be submitted by the owner of the trade name or mark of the headlamp or by his duly accredited representative. It shall specify:
 - 2.1.1. whether the headlamp is intended to provide a passing beam, a driving beam or both;
 - 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;
 - 2.1.4. the maximum vertical angles above and below the nominal position(s) which the aiming device can achieve;
 - 2.1.5. which light sources are energised when the various beam combinations are used;
 - 2.1.6. whether a distributed lighting system is used and which type(s) of beam(s) is (are) intended to be provided by this system;
 - 2.1.7. the category of light source as listed in Regulations No 37 or No 99 and their series of amendments in force at the time of application for type approval.

For a distributed lighting system using a non-replaceable gas-discharge light source not approved under Regulation No 99, the part number assigned by the light-generator manufacturer to the light-generator.

- 2.2. Every application shall be accompanied by:

⁽¹⁾ For gas-discharge light sources see Regulation No 99.

2.2.1. drawings in triplicate in sufficient detail to permit identification of the type (see paragraphs 3.2 and 4.2 below). The drawings must show the position intended for the approval number and the additional symbols in relation to the circle of the approval mark, in case of LED module(s) also the space reserved for the specific identification code(s) of the module(s), and must show the headlamp in vertical (axial) section and in front elevation, with main details of the optical design including the flutings, if applicable.

2.2.2. A brief technical specification including, where it applies, the make and type of the ballast(s) and, in the case where the headlamp is used to produce bend lighting, the extreme positions according to paragraph 6.2.7 below. In the case of LED module(s) this shall include:

(a) a brief technical specification of the LED module(s);

(b) a drawing with dimensions and the basic electrical and photometric values and the objective luminous flux.

In addition, for a distributed lighting system, 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 5.8 of this Regulation.

2.2.3. Samples, as follows:

2.2.3.1. for approval of a headlamp, two samples of each type of headlamp, 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, with standard gas-discharge light source and one ballast of each type to be used, where applicable.

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.

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

2.2.4.1. fourteen lenses;

2.2.4.1.1. ten of these lenses may be replaced by ten 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.

2.2.5. For testing the UV-resistance of light transmitting components made of plastic material against UV radiation of gas-discharge light sources inside the headlamp:

2.2.5.1. One sample each of the relevant material as being used in the headlamp or one headlamp sample containing these. Each material sample shall have the same appearance and surface treatment — if any — as intended for use in the headlamp to be approved.

- 2.2.5.2. The UV-resistance testing of internal materials to light source radiation is not necessary:
- 2.2.5.2.1. if low-UV-type gas-discharge light sources are being applied as specified in Regulation No 99, or;
- 2.2.5.2.2. if provisions are taken to shield the relevant headlamp components from UV radiation, e.g. by glass filters.
- 2.3. For a distributed lighting system 10 samples of the material(s) and related protective coating/shield, if any, of which the light-guide and other optical parts of the system are made.
- 2.4. The materials making up the lens and, in the case of a distributed lighting system, the materials making up the optical parts of the system, and related coatings/shields, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.
3. MARKINGS
- 3.1. Headlamps or distributed lighting systems submitted for approval shall bear legibly and indelibly the trade name or mark of the applicant.
- 3.2. They shall comprise, on the lens and on the main body ⁽¹⁾, 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 on the vehicle or of the gas-discharge light source 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.
- 3.4. All beams may bear on their light-emitting surface a centre of reference as shown in Annex 6.
- 3.5. In the case of a light-generator of a distributed lighting system using a non-replaceable gas-discharge light source not approved under Regulation No 99, the light-generator shall bear the trade name or mark of its manufacturer and the part number referred to in paragraph 2.2.2 above.
- 3.6. In the case of lamps with LED module(s), the lamp shall bear the marking of the rated voltage and rated wattage and the light source module specific identification code.
- 3.7. LED module(s) submitted along with the approval of lamp:
- 3.7.1. shall bear the trade name or mark of the applicant. This marking shall be clearly legible and indelible;
- 3.7.2. shall bear the specific identification code of the module. This marking shall 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 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.

⁽¹⁾ If the lens cannot be detached from the main body of the headlamp, a unique marking as per paragraph 4.2.5 shall be sufficient.

- 3.8. If an electronic light source control gear which is not part of a LED module is used to operate a LED module(s), 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 headlamp submitted pursuant to paragraph 2 above satisfy the provisions of this Regulation, approval shall be granted.
- 4.1.2. Headlamps conforming to this Regulation may be grouped, combined or reciprocally incorporated with any other lighting or light-signalling function(s) provided that their respective lighting functions are not impaired.
- 4.1.3. 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.
- 4.1.4. An approval number shall be assigned to each type approved. Its first two digits (at present 00) 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. However, the matched pair is considered to be one type.
- 4.1.5. 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 communication form conforming to the model in Annex 1 to this Regulation.
- 4.1.6. 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 ⁽¹⁾;

⁽¹⁾ 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.

- 4.2.1.2. the approval number prescribed in paragraph 4.1.4 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 light source, 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 letter 'DC';
 - 4.2.2.4. on headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letter 'DR';
 - 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 'DCR';
 - 4.2.2.6. on headlamps incorporating a lens of plastic material, the 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 6.3.2.2 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 beam as a whole shall be expressed as above.
 - 4.2.2.8. on distributed lighting systems, the letters 'DLS' shall replace the letter 'D' required in paragraphs 4.2.2.3, 4.2.2.4 and 4.2.2.5 applying the same criteria.
- 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 allowed 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 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. The requirement in paragraph 4.2.3.1 above shall not apply to headlamps meeting the requirements of this Regulation which are so designed that the passing beam and the driving beam are provided by the same gas-discharge light source.
- 4.2.4. The two digits of the approval number (at present 00) 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 to 4.2.3 above shall be clearly legible and be indelible. They may be placed on an inner or outer part (transparent or not) of the headlamp, which cannot be separated from the transparent part of the headlamp emitting the 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 headlamp or the system is fitted on the vehicle or when a movable part such as the hood is opened.
- 4.3. Arrangement of the approval mark
- 4.3.1. Independent lamps
- Annex 2, Figures 1 to 9, to this Regulation give 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 as per paragraph 4.2.5.
- 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:
- 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, Figure 10).
- 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required by the Regulation under which approval has been granted for the smallest of the individual marks.
- 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 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 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 or distributed lighting system of the headlamp, even if they cannot be separated from the lens, also comprises the space described in paragraph 3.2 above, and bears the approval mark of the actual functions.

4.3.3.2. Annex 2, Figure 11, to this Regulation gives examples of arrangements of approval marks relating to the above case.

4.3.4. Distributed lighting systems

For distributed lighting systems the applicable provisions of paragraphs 4.3.1 to 4.3.3.2 shall be complied with, in conjunction with the requirements of paragraph 3.4.

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS ⁽¹⁾

5. GENERAL SPECIFICATIONS

5.1. Each sample shall comply with 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 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 headlamps setting can be adjusted by other means.

Where a headlamp providing a principal passing beam and a headlamp providing a driving beam, each equipped with its own light source(s), are assembled to form a composite unit, the adjusting device shall enable each optical system individually to be duly adjusted. The same provision applies to headlamps providing a front fog lamp beam and a driving beam, and to headlamps providing a principal passing beam and a front fog lamp beam, and to headlamps providing these three beams.

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. Headlamps designed to satisfy the requirements of both 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 light source(s) 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 light source, the components for attaching the light source to the reflector must be so designed and made that, in each of its two settings, the light source 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.

⁽¹⁾ Technical requirements for gas-discharge light sources: see Regulation No 99.

- 5.4. Illumination configuration for different traffic conditions
- 5.4.1. In the case of headlamps designed to meet the requirements of traffic moving on one side of the road (either right or left) only, appropriate measures shall be taken to prevent discomfort to road-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 ⁽¹⁾. Such measures may be:
- (a) occulting a part of the outer headlamp lens area;
 - (b) downward movement of the beam. Horizontal movement is allowed;
 - (c) any other measure to remove or reduce the asymmetrical part of the beam.
- 5.4.2. Following the application of this (these) measure(s) the following requirements regarding illumination shall be met with the adjustment left unchanged compared to that for the original traffic direction
- 5.4.2.1. Passing beam designed for right-hand traffic and adapted to left-hand traffic:
- | | |
|----------------|-----------------------|
| at 0,86D-1,72L | at least 5 lux |
| at 0,57U-3,43R | not more than 1,4 lux |
- 5.4.2.2. Passing beam designed for left-hand traffic and adapted to right-hand traffic:
- | | |
|----------------|-----------------------|
| at 0,86D-1,72R | at least 5 lux |
| at 0,57U-3,43L | not more than 1,4 lux |
- 5.5. On headlamps designed to provide alternately a driving beam and a passing beam or a passing beam and/or a driving beam designed to become a bend lighting, any mechanical, electro-mechanical or other device incorporated in the headlamp for these purposes ⁽²⁾ must be so constructed that:
- 5.5.1. the device is robust enough to withstand 50 000 operations under normal conditions of use. In order to verify compliance with this requirement, the Technical Service responsible for approval tests may:
- (a) require the applicant to supply the equipment necessary to perform the test;
 - (b) forego the test if the headlamp presented by the applicant is accompanied by a test report, issued by a Technical Service responsible for approval tests for headlamps of the same construction (assembly), confirming compliance with this requirement.
- 5.5.2. in the case of failure, the illumination above the line H-H shall not exceed the values of a passing beam according to paragraph 6.2.6; in addition, on headlamps designed to provide a passing and/or a driving beam to become a bend lighting, a minimum illumination of at least 5 lux shall be fulfilled in test point 25 V (VV line, D 75 cm).
- When performing the tests to verify compliance with these requirements, the Technical Service responsible for approval tests shall refer to the instructions supplied by the applicant.
- 5.5.3. either the principal passing beam or the driving beam can always be obtained without any possibility of the mechanism stopping in between the two positions;

⁽¹⁾ Instructions on the installation of lamps fitted with these measures are given in Regulation No 48.

⁽²⁾ These provisions shall not apply to the control switch.

- 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 4 to ensure that in use there is no excessive change in photometric performance.
- 5.7. Light transmitting components made of plastic material shall be tested according to the requirements of Annex 5.
- 5.8. Replaceability of light sources
- 5.8.1. The gas-discharge light source(s) used in gas-discharge headlamps or in distributed lighting systems shall be replaceable and approved according to Regulation No 99 and its series of amendments in force at the time of application for type approval. However, gas-discharge light source(s) not approved according to Regulation No 99 can be used only in the case where they are a non-replaceable part of a light-generator. However, in the case of distributed lighting systems the light-generator can be replaceable without using special tools also in the case where the light-source used in it is not approved.
- 5.8.2. In the case that one or more (additional) filament light sources are used in the gas-discharge headlamp, these filament light sources shall be approved according to Regulation No 37 and its series of amendments in force at the time of application for type approval, 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.
- 5.8.3. The design of the device shall be such that the filament lamp, if any, can be fixed in no other position but the correct one.
- 5.8.4. In the case of replaceable gas-discharge light sources and in the case of additional filament light sources the lamp holder shall conform to the dimensional characteristics as given on the data sheet of IEC Publication 60061, relevant to the category of light source(s) used. The light source(s) shall fit easily into the headlamp.
- 5.9. Non-replaceable gas-discharge light sources not approved under Regulation No 99 used in distributed lighting systems shall moreover comply with the following requirements (corresponding to those specified in Regulation No 99 for approval of gas-discharge light sources):
- 5.9.1. starting, run-up and hot-restrike as prescribed in paragraph 3.6 of Regulation No 99;
- 5.9.2. colour as prescribed in paragraph 3.9 of Regulation No 99. The colour shall be white;
- 5.9.3. UV-radiation as prescribed in paragraph 3.10 of Regulation No 99, if so indicated in the application for approval (paragraph 2.2.2 above).
- 5.10. The headlamp and ballast system shall not generate radiated or power line disturbances to cause a malfunction of other electric/electronic systems of the vehicle ⁽¹⁾.
- 5.11. If it is necessary for the test procedure, the test house may require from the manufacturer additional test samples, test benches (holders) or special power supplies.
- 5.12. The test procedure shall be carried out under the mounting specifications of the manufacturer.

⁽¹⁾ Compliance with the requirements for electromagnetic compatibility is relevant to the individual vehicle type.

- 5.13. The headlamp (if equipped with LED modules) and the LED module(s) themselves shall comply with the relevant requirements specified in Annex 11 of this Regulation. The compliance with the requirements shall be tested.

6. ILLUMINATION

6.1. General provisions

- 6.1.1. Headlamps or distributed lighting systems shall be so made that with suitable gas-discharge light source they give adequate illuminance 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 flat vertical screen set up 25 m forward of the headlamp, at right angles to its axes as shown in Annex 3 to this Regulation; the test screen shall be sufficiently wide to allow examination and adjustment of the 'cut-off' of the passing beam over at least 5° on either side of the V-V line.

- 6.1.3. The headlamp or distributed lighting systems shall be deemed satisfactory if the photometric requirements set in the present paragraph 6 are met with one light source, which has been aged during at least 15 cycles, in accordance with Annex 4, paragraph 4 of Regulation No 99.

Where the gas-discharge light source is approved according to Regulation No 99 it shall be a standard (étalon) light-source and its luminous flux may differ from the objective luminous flux specified in Regulation No 99. In this case, the illuminances shall be corrected accordingly.

The above correction does not apply to distributed lighting systems using a non-replaceable gas-discharge light source or to headlamps with the ballast(s) totally or partially integrated.

Where the gas-discharge light source is not approved according to Regulation No 99 it shall be a production non-replaceable light source.

- 6.1.4. The dimensions determining the position of the arc inside the standard gas-discharge light source are shown in the relevant data sheet of Regulation No 99.
- 6.1.5. Photometric compliance must be checked in accordance with paragraph 6.2.6 or 6.3 of this Regulation. This is also valid for the cut-off zone between 3 °R and 3 °L (measurement method for the cut-off colour being under consideration).
- 6.1.6. The colour of the light of the beams emitted by headlamps using gas-discharge light sources shall be white.
- 6.1.7. Four seconds after ignition of a headlamp that has not been operated for 30 minutes or more:
- 6.1.7.1. At least 60 lux shall be attained at point HV, for a headlamp producing driving beam only.
- 6.1.7.2. At least 10 lux shall be attained at point 50 V for headlamps producing passing beam only or alternately passing and driving beam functions as described in paragraph 5.4 of this Regulation.
- 6.1.7.3. In either case the power supply shall be sufficient to secure the required rise of the high current pulse.

6.2. Provisions concerning passing beams

- 6.2.1. The luminous intensity distribution of the passing beam headlamp shall incorporate a 'cut-off' (see Figure 1 below), which enables the headlamp to be adjusted correctly for the photometric measurements and for the aiming on the vehicle.

The 'cut-off' shall provide:

(a) For right hand traffic beams:

- (i) a straight 'horizontal part' towards the left;
- (ii) a raised 'elbow-shoulder' part towards the right.

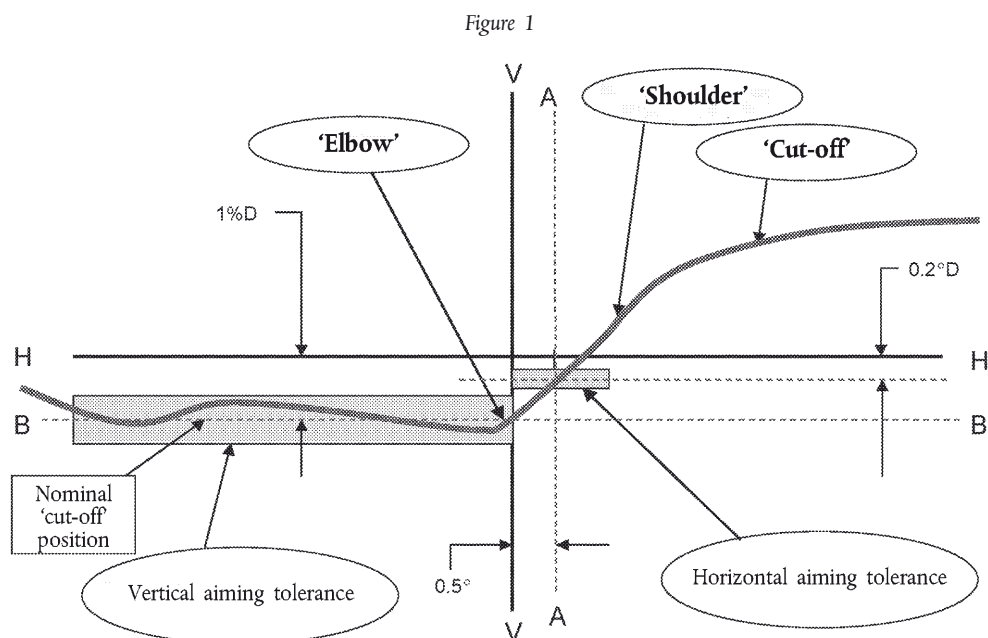
(b) For left hand traffic beams:

- (i) a straight 'horizontal part' towards the right;
- (ii) a raised 'elbow-shoulder' part towards the left.

In each case the 'elbow-shoulder' part shall have a sharp edge.

- 6.2.2. The headlamp shall be visually aimed by means of the 'cut-off' (see Figure 1 below) as follows:

- 6.2.2.1. for vertical adjustment: the horizontal part of the 'cut-off' is moved upward from below line B and adjusted to its nominal position one per cent (25 cm) below the HH line;



Note: The scales are different for vertical and horizontal lines.

- 6.2.2.2. for horizontal adjustment: the 'elbow-shoulder' part of the 'cut-off' shall be moved:

- (a) for right hand traffic from right to left and shall be horizontally positioned after its movement so that:

(b) above the line $0,2^{\circ}$ D its 'shoulder' shall not exceed the line A to the left; and

(c) on the line $0,2^{\circ}$ D or below its 'shoulder' should cross the line A; and

(d) the kink of 'elbow' should be primarily on the V-V line;

or

for left hand traffic from left to right and shall be horizontally positioned after its movement so that:

(a) above the line $0,2^{\circ}$ D its 'shoulder' shall not exceed the line A to the right; and

(b) on the line $0,2^{\circ}$ D or below its 'shoulder' should cross the line A; and

(c) the kink of 'elbow' should be primarily on the V-V line.

6.2.2.3. Where a headlamp so aimed does not meet the requirements set out in paragraphs 6.2.5, 6.2.6 and 6.3, its alignment may be changed, provided that the axis of the beam is not displaced:

Horizontally from line A by more than:

(a) $0,5^{\circ}$ to the left or $0,75^{\circ}$ to the right, for right hand traffic; or

(b) $0,5^{\circ}$ to the right or $0,75^{\circ}$ to the left, for left hand traffic; and

vertically not more than $0,25^{\circ}$ up or down from line B.

6.2.2.4. If, however, vertical adjustment cannot be performed repeatedly to the required position within the tolerances described in paragraph 6.2.2.3 above, the instrumental method of Annex 10, paragraphs 2 and 3 shall be applied to test compliance with the required minimum quality of the 'cut-off' and to perform the vertical and horizontal adjustment of the beam.

6.2.3. When so aimed, the headlamp needs, if its approval is sought solely for a passing beam, to comply only with the requirements referred to in paragraphs 6.2.4 and 6.2.5 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 6.2.4 to 6.2.6. The values specified for Segment II in paragraph 6.2.5 do not apply to Annex 3, Screen 2.

6.2.4. Only one gas-discharge light source is permitted for each passing beam headlamp. A maximum of two additional light sources are permitted as follows:

6.2.4.1. One additional light source according to Regulation No 37 or one or more additional LED module(s) may be used inside the passing beam headlamp to contribute to bend lighting.

6.2.4.2. One additional light source according to Regulation No 37, and/or one or more LED module(s) inside the passing beam headlamp, may be used for the purposes of generating infrared radiation. It/they shall only be activated at the same time as the gas-discharge light source. In the event that the gas-discharge light source fails, this additional light source and/or LED module(s) shall be automatically switched off.

The test voltage for the measurement with this additional light source and/or LED module(s) shall be the same as in paragraph 6.2.4.4.

6.2.4.3. In the event of failure of an additional light source or LED module, the headlamp shall continue to fulfil the requirements of the passing beam.

6.2.4.4. The voltage applied to the terminals of the ballast(s) is:

either: 13,5 V $\pm$ 0,1 for 12 V systems
or: otherwise specified (See Annex 7)

6.2.5. After more than 10 minutes after ignition the illuminances produced on Screen 1 or 2 (or mirrored about the VV line for left-hand traffic) shall meet the following requirements:

Note: In the table:

Letter L means that the point or segment is located on the left of VV line.

Letter R means that the point or segment is located on the right of VV line.

Letter U means the point or segment is located above HH line.

Letter D means the point or segment is located below HH line.

Points or segments	Designation	Illuminances (lux)	Horizontal distances (cm)	Vertical distances (cm)
	On and above line H/H2, or On and above line H/H3/H4	1 max		
1	HV	1 max	0	0
2	B 50 L	0,5 max	L 150	U 25
3	75 R	20 min	R 50	D 25
4	50 L	20 max	L 150	D 37,5
5	25 L1	30 max	L 150	D 75
6	50 V	12 min	0	D 37,5
7	50 R	20 min	R 75	D 37,5
8	25 L2	4 min	L 396	D 75
9	25 R1	4 min	R 396	D 75
10	25 L3	2 min	L 670	D 75
11	25 R2	2 min	R 670	D 75
12	15 L	1 min	L 910	D 125

Points or segments	Designation	Illuminances (lux)	Horizontal distances (cm)	Vertical distances (cm)
13	15 R	1 min	R 910	D 125
14		(*)	L 350	U 175
15		(*)	0	U 175
16		(*)	R 350	U 175
17		(*)	L 175	U 87,5
18		(*)	0	U 87,5
19		(*)	R 175	U 87,5
20		0,1 min	L 350	0
21		0,2 min	L 175	0
A to B	Segment I	6 min	L 225 to R 225	D 37,5
C to D	Segment II	6 max	R 140 to R 396	U 45
E to F	Segment III and under	20 max	L 417 to R 375	D 187,5
	E max R	70 max	Right of VV line	Above D 75
	E max L	50 max	Left of VV line	

(*) The illumination values at points 14 through 19 shall be such that:

14 + 15 + 16 ≥ 0,3 lux, and

17 + 18 + 19 ≥ 0,6 lux.

6.2.6. The requirements in paragraph 6.2.5 above shall also apply to headlamps designed to provide bend lighting and/or that include the additional light source or LED module(s) referred to in paragraph 6.2.4.2. In the case of a headlamp designed to provide bend lighting its alignment may be changed, provided that the axis of the beam is not displaced vertically by more than 0,2°.

6.2.6.1. If bend lighting is obtained by:

6.2.6.1.1. swivelling the passing beam or moving horizontally the kink of the elbow of the cut-off, the measurements shall be carried out after the complete headlamp assembly has been re-aimed horizontally, e. g. by means of a goniometer;

6.2.6.1.2. moving one or more optical parts of the headlamp without moving horizontally the kink of the elbow of the cut-off, measurements shall be carried out with these parts being in their extreme operating position;

6.2.6.1.3. means of one additional light source or one or more LED module(s) without moving horizontally the kink of the elbow of the cut-off, measurements shall be carried out with this light source or LED module(s) activated.

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 paragraph 6.2.5 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 H-H and V-V; such a headlamp needs meet only the requirements referred to in paragraph 6.3. Test voltages are the same as in paragraph 6.2.4.4.

6.3.2. It is possible to use several light sources for the driving beam, these light sources being listed in either Regulation No 37 (in this case the filament lamps shall be operated at their reference luminous flux) or Regulation No 99.

It is also possible that a part of the driving beam produced by one of these light sources will be used exclusively for short time signals (flash to pass) as declared by the applicant. This shall be indicated in the relevant drawing and a remark shall be made in the communication form.

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

6.3.3.1. The point of intersection (HV) of the lines HH and VV shall be situated within the isolux representing 80 per cent of the maximum illuminance. This maximum illuminance, hereunder designated as $E_{\max}$, shall lie between 70 and 345 lux.

6.3.3.2. The reference mark referred to in paragraph 4.2.2.7 above shall be obtained by means of the formula:

$$\text{Reference mark} = 0,146 E_{\max}$$

This value shall be rounded off to the value: 17,5 – 20 – 25 – 27,5 – 30 – 37,5 – 40.

6.3.3.3. Starting from point HV, horizontally to the right and left, the illuminance shall be not less than 40 lux up to a distance of 1,125 m and not less than 10 lux up to a distance of 2,25 m.

6.4. The screen illuminance values mentioned in paragraphs 6.2.5 to 6.3.2.3 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.

6.5. Provisions concerning movable reflectors

6.5.1. With the lamp fixed according to all the positions described in paragraph 2.1.4, the headlamp must meet the photometric requirements of paragraph 6.2 or 6.3, or both.

6.5.2. Additional tests are made after the reflector has been tilted vertically upwards by the angle quoted in paragraph 2.1.4 or 2 degrees, whichever is smaller, by means of the headlamp aiming devices. The headlamp is then re-aimed downwards (by means of the goniometer), and the photometric specifications must be met at the following points:

Principal passing beam: HV and 75 R (75 L respectively)

Driving beam: E max, HV as percent of $E_{\max}$

If the aiming devices do not allow a continuous movement, the position nearest to 2 degrees is chosen.

- 6.5.3. The reflector is brought back to its nominal angular position as defined in paragraph 6.2.2, and the goniometer is set back to its position of origin. The reflector is tilted vertically downwards by the angle quoted in paragraph 2.1.4, or 2 degrees, whichever is smaller, by means of the headlamp aiming device. The headlamp is then re-aimed upwards (by means of the goniometer for example) and points as in paragraph 6.5.2 are checked.
7. GAUGING OF DISCOMFORT AND/OR DISABILITY
- The discomfort and/or disability caused by the passing beam of headlamps shall be gauged ⁽¹⁾.
- C. FURTHER ADMINISTRATIVE PROVISIONS
8. MODIFICATION OF THE HEADLAMP TYPE AND EXTENSION OF APPROVAL
- 8.1. Every modification of the headlamp type including the ballast shall be notified to the administrative department which approved the headlamp type. The said department may then either:
- 8.1.1. 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
- 8.1.2. Require a further test report from the technical service responsible for conducting the tests.
- 8.2. Confirmation or refusal or approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.5 above to the Contracting Parties to the Agreement which apply this Regulation.
- 8.3. 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 Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.
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 8 to this Regulation are carried out;

⁽¹⁾ This requirement will be the subject of a recommendation for the benefit of the administrations.

- 9.3.6. 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.
- 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 results of the manufacturer's own checks.
- 9.4.3. 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 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 9.
- 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 9.
- 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.
- 9.7. The measuring points 14 to 21 from paragraph 6.2.6 of this Regulation are disregarded.
10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 10.1. 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.
- 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. 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 Contracting 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. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Contracting 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.

13. TRANSITIONAL PROVISIONS

13.1. As from the official date of entry into force of Supplement 9, no Contracting Party applying this Regulation shall refuse to grant approvals under this Regulation as amended by Supplement 9 to the original version of the Regulation.

13.2. As from 24 months from the entry into force of Supplement 9, Contracting Parties applying this Regulation shall grant approvals only if the headlamp type to be approved meets the requirements of this Regulation as amended by Supplement 9 to the original version of the Regulation.

13.3. Approvals granted under the preceding supplements to this Regulation shall remain valid.

13.4. Contracting Parties applying this Regulation shall continue to grant approvals on the basis of the preceding supplements to this Regulation, provided that the headlamps are intended as replacements for fitting to vehicles in use.

13.5. Contracting Parties applying this Regulation shall not refuse to grant extensions of approvals to the preceding supplements to this Regulation.

ANNEX I

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 or of a distributed lighting system pursuant to Regulation No 98.

Approval No: Extension No:

1. Trade name or mark of the headlamp or distributed lighting system:
2. Manufacturer's name for the type of device or system:
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:
- 9.1. Headlamp/system submitted for approval as type ⁽³⁾:
- 9.2. The passing beam light source may/may not ⁽²⁾ be lit simultaneously with the driving beam light source and/or another reciprocally incorporated headlamp.
- 9.3. The rated voltage of the device is:
- 9.4. Category (or categories) of light source(s) ⁽⁴⁾:
- 9.5. Trade name and identification number of separate ballast(s) or part(s) of ballast(s):
- 9.6. The adjustment of the 'cut-off' has been determined at 10 m/25 m ⁽²⁾.
The determination of the minimum sharpness of the 'cut-off' has been carried out at 10 m/25 m ⁽²⁾.
- 9.7. Number and specific identification code(s) of LED module(s):
- 9.8. Distributed lighting system with one common gas-discharge light source: Yes/No ⁽²⁾
- 9.9. Remarks (if any):
- 9.10. Measures according to paragraph 5.4 of this Regulation:

10. Approval mark position:
11. Reason(s) for extension of approval:
12. Approval granted/extended/refused/withdrawn ⁽²⁾:
13. Place:
14. Date:
15. Signature:
16. The list of documents deposited with the Administration 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:

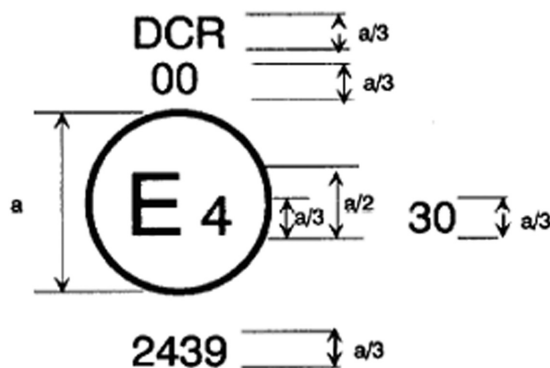
DC,	DC/,	DC/PL,	DR,	DCR,	DC/R,	DC PL,	DR PL,	DCR PL,	DC/R PL,
DC,	DCR,	DC/R,	DC/,	DC PL,	DCR PL,	DC/R PL,	DC/PL,		
→	→	→	→	→	→	→	→		
DC,	DCR,	DC/R,	DC/,	DC PL,	DCR PL,	DC/R PL,	DC/PL,		
→	→	→	→	→	→	→	→		
DLSC,	DLSC/,	DLSC/PL,	DLSR,	DLSCR,	DLSC/R,	DLSC PL,	DLSR PL,	DLSCR PL,	DLSC/R PL,
DLSC,	DLSCR,	DLSC/R,	DLSC/,	DLSC PL,	DLSCR PL,	DLSC/R PL,	DLSC/PL,		
→	→	→	→	→	→	→	→		
DLSC,	DLSCR,	DLSC/R,	DLSC/,	DLSC PL,	DLSCR PL,	DLSC/R PL,	DLSC/PL,		
→	→	→	→	→	→	→	→		

⁽⁴⁾ In the case of a DLS using a non-replaceable gas-discharge light source not approved under Regulation No 99 shall be indicated the part number assigned by the light-generator manufacturer to the light-generator.

ANNEX 2

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS

Figure 1



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

The headlamp bearing the approval mark shown above is a headlamp approved in the Netherlands (E4), under approval number 2439, meeting the requirements of this Regulation in its original form (00). The passing beam is designed for right-hand traffic only.

The Figure 30 indicates that the maximum luminous intensity of the driving beam is between 86 250 and 101 250 candelas.

Note: The approval number and 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 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



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 light source on the vehicle

Figure 3b

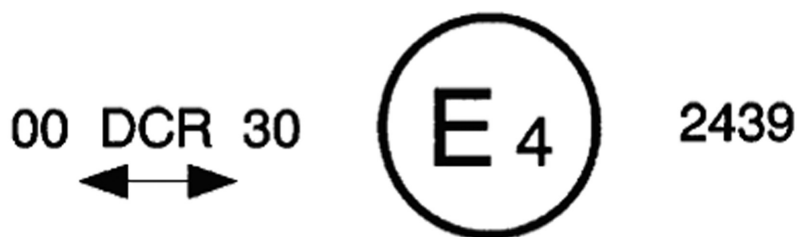


Figure 4



Figure 5

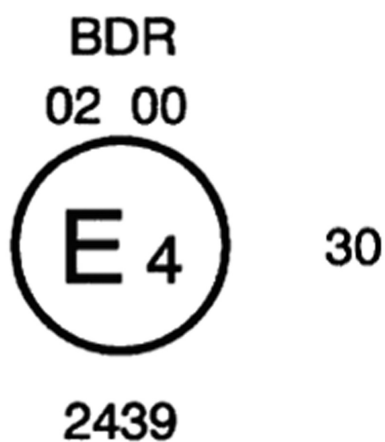


The headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation in its original form with a gas discharge light source for the passing beam only and is equipped with a lens of plastic material, and designed:

For both traffic systems

For right-hand traffic only

Figure 6

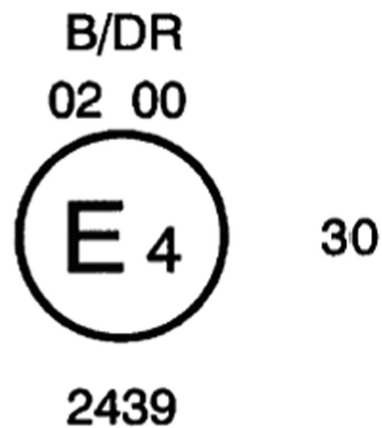


The headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation in its original form with gas discharge light sources for the driving beam, and is combined or grouped or reciprocally incorporated with a front fog lamp.

Figure 7a



Figure 7b



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

With a gas discharge light source in respect of the passing beam only and is designed for left-hand traffic only.

Same arrangement as Figure 6, but the front fog lamp cannot be lit simultaneously with the driving beam.

Figure 8

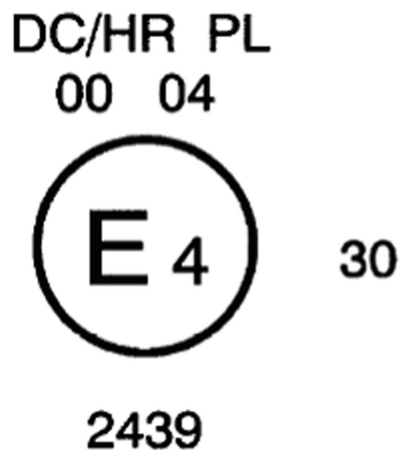


Figure 9



Identification of a passing beam headlamp meeting the requirements of this Regulation and incorporating a lens of plastic material,

and combined or grouped or reciprocally incorporated with R 8 halogen driving beam.

The passing beam shall not be lit simultaneously with the halogen driving beam. The passing beam is designed for right-hand traffic only.

designed for both traffic systems.

The passing beam shall not be lit simultaneously with another reciprocally incorporated headlamp.

Figure 10



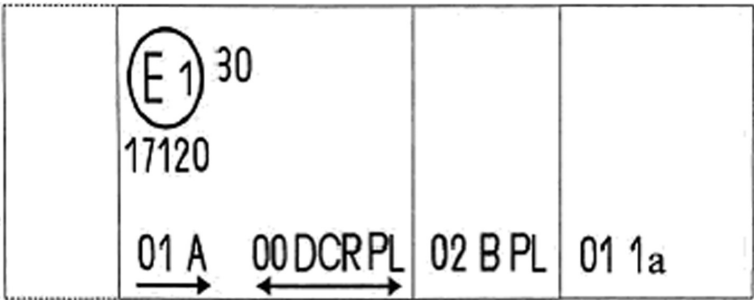
The approval marking shown above identifies a distributed lighting system using a gas-discharge light source and meeting the requirements of this Regulation with respect to both the passing beam and the driving beam for both traffic systems.

Figure 11

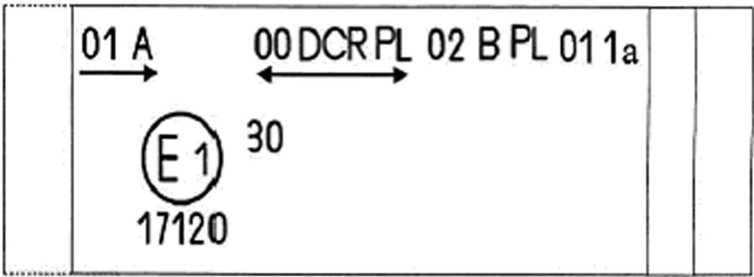
Examples of possible simplified marking for grouped, combined or reciprocally incorporated lamps fitted to the front of the vehicle

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

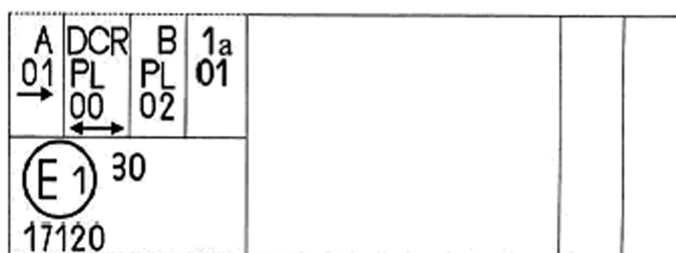
MODEL A



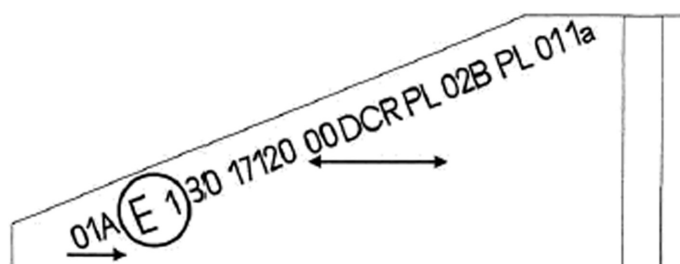
MODEL B



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, for left-hand installation;

A headlamp with a gas discharge passing beam designed for right-hand and left-hand traffic and a gas discharge driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas (as indicated by the number 30), approved in accordance with this Regulation in its original form and incorporating a lens of plastic material;

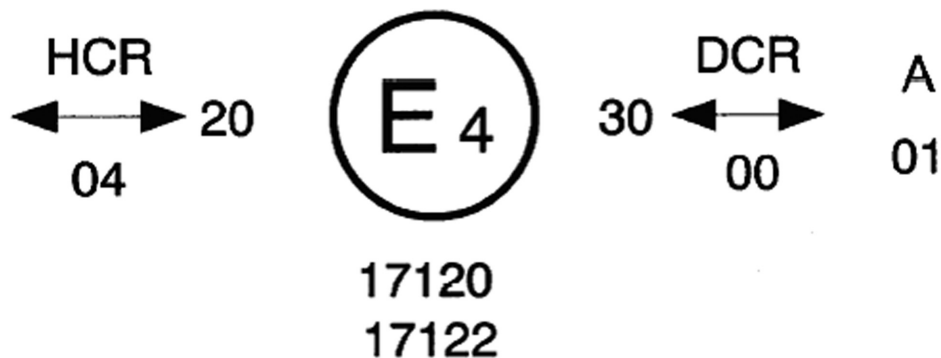
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19 and incorporating a lens of plastic material;

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

Figure 12

Lamp reciprocally incorporated or grouped with a headlamp

Example 1



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 both traffic systems and a driving beam with a maximum luminous intensity comprised between 52 500 and 67 500 candelas (as indicated by the number 20) approved in the Netherlands (E 4) in accordance with the requirements of Regulation No 8 as amended by the 04 series of amendments, and

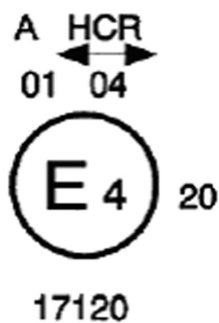
a front position lamp approved in accordance with the 01 series of amendments to Regulation No 7,

or: a headlamp with a gas discharge passing beam and a driving beam with a maximum luminous intensity comprised between 86 250 and 101 250 candelas (as indicated by the number 30), designed for both traffic systems and approved in the Netherlands in accordance with the requirements of this Regulation in its original form, which is reciprocally incorporated with

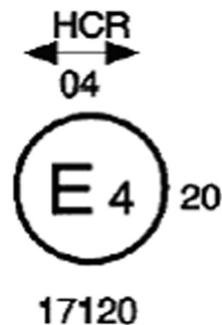
the same front position lamp as above,

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

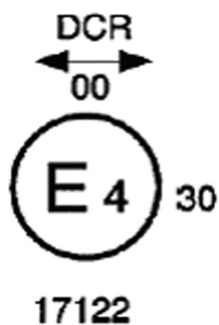
The main body of the headlamp shall bear the only valid approval number, for instance:



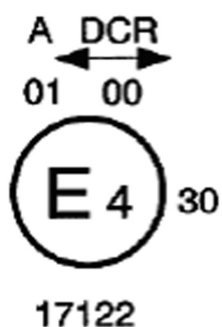
or



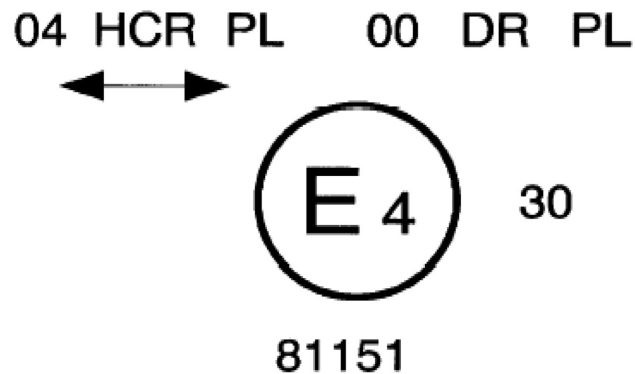
or



or



Example 2



The above example corresponds to the marking of a lens of plastic material and used in an assembly of two headlamps approved in the Netherlands (E4) under approval number 81151, consisting of:

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

a headlamp emitting a gas discharge driving beam with a maximum luminous intensity comprised between w and z candelas, meeting the requirements of this Regulation in its original form, the maximum luminous intensities of the driving beam contributors as a whole being comprised between 86 250 and 101 250 candelas as shown by the number 30.

Figure 13

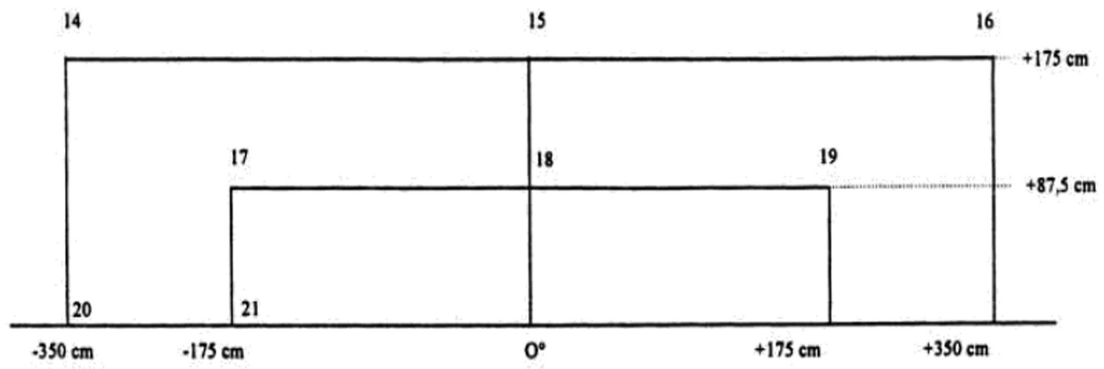
LED modules

MD E3 17325

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

Figure C

Measuring points for illumination values



ANNEX 4

Tests for stability of photometric performance of headlamps in operation**TEST 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 and 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 ballast(s) and 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 $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 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 have 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 dismantled from or readjusted in relation to its test fixture. The light source used shall be a light source of the category specified for that headlamp.

1. TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of $23 \pm 5^{\circ}\text{C}$, 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 light source is lit for the prescribed time ⁽¹⁾;
- (b) In the case of a reciprocally incorporated passing beam lamp and driving beam lamp or in the case of a reciprocally incorporated front fog lamp and driving beam headlamp:

If the applicant declares that the headlamp is to be used with a single light source 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, ⁽¹⁾ ⁽²⁾ the headlamp shall be subjected to the following cycle until the time specified is reached:

⁽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, 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.

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

15 minutes, passing beam lit

5 minutes, all functions lit;

In the case of a passing beam and a driving beam provided by the same gas-discharge light source, the cycle will be:

15 minutes, passing beam lit

5 minutes, all driving beam contributors 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.
- (d) In the case of a passing beam designed to provide bend lighting with the addition of a light source, this light source shall be switched on for 1 minute, and switched off for 9 minutes during the activation of the passing beam only (see Appendix 1).
- (e) In the case that the driving beam uses several light sources in accordance with paragraph 6.3.2 and if the applicant declares that a part of the driving beam (one of these additional light sources) will be used exclusively for short time signals (flash to pass), the test shall be carried out without this part of the driving beam.

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 $13,2 \pm 0,1$ 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.

1.1.2. 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 ⁽¹⁾, 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 ⁽¹⁾,

⁽¹⁾ 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.

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

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

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 this Annex:

Point $E_{\max}$ in passing beam/driving beam and in driving beam only,

50 R and 50 V ⁽²⁾ for a passing lamp only, designed for right-hand traffic,

50 L and 50 V ⁽²⁾ for a passing lamp only, designed for left-hand traffic.

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.

If the headlamp has a moving reflector, only the position closest to the average vertical angular stroke is chosen for this test.

2.1. Test for passing beam headlamps

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

Using a mass production gas-discharge light source which has been aged for at least 15 hours, the headlamp shall be operated on passing beam function 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 expressed in milliradians (mrad) shall be considered as acceptable for a passing beam headlamp 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, 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.

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

⁽¹⁾ The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

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

Appendix

Overview of operational periods concerning test for stability of photometric performance

- Abbreviations:
- P: passing beam lamp

D: driving beam lamp (D₁ + D₂ means two driving beams)

F: front fog lamp

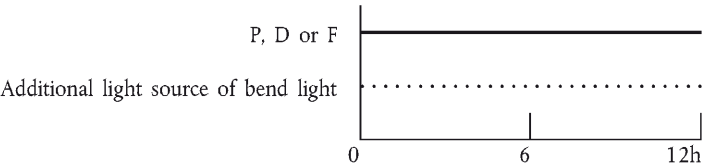
----- means a cycle of 15 minutes off and 5 minutes lit.

..... means a cycle of 9 minutes off and 1 minutes lit

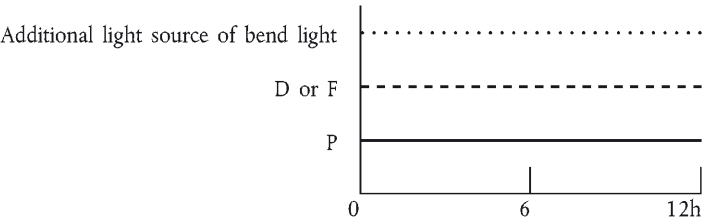
- . - . - . - means a cycle of 15 minutes lit and 5 minutes off

All following grouped headlamps and front fog lamps together with the added marking symbols are given as examples and are not exhaustive.

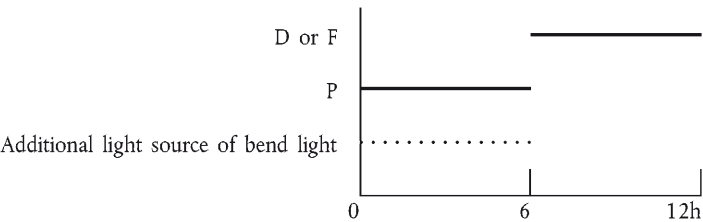
1. P or D or F (HC or HR or B)



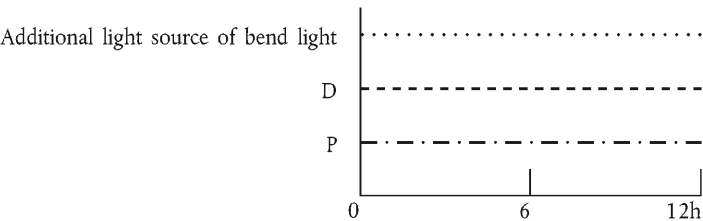
2. P+F (HC B) or P+D (HCR)



3. P+F (HC B/) or HC/B or P+D (HC/R)



4. P+D (DCR) with the same light source



ANNEX 5

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 paragraphs 2.2.5 and 2.3 of this Regulation shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.
- 1.2. The two samples of complete lamps/systems supplied pursuant to paragraph 2.2.4 of this Regulation and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications 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.
- 1.5. If the headlamps are designed for right-hand installation only, or for left-hand installation only, tests pursuant to this Annex may be done on one sample only, at the choice of the applicant.

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 ± 2 °C and 85-95 per cent RH;

1 hour at 23 ± 5 °C and 60-75 per cent RH;

15 hours at -30 ± 2 °C;

1 hour at 23 ± 5 °C and 60-75 per cent RH;

3 hours at 80 ± 2 °C;

1 hour at 23 ± 5 °C and 60-75 per cent RH;

Before this test, the samples shall be kept at 23 ± 5 °C and 60-75 per cent RH for at least four hours.

Note: The periods of one hour at 23 ± 5 °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} 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 $50 \pm 5\text{ }^\circ\text{C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 min^{-1} .

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of $23 \pm 5\text{ }^\circ\text{C}$, 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 per cent n-heptane, 12,5 per cent toluene, 7,5 per cent ethyl tetrachloride, 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) at $23 \pm 5\text{ }^\circ\text{C}$.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0,2 per cent impurities at $23 \pm 5\text{ }^\circ\text{C}$ 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

$\Delta t = (T_2 - T_3)/T_2$, 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

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

2.2.4. Resistance to light source radiations

The following test shall be done:

Flat samples of each light transmitting plastic component of the headlamp 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 headlamp. These samples shall have the same colour and surface treatment, if any, as the parts of the headlamp.

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 surfaces of the samples shall be free of cracks, scratches, scalings or deformation.

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 ± 5 °C and then immersed for five minutes in a mixture maintained at 23 ± 5 °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 ± 5 °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 above. The mean value of the three samples shall be such that:

$\Delta t_m \leq 0,100$;

$\Delta d_m \leq 0,050$.

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 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 $2 \text{ N}/(\text{cm of width}) \pm 20$ 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 $1,5 \text{ m/s} \pm 0,2 \text{ m/s}$.

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 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.

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	14
1.1. Limited photometry (paragraph 2.1.2)											x	x	x	
1.1.1. Temperature change (paragraph 2.1.1)											x	x	x	
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 agents (paragraph 2.2.1)	x	x	x											
1.3.1. Transmission measurement	x	x	x											
1.4. Chemical agents (paragraph 2.2.2)	x	x	x											
1.4.1. Diffusion measurements	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
1.9. Resistance to light source radiations (paragraph 2.2.4)										x				

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

Tests	Complete headlamp	
	Sample number	
	1	2
2.1. Deterioration (paragraph 2.6.1.1.1)	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 $\alpha/2 = 1^\circ$ 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

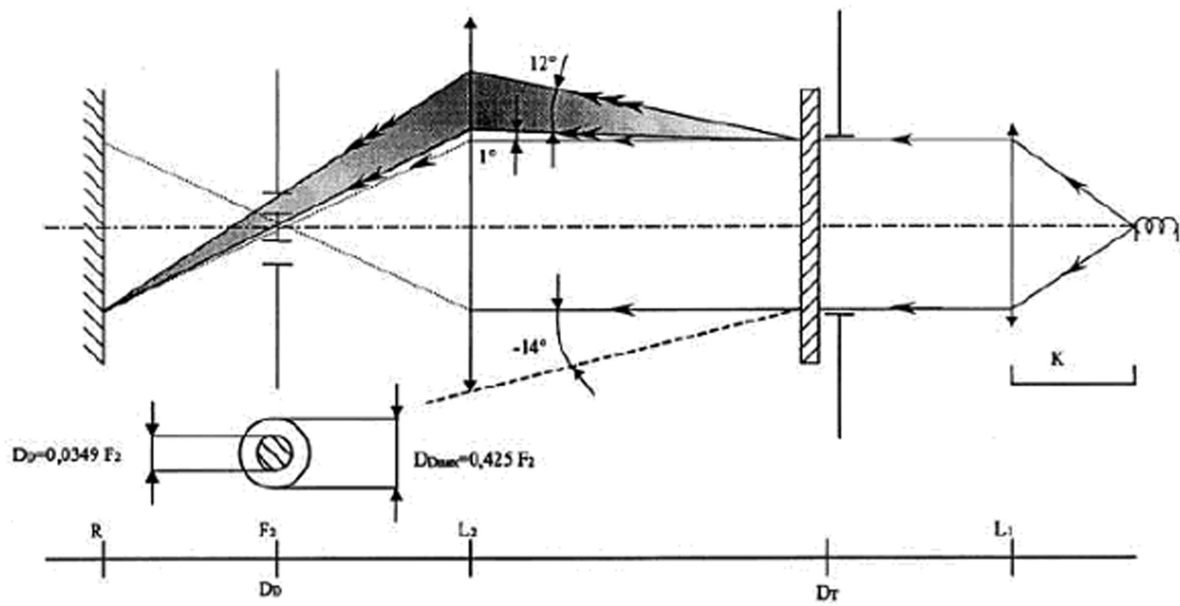
The following readings shall be taken:

Reading	With sample	With central 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°
T_3	yes (after test)	no	Flux transmitted by the tested material in a field of 24°
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.

Figure 1

Optical setup for measurement of variations in diffusion and transmission



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 ± 5 °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 lengthwise 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.

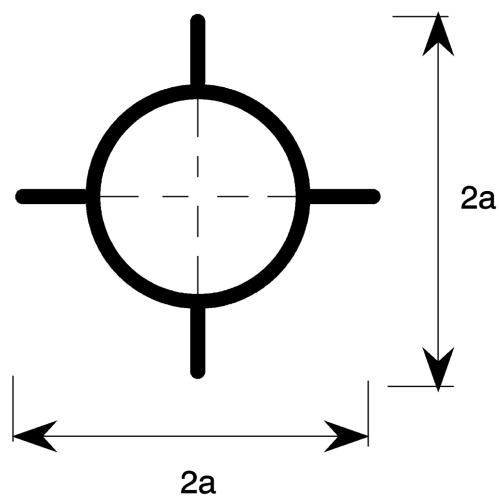
6. RESULTS

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 6

CENTRE OF REFERENCE

Diameter = a



$a = 2 \text{ mm min.}$

This optional mark of the centre of reference shall be positioned on the lens at its intersection with the reference axis of the passing beam, and also on the lenses of the driving beams when they are neither grouped nor combined nor reciprocally incorporated with a passing beam.

The above drawing represents the mark of the centre of reference as projected on a plane substantially tangent to the lens about the centre of the circle. The lines constituting this mark may either be solid or dotted.

—

ANNEX 7

VOLTAGE MARKINGS



This marking must be placed on the main body of each headlamp containing only gas discharge light sources and ballast, and on each external part of the ballast.

The ballast(s) is(are) designed for a ** Volts network system.

This marking must be placed on the main body of each headlamp containing at least one gas discharge light source and ballast.

The ballast(s) is(are) designed for a ** Volts network system.

None of the filament lamps and/or LED module(s) which the headlamp contains is designed for a 24 Volts network system.

ANNEX 8

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 performance, the conformity of mass-produced headlamps shall not be contested if, when testing photometric performance of any headlamp chosen at random and measured at $13,5\text{ V} \pm 0,1\text{ V}$ or as otherwise specified and:

either

equipped with a removable standard gas-discharge light source according to paragraph 6.1.3. The luminous flux of this gas-discharge light source may differ from the reference luminous flux specified in Regulation No 99. In this case, the illuminances shall be corrected accordingly;

or

equipped with the serial production gas-discharge light source and the serial ballast. The luminous flux of this light source may deviate from the nominal luminous flux due to light source and ballast tolerances as specified in Regulation No 99; accordingly the measured illuminances may be corrected by 20 per cent in the favourable direction.

1.2.1. no illuminance value, if measured and corrected according to paragraph 1.2 above, deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. For values B 50 L (or R) and on line H/H2 (or H/H3/H4) and above, the maximum unfavourable deviation may be respectively:

B 50 L (or R) ⁽¹⁾ :	0,20 lx equivalent 20 per cent
	0,30 lx equivalent 30 per cent

On line H/H2
(or line H/H3/H4)

and above:	0,30 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 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 R1, 25 L2, and on segment I;

1.2.2.2. and if, for the driving beam, HV being situated within the isolux line $0,75 E_{\max}$, 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 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 $0,5^\circ$ to the right or left and not by more than $0,2^\circ$ up or down.

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 gas-discharge light source or gas-discharge light source and ballast, whatever is applicable according to paragraph 1.2 above.

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 Dr (as defined in paragraphs 2.1 and 2.2 of Annex 4 to this Regulation) does not exceed 1,5 mrad.

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

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.

1.5. If, however, vertical adjustment cannot be performed repeatedly to the required position within the tolerances described in paragraph 6.2.2.3 of this Regulation, one sample shall be tested according to the procedure described in paragraphs 2 and 3 of Annex 10.

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 respect 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 calibrations 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 headlamps shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points $E_{\max}$, HV ⁽²⁾, HL, HR ⁽³⁾ in the case of the driving beam, and to points B 50 L (or R) ⁽⁴⁾, HV, 50 V, 75 R (or L) and 25 L2 (or R2) 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 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 9 (first sampling) would be 0,95.

⁽²⁾ 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.

⁽³⁾ HL and HR: points on 'hh' located at 1,125 m to the left and to the right of point HV respectively.

⁽⁴⁾ See footnote 1.

ANNEX 9

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 performance of any headlamp chosen at random and measured at $13,5 \text{ V} \pm 0,1 \text{ V}$ or as otherwise specified and:

either

equipped with a removable standard gas-discharge light source according to paragraph 6.1.3. The luminous flux of this gas-discharge light source may differ from the reference luminous flux specified in Regulation No 99. In this case, the illuminances shall be corrected accordingly;

or

equipped with the serial production gas-discharge light source and the serial ballast. The luminous flux of this light source may deviate from the nominal luminous flux due to light source and ballast tolerances as specified in Regulation No 99, accordingly the measured illuminances may be corrected by 20 per cent in the favourable direction.

- 1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.

In the glare zone the maximum deviation may be respectively:

B 50 L (or R) ⁽¹⁾ :	0,20 lx equivalent 20 per cent
	0,30 lx equivalent 30 per cent

On line H/H2 (or line H/H3/H4) and above:	0,30 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 $+ 0,2 \text{ lx}$) and related to that aiming at one point of each area delimited on the measuring screen (at 25 m) by a circle of 15 cm in radius around points B 50 L (or R) ⁽¹⁾ (with a tolerance of $0,1 \text{ lx}$), 75 R (or L), 50 V, 25 R1, 25 L2, and on segment I;

- 1.2.2.2. and if, for the driving beam, HV being situated within the isolux $0,75 E_{\text{max}}$, 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 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 $0,5^\circ$ to the right or left and not by more than $0,2^\circ$ up or down.

- 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 gas-discharge light source or gas-discharge light source and ballast, whatever is applicable according to paragraph 1.2 above.

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

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 acceptable if D_r (as defined in paragraphs 2.1 and 2.2 of Annex 4 to this Regulation) 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.

1.5. If, however, vertical adjustment cannot be performed repeatedly to the required position within the tolerances described in paragraph 6.2.2.3 of this Regulation, one sample shall be tested according to the procedure described in paragraphs 2 and 3 of Annex 10.

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 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 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 11 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
C:4 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:

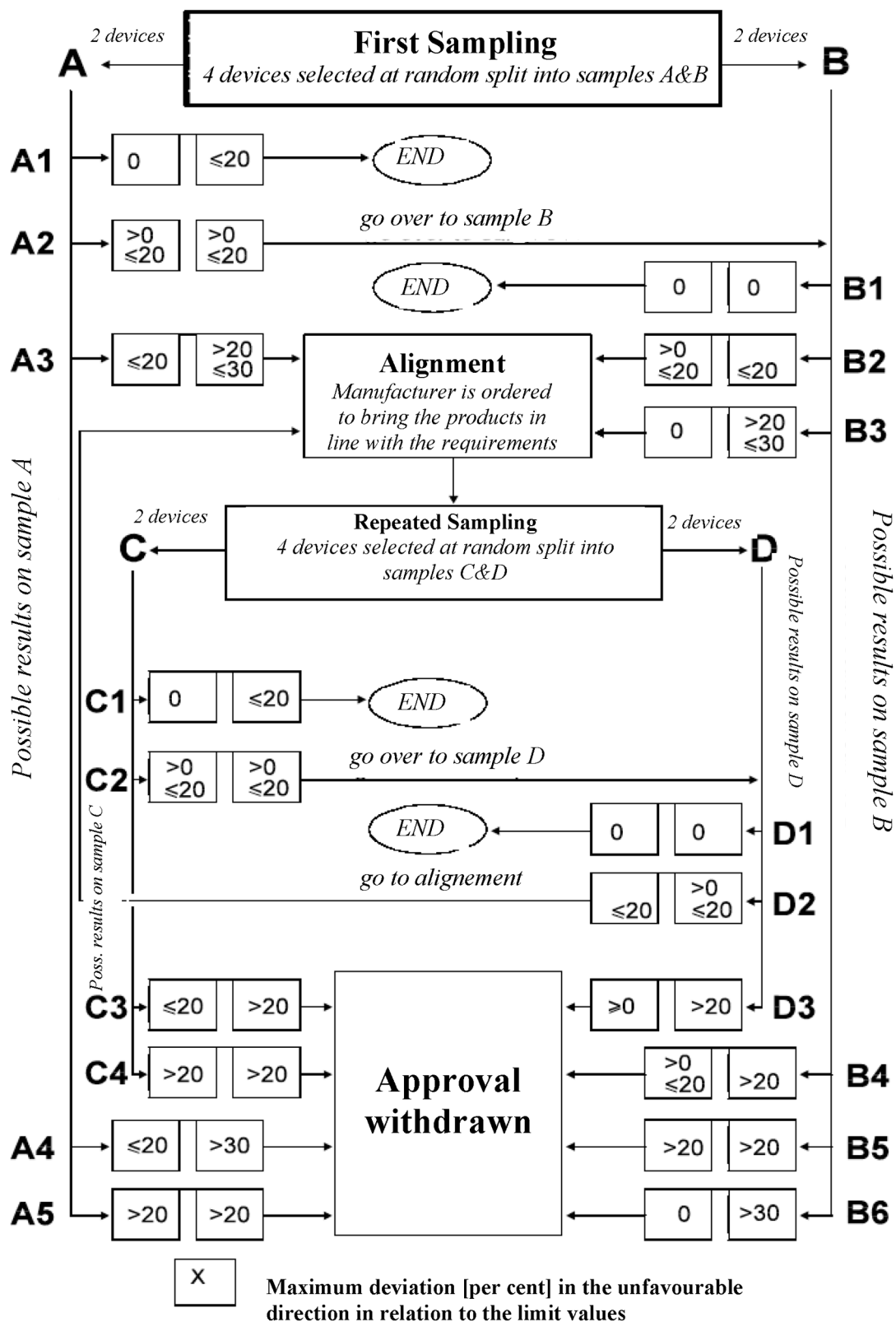
One of the headlamps of sample A after sampling procedure in Figure 1 of this Annex shall be tested according to the procedure described in paragraph 2.1 of Annex 4 after being subjected three consecutive times to the cycle described in paragraph 2.2.2 of Annex 4.

The headlamp shall be considered as acceptable if D_r 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 D_r for each of them shall not exceed 1,5 mrad.

Figure 1



ANNEX 10

Instrumental verification of the 'cut-off' for passing beam headlamps

1. GENERAL

In the case where paragraph 6.2.2.4 of this Regulation applies, the quality of the 'cut-off' shall be tested according to the requirements set out in paragraph 2 below and the instrumental vertical and horizontal adjustment of the beam shall be performed according to the requirements set out in paragraph 3 below.

Before carrying out the measurement of the quality of 'cut-off' and the instrumental aiming procedure, a visual pre-aim in accordance with paragraphs 6.2.2.1 and 6.2.2.2 of this Regulation is required.

2. MEASUREMENT OF THE QUALITY OF THE 'CUT-OFF'

To determine the minimum sharpness, measurements shall be performed by vertically scanning through the horizontal part of the 'cut-off' in angular steps of $0,05^\circ$ at either a measurement distance of:

- (a) 10 m with a detector having a diameter of approximately 10 mm or
- (b) 25 m with a detector having a diameter of approximately 30 mm.

The measuring distance at which the test was carried out shall be recorded in item 9 of the communication form (see Annex 1 of this Regulation).

To determine the maximum sharpness, measurements shall be performed by vertically scanning through the horizontal part of the 'cut-off' in angular steps of $0,05^\circ$ exclusively at a measurement distance of 25 m and with a detector having a diameter of approximately 30 mm.

The 'cut-off' quality shall be considered acceptable if the requirements of paragraph 2.1 to 2.3 below comply with at least one set of measurements.

2.1. Not more than one 'cut-off' shall be visible ⁽¹⁾.

2.2. Sharpness of 'cut-off'

The sharpness factor G is determined by scanning vertically through the horizontal part of the 'cut-off' at $2,5^\circ$ from the V-V where:

$$G = (\log E_\beta - \log E_{(\beta + 0,1^\circ)}) \text{ where } \beta = \text{the vertical position in degrees.}$$

The value of G shall not be less than 0,13 (minimum sharpness) and not greater than 0,40 (maximum sharpness).

2.3. Linearity

The part of the horizontal 'cut-off' that serves for vertical adjustment shall be horizontal between $1,5^\circ$ and $3,5^\circ$ from the V-V line (see Figure 1 below).

- (a) The inflection points of the 'cut-off' gradient at the vertical lines at $1,5^\circ$, $2,5^\circ$ and $3,5^\circ$ shall be determined by the equation:

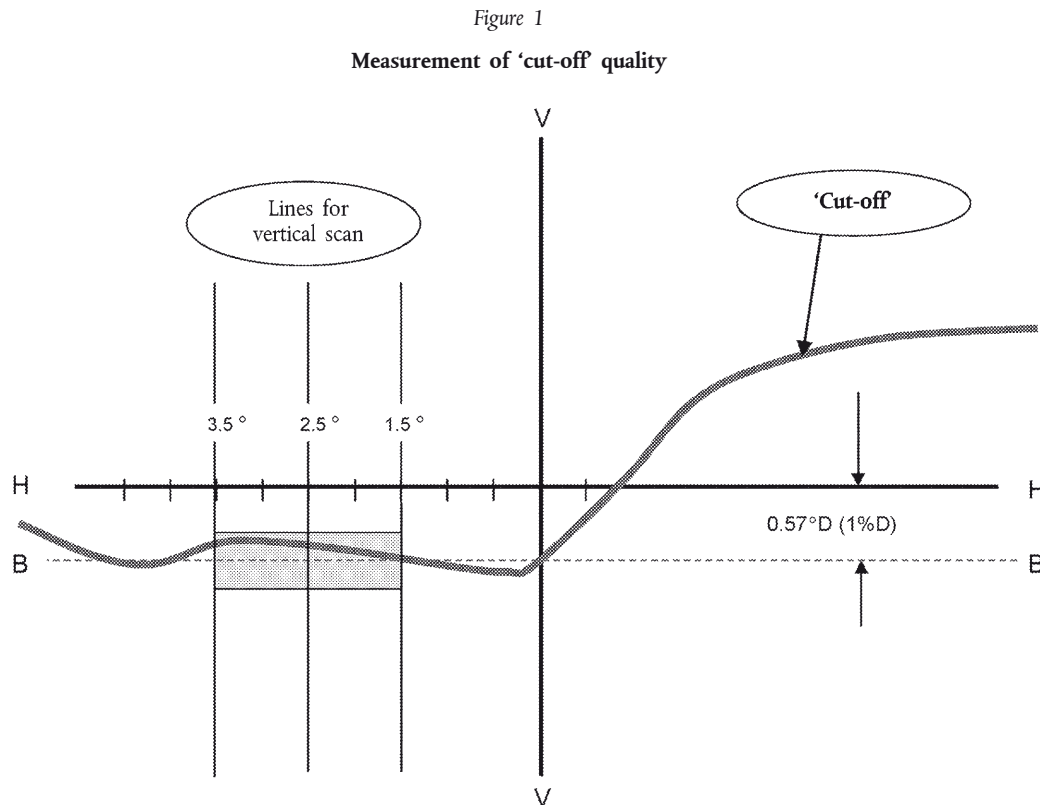
$$(d^2 (\log E)/d\beta^2 = 0).$$

- (b) The maximum vertical distance between the inflection points determined shall not exceed $0,2^\circ$.

⁽¹⁾ This paragraph should be amended when an objective test method is available.

3. VERTICAL AND HORIZONTAL ADJUSTMENT

If the 'cut-off' complies with the quality requirements of paragraph 2 of this Annex, the beam adjustment may be performed instrumentally.



Note: The scales are different for vertical and horizontal lines.

3.1. Vertical adjustment

Moving upward from below the line B (see Figure 2 below), a vertical scan is carried out through the horizontal part of the 'cut-off' at $2,5^\circ$ from V-V. The inflection point (where $d^2 (\log E)/dv^2 = 0$) is determined and positioned on the line B situated one per cent below H-H.

3.2. Horizontal adjustment

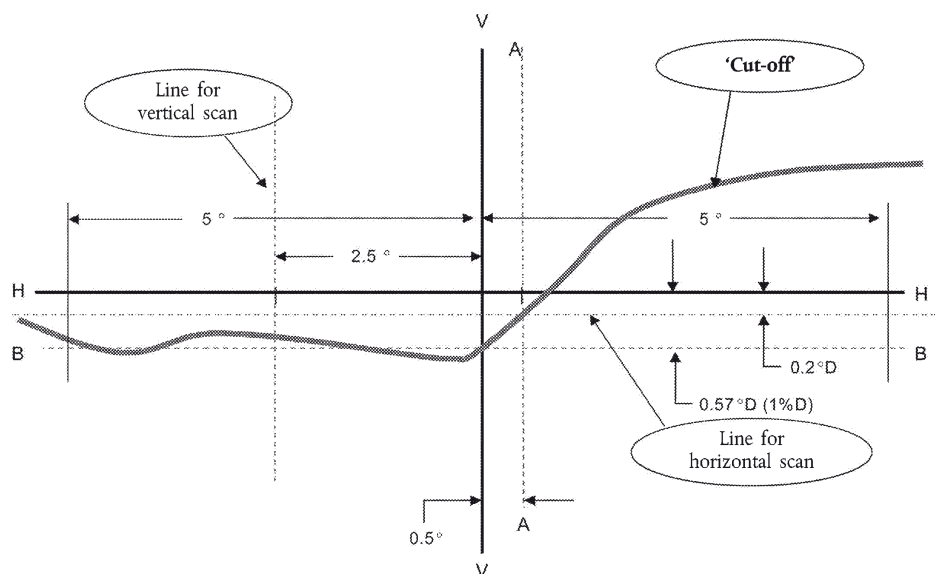
The applicant shall specify one of the following horizontal aim methods:

- (a) The '0,2 D line' method (see Figure 2 below).

A single horizontal line at $0,2^\circ$ D shall be scanned from 5° left to 5° right after the lamp has been aimed vertically. The maximum gradient 'G' determined using the formula $G = (\log E_\beta - \log E_{(\beta + 0,1^\circ)})$ where β is the horizontal position in degrees, shall not be less than 0,08.

The inflection point found on the 0,2 D line shall be positioned on the line A.

Figure 2

Instrumental vertical and horizontal adjustment — horizontal line scan method

Note: The scales are different for vertical and horizontal lines.

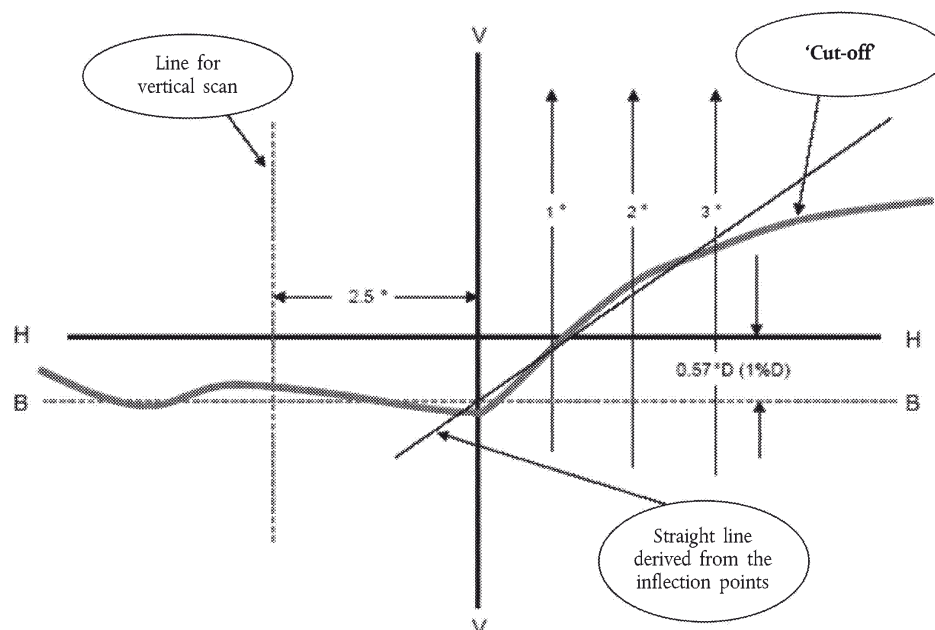
(b) The '3 line' method (see Figure 3 below)

Three vertical lines shall be scanned from 2°D to 2°U at 1°R, 2°R, and 3°R after the lamp has been aimed vertically. The respective maximum gradients 'G' determined using the formula:

$$G = (\log E_{\beta} - \log E_{(\beta + 0.1^\circ)})$$

where β is the vertical position in degrees, shall not be less than 0,08. The inflection points found on the three lines shall be used to derive a straight line. The intersection of this line and the line B found while performing vertical aim shall be placed on the V line.

Figure 3

Instrumental vertical and horizontal adjustment — three line scan method

Note: The scales are different for vertical and horizontal lines.

ANNEX 11

Requirements for LED modules and headlamps including LED modules

1. GENERAL SPECIFICATIONS

- 1.1. Each LED module sample submitted shall conform to the relevant specifications of this Regulation when tested with the supplied electronic light source control-gear(s), if any.
- 1.2. LED module(s) 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 module(s) shall be tamperproof.
- 1.4. The design of removable LED module(s) shall be such that:
 - 1.4.1. when the LED module is removed and replaced with another module provided by the applicant and bearing the same light source module identification code, the photometric specifications of the headlamp shall be met;
 - 1.4.2. LED modules with different light source module identification codes within the same lamp housing, shall not be interchangeable.
- 1.5. Electronic light source control gear(s) may be part of the LED module(s).

2. MANUFACTURE

- 2.1. The LED(s) on the LED module shall be equipped with suitable fixation elements.
- 2.2. The fixation elements shall be strong and firmly secured to the LED(s) and the LED module.

3. TEST CONDITIONS

3.1. Application

- 3.1.1. All samples shall be tested as specified in paragraph 4 below;
- 3.1.2. The kind of light sources on a LED MODULE shall be light emitting diodes (LED) as defined in Regulation No 48 paragraph 2.7.1 in particular with regard to the element of visible radiation. Other kinds of light sources are not permitted.

3.2. Operating conditions

3.2.1. LED module operating conditions

All samples shall be tested under the conditions as specified in paragraphs 6.2.4.4 of this Regulation. If not specified differently in this Annex LED modules shall be tested inside the headlamp as submitted by the manufacturer.

3.2.2. Ambient temperature

For the measurement of electrical and photometric characteristics, the headlamp shall be operated in dry and still atmosphere at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

3.3. Ageing

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.

4. SPECIFIC REQUIREMENTS AND TESTS

4.1. UV-radiation

The UV-radiation of a LED module shall be such that:

$$k_{UV} = \frac{\int_{\lambda=250\text{nm}}^{400\text{nm}} E_e(\lambda) S(\lambda) d\lambda}{k_m \int_{\lambda=380\text{nm}}^{780\text{nm}} E_e(\lambda) S(\lambda) d\lambda} \leq 10^{-5} \text{ W/lm}$$

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 4.1.1 of Annex 9 to Regulation No 112).

This value shall be calculated using intervals of one nanometre. The UV-radiation shall be weighted according to the values as indicated in the Table UV below:

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				

Table UV: Values according to 'IRPA/INIRC Guidelines on limits of exposure to ultraviolet radiation'. Wavelengths (in nanometres) chosen are representative; other values should be interpolated.

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 99 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles

Incorporating all valid text up to:

Supplement 5 to the original version of the Regulation — Date of entry into force: 19 August 2010

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5. Penalties for non-conformity of production
6. Production definitely discontinued
7. Names and addresses of Technical Services responsible for conducting approval tests, and of Administrative Departments

ANNEXES

- Annex 1 — Sheets for gas-discharge light sources
- Annex 2 — Communication concerning the approval (or extension or refusal or withdrawal of approval or production definitely discontinued) of a type of gas-discharge light source pursuant to Regulation No 99
- Annex 3 — Example of a type of approval mark
- Annex 4 — Method of measurement of electrical and photometric characteristics
- Annex 5 — Optical set-up for the measurement of the position and form of the arc and of the position of the electrodes
- Annex 6 — Minimum requirements for quality procedures by the manufacturer
- Annex 7 — Sampling and compliance levels for manufacturer's test records
- Annex 8 — Minimum requirements for sampling by an inspector

1. SCOPE

This Regulation applies to gas-discharge light sources shown in Annex 1 and intended for use in approved gas-discharge lamp units of power-driven vehicles.

2. ADMINISTRATIVE PROVISIONS

2.1. Definitions

- 2.1.1. The term 'category' is used in this Regulation to describe different basic design of standardized gas-discharge light sources. Each category has a specific designation, as for example: 'D2S'.

- 2.1.2. Gas-discharge light sources of different 'types' ⁽¹⁾ are gas-discharge light sources within the same category which differ in such essential respects as:
- 2.1.2.1. trade name or mark; that means:
- (a) Gas-discharge light sources bearing the same trade name or mark but produced by different manufacturers are considered as being of different types.
- (b) Gas-discharge light sources produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type;
- 2.1.2.2. bulb and/or cap design, in so far as these differences affect the optical results;
- 2.2. Application for approval
- 2.2.1. Application for approval shall be submitted by the owner of the trade name or mark, or by his duly accredited representative.
- 2.2.2. Every application for approval shall be accompanied (see also paragraph 2.4.2) by:
- 2.2.2.1. drawings in triplicate, sufficiently detailed to permit identification of the type;
- 2.2.2.2. a technical description including ballast identification;
- 2.2.2.3. three samples of each colour which has been applied for;
- 2.2.2.4. one sample of the ballast.
- 2.2.3. In the case of a type of gas-discharge light source differing only by the trade name or mark from a type that has already been approved it shall be sufficient to submit:
- 2.2.3.1. a declaration by the manufacturer that the type submitted is identical (except in the trade name or mark) to and has been produced by the same manufacturer as, the type already approved, the latter being identified by its approval code;
- 2.2.3.2. two samples bearing the new trade name or mark.
- 2.2.4. The Competent Authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.
- 2.3. Inscriptions
- 2.3.1. Gas-discharge light sources submitted for approval shall bear on the cap or bulb:
- 2.3.1.1. the trade name or mark of the applicant;
- 2.3.1.2. the international designation of the relevant category;
- 2.3.1.3. the rated wattage; this need not to be indicated separately if it is part of the international designation of the relevant category;
- 2.3.1.4. a space of sufficient size to accommodate the approval mark.
- 2.3.2. The space mentioned in paragraph 2.3.1.4 shall be indicated in the drawings accompanying the application for approval.

⁽¹⁾ A selective yellow bulb or an additional selective yellow outer bulb, solely intended to change the colour but not the other characteristics of a gas-discharge light source emitting white light, does not constitute a change of type of the gas-discharge light source.

2.3.3. Other inscriptions than those covered by paragraphs 2.3.1 and 2.4.4 may be affixed on the cap.

2.3.4. The ballast used for the type approval of the light source shall be marked with type and trade mark identification and with the rated voltage and wattage, as indicated on the relevant lamp data sheet,

2.4. Approval

2.4.1. If all samples of a type of gas-discharge light source which are submitted in accordance with paragraphs 2.2.2.3 or 2.2.3.2 comply with the requirements of this Regulation when tested with the ballast according to paragraph 2.2.2.4, approval shall be granted.

2.4.2. An approval code shall be assigned to each type approved. Its first character 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.

This will be followed by an identification code comprising not more than two characters. Only the Arabic numerals and capital letters listed in footnote (1) shall be used.

The same Contracting Party may not assign the same code to another type of gas-discharge light source. If the applicant so desires the same approval code may be assigned to both gas-discharge light sources emitting white and selective yellow light (see paragraph 2.1.2).

2.4.3. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of gas-discharge light source pursuant to this Regulation shall be communicated to the Parties of the Agreement which apply this Regulation by means of a form conforming to the model in Annex 2 to this Regulation and of a drawing, supplied by the applicant for approval in a format not exceeding A4 (210 × 297 mm) and on a scale of at least 2 : 1.

2.4.4. To every gas-discharge light source conforming to a type approved under this Regulation there shall be affixed in the space referred to in paragraph 2.3.1.4, in addition to the inscriptions required under paragraph 2.3.1, an international approval mark consisting of:

2.4.4.1. a truncated circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval (2);

2.4.4.2. the approval code, placed close to the truncated circle.

2.4.5. If the applicant has obtained the same approval code for several trade names or marks, one or more of them will suffice to meet the requirements of paragraph 2.3.1.1.

2.4.6. The marks and inscriptions specified in paragraphs 2.3.1 and 2.4.3 shall be clearly legible and be indelible.

(1) 0 1 2 3 4 5 6 7 8 9

A B C D E F G H J K L M N P R S T U V W X Y Z

(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.

2.4.7. Annex 3 to this Regulation gives an example of arrangement of the approval mark.

3. TECHNICAL REQUIREMENTS

3.1. Definitions

3.1.1. 'Gas-discharge light source': light source in which the light is produced by a stabilized discharge arc.

3.1.2. 'Ballast': Specific electrical supply for the gas-discharge light source.

3.1.3. 'Rated voltage': Input voltage marked on the ballast.

3.1.4. 'Rated wattage': Wattage marked on the gas-discharge light source and ballast.

3.1.5. 'Test voltage': Voltage, at the input terminals of the ballast for which the electrical and photometric characteristics of the gas-discharge light source are intended and are to be tested.

3.1.6. 'Objective value': Design value of an electrical or photometric characteristic. To be achieved, within the specified tolerances, when the gas-discharge light source is energized by the ballast operated at test voltage.

3.1.7. 'Standard (etalon) gas-discharge light source': Special gas-discharge light source used for the testing of headlamps. It has reduced dimensional, electrical and photometric characteristics as specified on the relevant data sheet.

3.1.8. 'Reference axis': An axis defined with reference to the cap and to which certain dimensions of the gas-discharge light source are referred.

3.1.9. 'Reference plane': a plane defined with reference to the cap and to which certain dimensions of the gas-discharge light source are referred.

3.2. General specifications

3.2.1. Each sample submitted shall conform to the relevant specifications of this Regulation when tested with the ballast according to paragraph 2.2.2.4.

3.2.2. Gas-discharge light sources 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.

3.3. Manufacture

3.3.1. The bulb of the gas-discharge light source shall exhibit no scores or spots which might impair their efficiency and their optical performance.

3.3.2. In the case of a coloured (outer) bulb, after an operating period of 15 hours with the ballast at test voltage, the surface of the bulb shall be lightly wiped with a cotton cloth soaked in a mixture of 70 volume per cent of n-heptane and 30 volume per cent of toluol. After about five minutes, the surface shall be inspected visually. It shall not show any apparent changes.

3.3.3. Gas-discharge light sources shall be equipped with standard caps complying with the cap data sheets of IEC Publication 60061, third edition, as specified on the individual data sheets of Annex 1.

- 3.3.4. The cap shall be strong and firmly secured to the bulb.
- 3.3.5. To ascertain whether gas-discharge light sources conform to the requirements of paragraphs 3.3.3 to 3.3.4, a visual inspection, a dimension check and, where appropriate, a trial fitting shall be carried out.
- 3.4. Tests
- 3.4.1. Gas-discharge light sources shall be aged as indicated in Annex 4.
- 3.4.2. All samples shall be tested with the ballast, according to paragraph 2.2.2.4.
- 3.4.3. Electrical measurements shall be carried out with instruments of at least class 0,2. (0,2 per cent full scale accuracy).
- 3.5. Position and dimensions of electrodes, arc and stripes
- 3.5.1. The geometric position of the electrodes shall be as specified on the relevant data sheet. An example of a method of measuring arc and electrodes position is given in Annex 5. Other methods may be used.
- 3.5.1.1. The position and dimensions of the light source electrodes shall be measured before the ageing period, the gas-discharge light source unlit and using optical methods through the glass envelope.
- 3.5.2. The shape and the displacement of the arc shall conform to the requirements as given on the relevant data sheet.
- 3.5.2.1. The measurement shall be made after ageing with the light source supplied by the ballast at test voltage.
- 3.5.3. The position and dimension and transmission of the stripes shall comply with the requirements as given on the relevant data sheet.
- 3.5.3.1. The measurement shall be made after ageing with the light source supplied by the ballast at test voltage.
- 3.6. Starting, run-up and hot-restrike characteristics
- 3.6.1. Starting
- When tested according to the conditions specified in Annex 4, the gas-discharge light source shall start directly and remain alight.
- 3.6.2. Run-up
- When measured according to the conditions specified in Annex 4, the gas-discharge light source shall emit at least:
- 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 as indicated on the relevant data sheet.

3.6.3. Hot-restrike

When tested according to the conditions specified in Annex 4, the gas-discharge light source shall restart directly after being switched-off for a period as indicated on the data sheet. After one second the light source shall emit at least 80 per cent of its objective luminous flux.

3.7. Electrical characteristics

When measured according to the conditions specified in Annex 4, the voltage and wattage of the light source shall be within the limits given on the relevant data sheet.

3.8. Luminous flux

When measured according to the conditions specified in Annex 4, the luminous flux shall be within the limits given on the relevant data sheet. In the case where white and selective yellow is specified for the same type, the objective value applies to light sources emitting white light, whereas the luminous flux of the light source emitting selective yellow light shall be at least 68 per cent of the specified value.

3.9. Colour

3.9.1. The colour of the light emitted shall be white or selective yellow. Moreover, the colorimetric characteristics, expressed in CIE chromaticity coordinates, shall lie within the boundaries given on the relevant data sheet.

3.9.2. 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.

3.9.3. The colour shall be measured according to the conditions specified in Annex 4, paragraph 10.

3.9.4. The minimum red content of a gas-discharge light source shall be such that:

$$k_{\text{red}} = \frac{\int_{\lambda=610 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) \times V(\lambda) \times d\lambda}{\int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) \times V(\lambda) \times d\lambda} \geq 0,05$$

where:

$E_e(\lambda)$ [W/nm] is the spectral distribution of the radiant flux;
 $V(\lambda)$ [1] is the spectral luminous efficiency;
 λ [nm] is the wave length.

This value shall be calculated using intervals of one nanometre.

3.10. UV radiation

The UV radiation of the gas-discharge light source shall be such that:

$$k_{\text{uv}} = \frac{\int_{\lambda=250 \text{ nm}}^{400 \text{ nm}} E_e(\lambda) \times S(\lambda) \times d\lambda}{k_m \times \int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) \times V(\lambda) \times d\lambda} \leq 10^{-5} \text{ W/lm}$$

where:

$S(\lambda)$ [1] is the spectral weighting function;
 $k_m = 683$ [lm/W] is the photometric radiation equivalent;
 (For definitions of other symbols see paragraph 3.9.4 above).

This value shall be calculated using intervals of one nanometre.

The UV-radiation shall be weighted according to the values as indicated in the following 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	0,000090
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	0,000053
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				

Wavelengths chosen are representative; other values should be interpolated.

Values according to 'IRPA/INIRC Guidelines on limits of exposure to ultraviolet radiation'.

3.11. Standard gas-discharge light sources

Standard (etalon) gas-discharge light sources shall comply with the requirements applicable to type approval light sources and to the specific requirements as stated in the relevant data sheet. In case of a type emitting white and selective yellow light, the standard light source shall emit white light.

4. CONFORMITY OF PRODUCTION

4.1. Gas-discharge light sources approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the inscriptions and technical requirements set forth in paragraph 3 above and Annexes 1 and 3 to this Regulation.

4.2. In order to verify that the requirements of paragraph 4.1 are met, suitable controls of the production shall be carried out.

4.3. The holder of the approval shall in particular:

4.3.1. ensure existence of procedures for the effective control of the quality of products,

4.3.2. have access to the control equipment necessary for checking the conformity to each approved type,

4.3.3. 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,

4.3.4. analyse the results of each type of test, applying criteria of Annex 7, in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production,

4.3.5. ensure that for each type of gas-discharge light source, at least the tests prescribed in Annex 6 to this Regulation are carried out,

- 4.3.6. 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.
- 4.4. The Competent Authority which has granted type-approval may at any time verify the conformity control methods applicable to each production unit.
- 4.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.
- 4.4.2. The inspector may take samples at random which will be tested in the manufacturer's laboratory. The minimum number of samples may be determined according to the results of the manufacturer's own verification.
- 4.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in application of paragraph 4.4.2 above, the inspector shall select samples, to be sent to the Technical Service which has conducted the type approval tests.
- 4.4.4. The Competent Authority may carry out any tests 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 criteria of Annex 8.
- 4.4.5. 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 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.
5. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
- 5.1. The approval granted in respect of a gas-discharge light source pursuant to this Regulation may be withdrawn if the prescribed conformity of production requirements are not met.
- 5.2. 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 2 to this Regulation.
6. PRODUCTION DEFINITELY DISCONTINUED
- If the holder of the approval completely ceases to manufacture a type of gas-discharge light source approved in accordance with this Regulation, he shall so inform the authority which had granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.
7. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- The Parties to the 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.
-

ANNEX 1

SHEETS FOR GAS-DISCHARGE LIGHT SOURCES

List of categories of gas-discharge light sources and their sheet numbers:

Light source category	Sheet numbers
D1R	DxR/1 to 7
D1S	DxS/1 to 6
D2R	DxR/1 to 7
D2S	DxS/1 to 6
D3R	DxR/1 to 7
D3S	DxS/1 to 6
D4R	DxR/1 to 7
D4S	DxS/1 to 6

List of sheets for gas-discharge light sources and their sequence in this annex:

Sheet numbers
DxR/1 to 7
DxS/1 to 6

Categories D1R, D2R, D3R and D4R Sheet DxR/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the gas-discharge light source

Figure 1

Category D1R — Type with cables — Cap PK32d-3

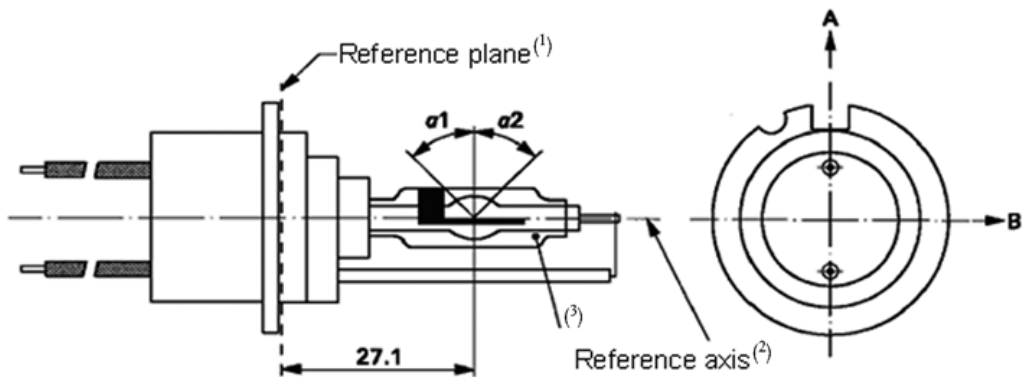
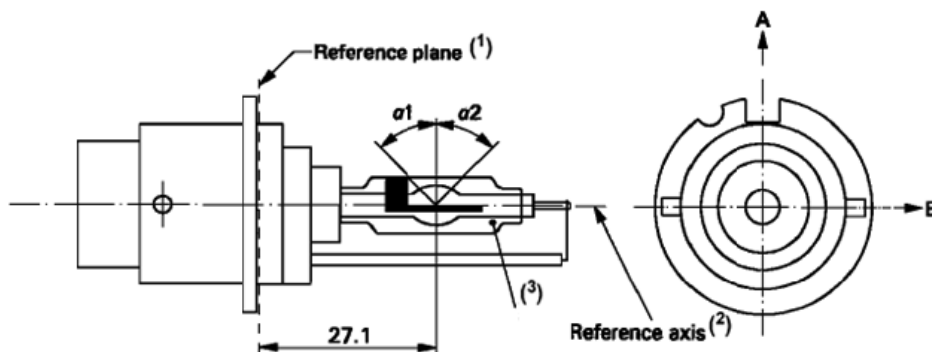


Figure 2

Category D2R — Type with connector — Cap P32d-3



(¹) The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.

(²) See sheet DxR/3.

(³) With respect to the reference axis, when measured at a distance of 27,1 mm from the reference plane the eccentricity of the outer bulb shall be less than $\pm 0,5$ mm in direction B and less than $+1$ mm $-0,5$ mm in direction A.

Categories D1R, D2R, D3R and D4R Sheet DxR/2

The drawings are intended only to illustrate the essential dimensions (in mm) of the gas-discharge light source

Figure 3

Category D3R — Type with starter — Cap PK32d-6

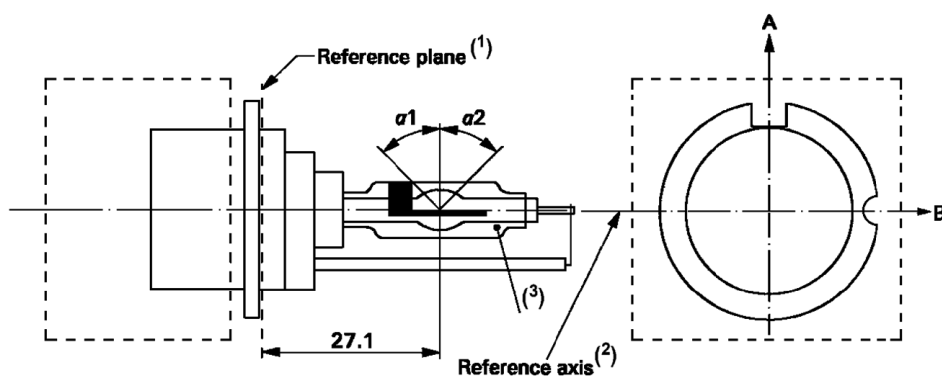
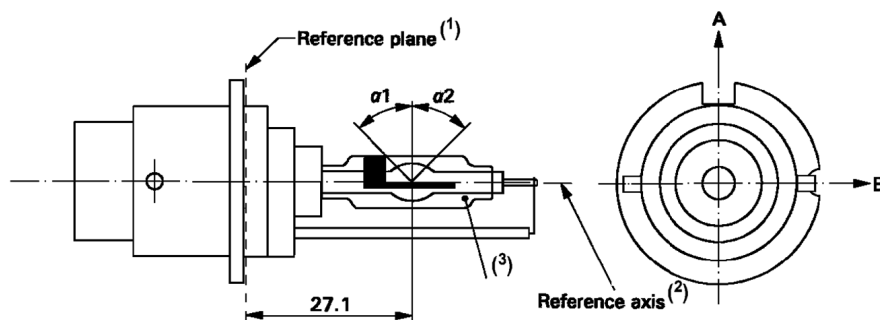


Figure 4

Category D4R — Type with connector — Cap P32d-6



(¹) The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.

(²) See sheet DxR/3.

(³) With respect to the reference axis, when measured at a distance of 27,1 mm from the reference plane the eccentricity of the outer bulb shall be less than $\pm 0,5$ mm in direction B and less than $+1$ mm $-0,5$ mm in direction A.

Categories D1R, D2R, D3R and D4R Sheet DxR/3

Figure 5

Definition of reference axis ⁽¹⁾

The cap shall be pushed in this direction

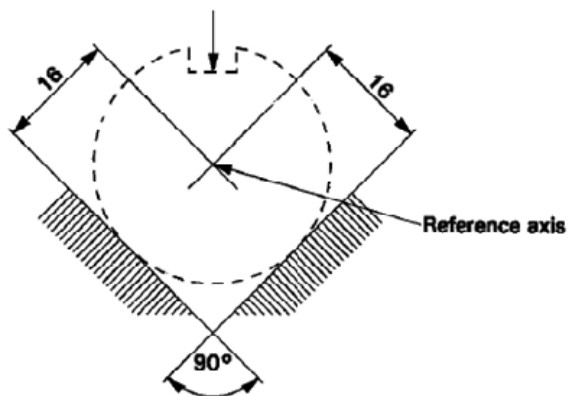
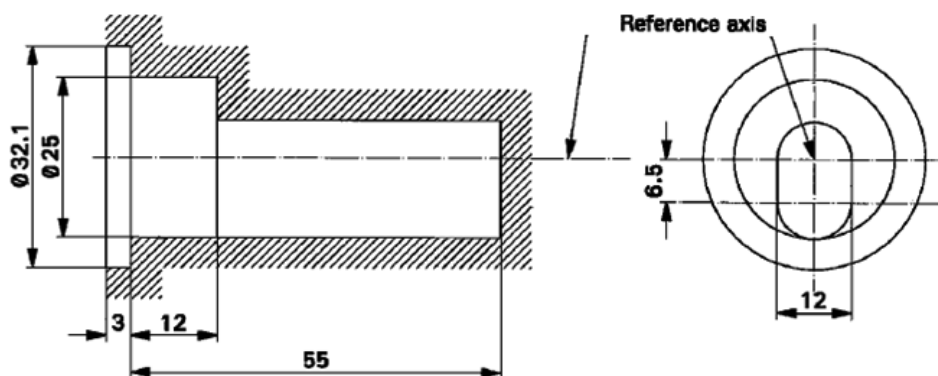


Figure 6

Maximum lamp outline ⁽²⁾

⁽¹⁾ The reference axis is perpendicular to the reference plane and crosses the intersection of the two parallel lines as indicated in figure 5.

⁽²⁾ Glass bulb and supports shall not exceed the envelope, as indicated in figure 6. The envelope is concentric with the reference axis.

Categories D1R, D2R, D3R and D4R Sheet DxR/4

Dimensions	Production light sources	Standard light sources
Position of electrodes	Sheet DxR/5	
Position and form of the arc	Sheet DxR/6	
Position of the black stripes	Sheet DxR/7	
$\alpha 1$ ⁽¹⁾	$45^\circ \pm 5^\circ$	
$\alpha 2$ ⁽²⁾	45° min.	

D1R: Cap PK32d-3

in accordance with IEC Publication 60061 (sheet 7004-111-3)

D2R: Cap P32d-3

D3R: Cap PK32d-6

D4R: Cap P32d-6

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

			D1R/D2R	D3R/D4R	D1R/D2R	D3R/D4R
Rated voltage of the ballast		V	12 (²)		12	
Rated wattage		W	35		35	
Test voltage		V	13,5		13,5	
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	2 800		2 800	
	Tolerance		± 450		± 150	
Chromaticity co-ordinates in the case of white light	Objective		x = 0,375		y = 0,375	
	Tolerance area (³)	Boundaries	x = 0,345		y = 0,150 + 0,640 x	
			x = 0,405		y = 0,050 + 0,750 x	
		Intersection points	x = 0,345		y = 0,371	
			x = 0,405		y = 0,409	
x = 0,405			y = 0,354			
			x = 0,345		y = 0,309	
Hot re-strike switch-off time		s	10		10	

⁽¹⁾ The part of the bulb within the angles ± 1 and ± 2 shall be the light emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles ± 1 and ± 2 except for the black stripes.

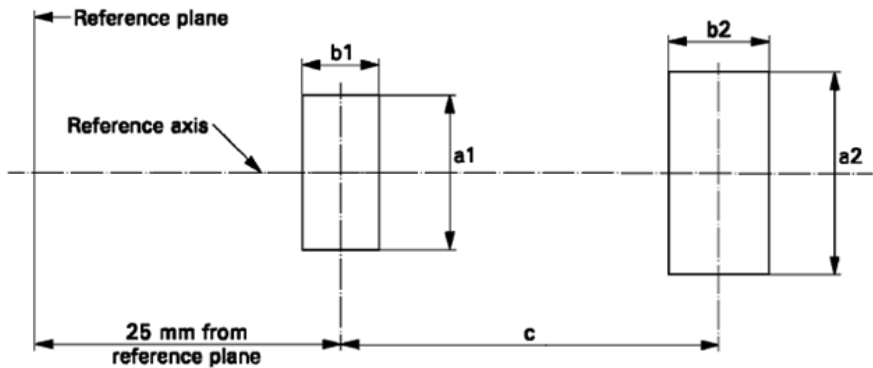
⁽²⁾ Application voltages of ballasts may differ from 12 V.

⁽³⁾ See Annex 4.

Categories D1R, D2R, D3R and D4R Sheet DxR/5

Position of the electrodes

This test is used to determine whether the electrodes are correctly positioned relative to the reference axis and the reference plane.



Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	$d + 0,5$	$d + 0,2$
a2	$d + 0,7$	$d + 0,35$
b1	0,4	0,15
b2	0,8	0,3
c	4,2	4,2

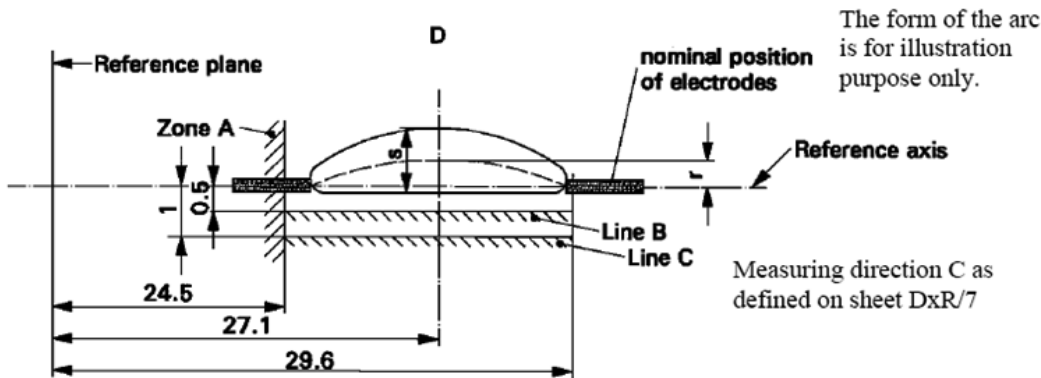
d = diameter of the electrode
d < 0,3 for D1R and D2R
d < 0,4 for D3R and D4R

The top of the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The top of the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2.

Categories D1R, D2R, D3R and D4R Sheet DxR/6

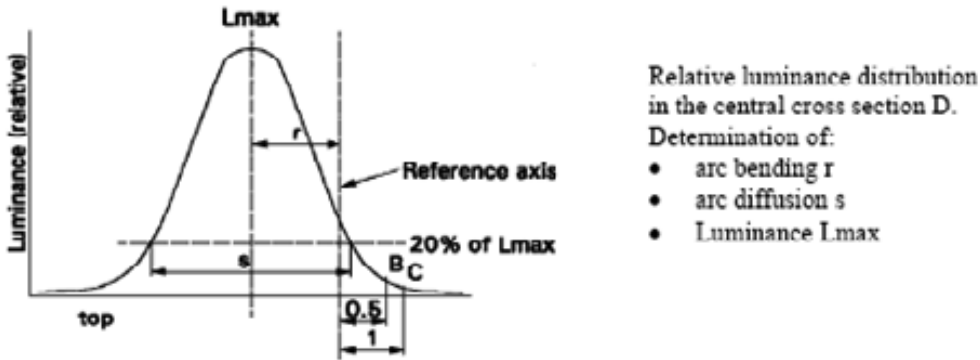
Position and form of the arc

This test is used to determine the form and sharpness of the arc and its position relative to the reference axis and plane by measuring its bending and diffusion in the central cross section D and by measuring stray light intensities in Zone A and at lines B and C.



When measuring the relative luminance distribution in the central cross section D as indicated in the drawing above, the maximum value L_{max} has the distance r from the reference axis. The points of 20 % of L_{max} have the distance s , as shown in the drawing below.

Dimension in mm	Production light sources		Standard light sources
	D1R/D2R	D3R/D4R	
r	0,50 ± 0,25	0,50 ± 0,25	0,50 ± 0,20
s	1,10 ± 0,25	1,10 + 0,25/- 0,40	1,10 ± 0,25



When measuring the luminances from measuring direction B as defined on sheet DxR/7 with a set-up as outlined in Annex 5, however with a circular field of 0,2M mm diameter, the relative luminance expressed as a percentage of L_{max} (at cross section D) shall be:

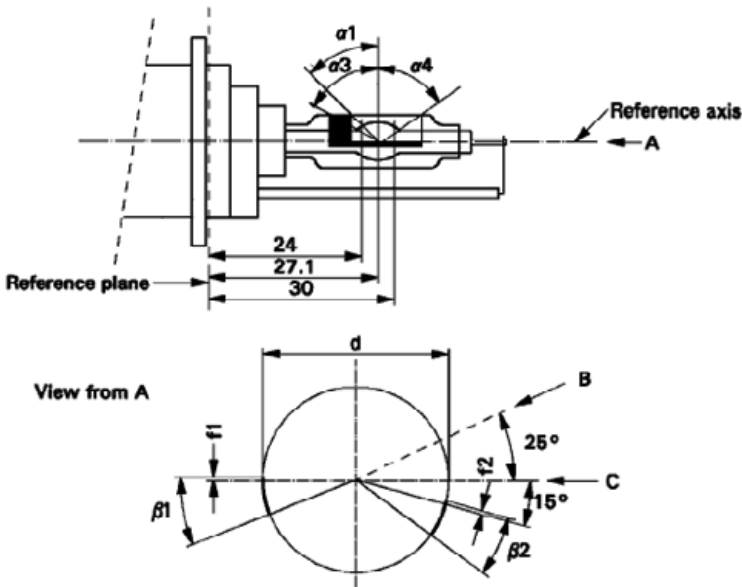
Zone A	≤ 4,5 %	Line B	≤ 15 %	Line C	≤ 5,0 %
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The area of zone A is defined by the black coating, the outer bulb and a plane at 24,5 mm from the reference plane.

Categories D1R, D2R, D3R and D4R Sheet DxR/7

Position of black stripes

This test is used to determine whether the black stripes are correctly positioned relative to the reference axis and the reference plane.



When measuring the luminance distribution of the arc in the central cross section as defined on sheet DxR/6, after having turned the light source so that the black stripe is covering the arc, the measured luminance shall be ≤ 0,5 % of L_{max} .

In the area defined by α_1 and α_3 the black coating may be replaced by any other means which prevents light transmission through the specified area.

Dimensions	Production light sources	Standard light sources
$\alpha 1$	$45^{\circ} \pm 5^{\circ}$	
$\alpha 3$	70° min.	
$\alpha 4$	65° min.	
$\beta 1/24, \beta 1/30, \beta 2/24, \beta 2/30$	$25^{\circ} \pm 5^{\circ}$	
$f1/24, f2/24$ ⁽¹⁾	$0,15 \pm 0,25$	$0,15 \pm 0,20$
$f1/30$	$f1/24 \text{ mv} \pm 0,15$ ⁽²⁾	$f1/24 \text{ mv} \pm 0,1$
$f2/30$	$f2/24 \text{ mv} \pm 0,15$ ⁽²⁾	$f2/24 \text{ mv} \pm 0,1$
$f1/24 \text{ mv} - f2/24 \text{ mv}$	$\pm 0,3 \text{ max.}$	$\pm 0,2 \text{ max.}$
d	9 ± 1	

⁽¹⁾ 'f1/...' means dimension f1 to be measured at the distance from the reference plane indicated in mm after the stroke.
⁽²⁾ '.../24 mv' means the value measured at a distance of 24 mm from the reference plane.

Categories D1S, D2S, D3S and D4S Sheet DxS/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the gas-discharge light source

Figure 1

Category D1S — Type with cables — Cap PK32d-2

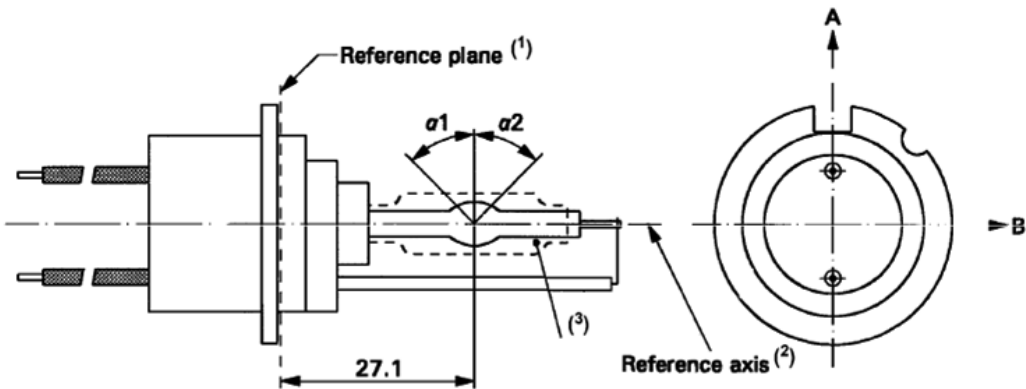
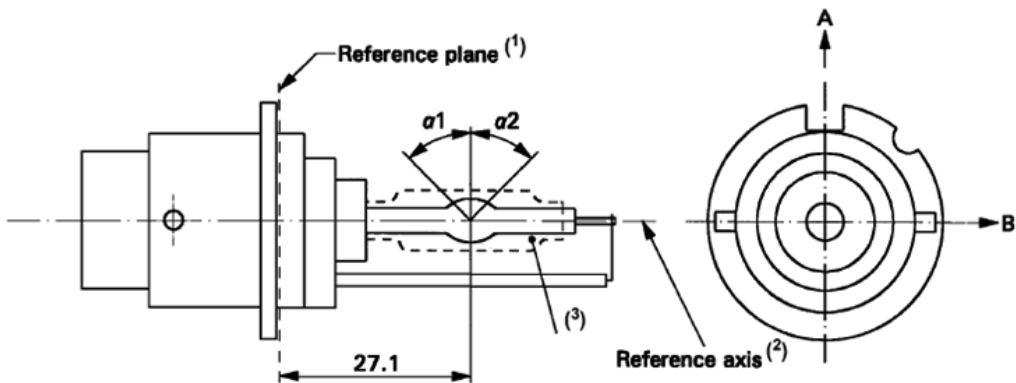


Figure 2

Category D2S — Type with connector — Cap P32d-2



(1) The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
(2) See sheet DxS/3.
(3) When measured at a distance of 27,1 mm from the reference plane and with respect to the mid-point of the inner bulb, the outer bulb shall have an eccentricity of 1 mm max.

Categories D1S, D2S, D3S and D4S Sheet DxS/2

The drawings are intended only to illustrate the essential dimensions (in mm) of the gas-discharge light source

Figure 3

Category D3S — Type with starter — Cap PK32d-5

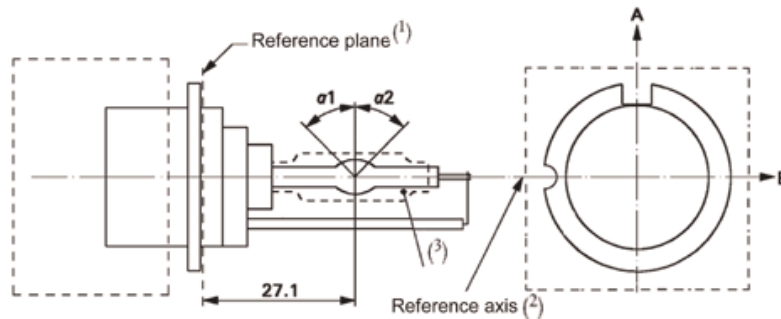
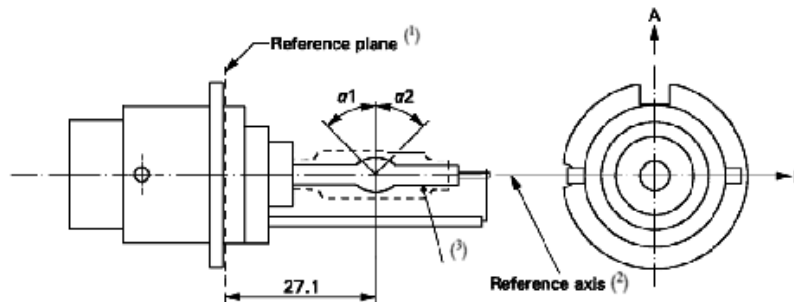


Figure 4

Category D4S — Type with connector — Cap P32d-5



(¹) The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.

(²) See sheet DxS/3.

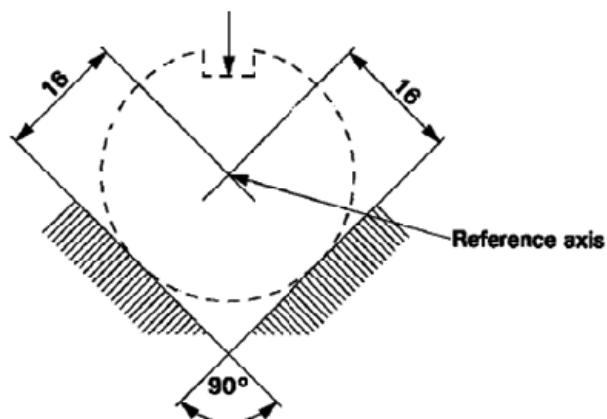
(³) When measured at a distance of 27,1 mm from the reference plane and with respect to the mid-point of the inner bulb, the outer bulb shall have an eccentricity of 1 mm max.

Categories D1S, D2S, D3S and D4S Sheet DxS/3

Figure 5

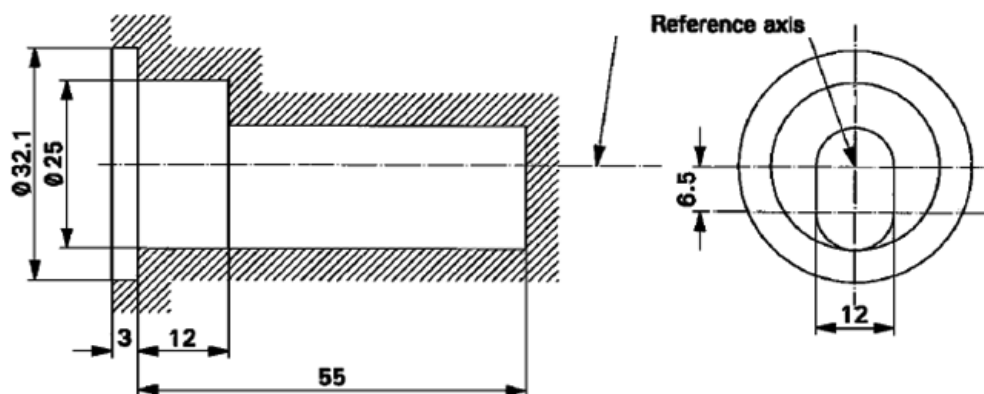
Definition of reference axis (¹)

The cap shall be pushed in this direction



(¹) The reference axis is perpendicular to the reference plane and crosses the intersection of the two parallel lines as indicated in figure 5.

Figure 6

Maximum lamp outline ⁽¹⁾

⁽¹⁾ Glass bulb and supports shall not exceed the envelope, as indicated in figure 6. The envelope is concentric with the reference axis.

Categories D1S, D2S, D3S and D4S Sheet DxS/4

Dimensions	Production light sources	Standard light sources
Position of electrodes	Sheet DxS/5	
Position and form of the arc	Sheet DxS/6	
$\alpha 1, \alpha 2$ ⁽¹⁾	55° min.	55° min.

D1S: Cap PK32d-2
D2S: Cap P32d-2
D3S: Cap PK32d-5
D4S: Cap P32d-5

in accordance with IEC Publication 60061 (sheet 7004-111-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

			D1S/D2S	D3S/D4S	D1S/D2S	D3S/D4S
Rated voltage of the ballast	V		12 ⁽²⁾		12	
Rated wattage	W		35		35	
Test voltage	V		13,5		13,5	
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	3 200		3 200	
	Tolerance		± 450		± 150	
Chromaticity co-ordinates in the case of white light	Objective		x = 0,375		y = 0,375	
		Boundaries	x = 0,345		y = 0,150 + 0,640 x	
			x = 0,405		y = 0,050 + 0,750 x	
	Tolerance area ⁽³⁾	Intersection points	x = 0,345		y = 0,371	
			x = 0,405		y = 0,409	
			x = 0,405		y = 0,354	
			x = 0,345		y = 0,309	
Hot re-strike switch-off time	s		10		10	

⁽¹⁾ The part of the bulb within the angles ± 1 and ± 2 shall be the light emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles ± 1 and ± 2.

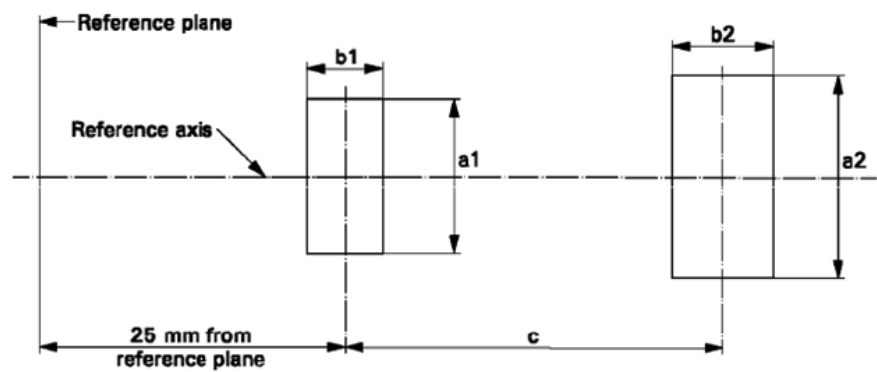
⁽²⁾ Application voltages of ballasts may differ from 12 V.

⁽³⁾ See Annex 4.

Categories D1S, D2S, D3S and D4S Sheet DxS/5

Position of the electrodes

This test is used to determine whether the electrodes are correctly positioned relative to the reference axis and the reference plane.



Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	$d + 0,2$	$d + 0,1$
a2	$d + 0,5$	$d + 0,25$
b1	0,3	0,15
b2	0,6	0,3
c	4,2	4,2

d = diameter of the electrode;
d < 0,3 for D1S and D2S;
d < 0,4 for D3S and D4S.

The top of the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The top of the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2.

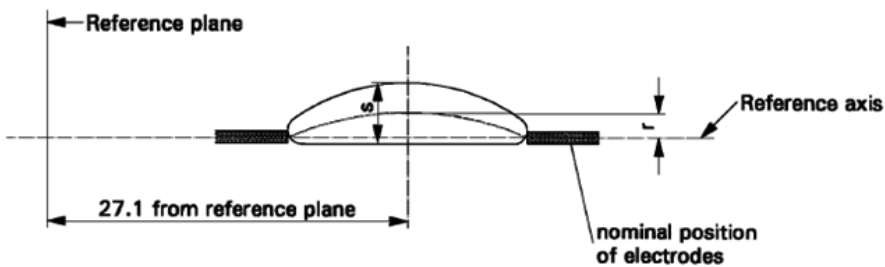
Categories D1S, D2S, D3S and D4S Sheet DxS/6

Position and form of the arc

This test is used to determine the form of the arc and its position relative to the reference axis and the reference plane by measuring its bending and diffusion in the cross section at a distance 27,1 mm from the reference plane.

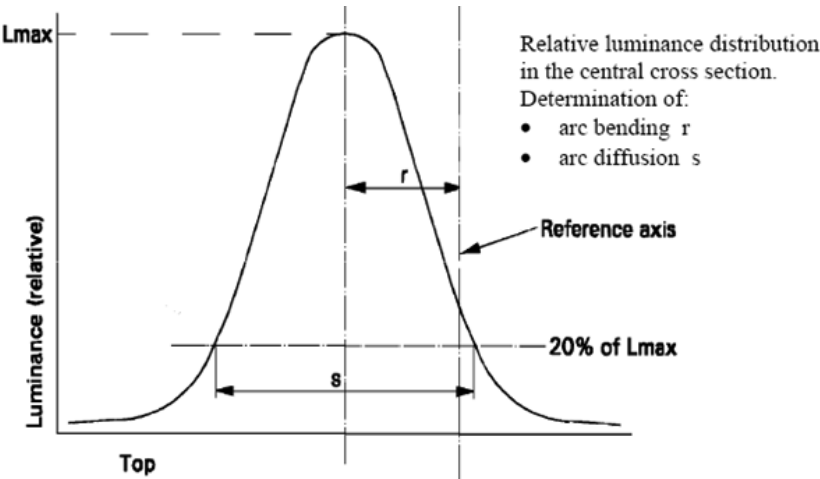
The form of the arc is for illustration purposes only.

Measuring direction: light source side view



When measuring the relative luminance distribution in the central cross section as indicated in the drawing above, the maximum value shall be located within the distance r from the reference axis. The point of 20 % of the maximum value shall be within s.

Dimension in mm	Production light sources	Standard light sources
r	$0,50 \pm 0,40$	$0,50 \pm 0,20$
s	$1,10 \pm 0,40$	$1,10 \pm 0,25$



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 gas-discharge light source pursuant to Regulation No 99

Approval No Extension No

1. Gas-discharge light source — category
 — rated wattage
2. Trade name or mark
3. Manufacturer's name and address
4. If applicable, name and address of manufacturer's representative

5. Brand and type number of the ballast
6. Submitted for approval on
7. Technical Service responsible for conducting approval test
8. Date of report issued by that service
9. Number of report issued by that service
10. Approval: granted/refused/extended/withdrawn ⁽²⁾
11. Place
12. Date
13. Signature
14. The attached drawing No shows the entire light source.

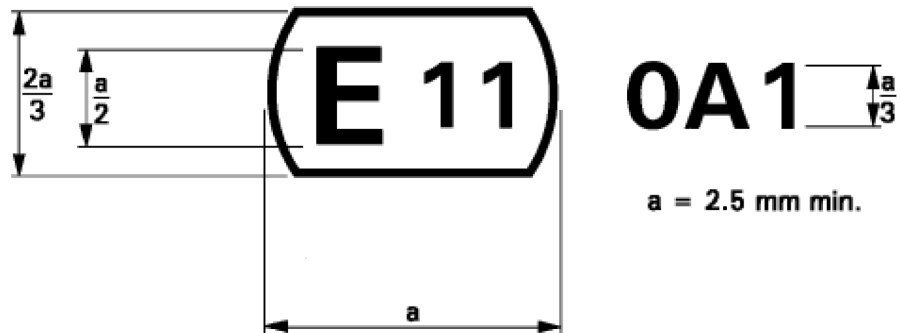
⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/ withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

ANNEX 3

EXAMPLE OF THE ARRANGEMENT OF THE APPROVAL MARK

(see paragraph 2.4.3)



The above approval mark affixed to a gas-discharge light source indicates that the light source has been approved in the United Kingdom (E11) under the approval code 0A1. The first character of the approval code indicates that the approval was granted in accordance with the requirements of Regulation No 99 in its original form.

ANNEX 4

METHOD OF MEASUREMENT OF ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS**1. General**

For starting, run-up and hot-restrike tests and for the measurement of electrical and photometric characteristics, the gas-discharge light source shall be operated in free air with an ambient temperature of $25^{\circ} \pm 5^{\circ}\text{C}$.

2. Ballast

All tests and measurements shall be carried out with the ballast as per paragraph 2.2.2.4 of this Regulation. The power supply used for the starting and run-up tests shall be qualified to secure the quick rise of the high current pulse.

3. Burning position

The burning position shall be horizontal within $\pm 10^{\circ}$ with the lead wire down. 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 cylinder having a diameter of 32 mm and a length of 60 mm concentric with the reference axis and symmetric to the arc. Moreover stray magnetic fields shall be avoided.

4. Ageing

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.

5. Supply voltage

All tests shall be carried out at test voltage as indicated on the relevant data sheet.

6. Starting test

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.

7. Run-up test

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.

8. Hot restrike test

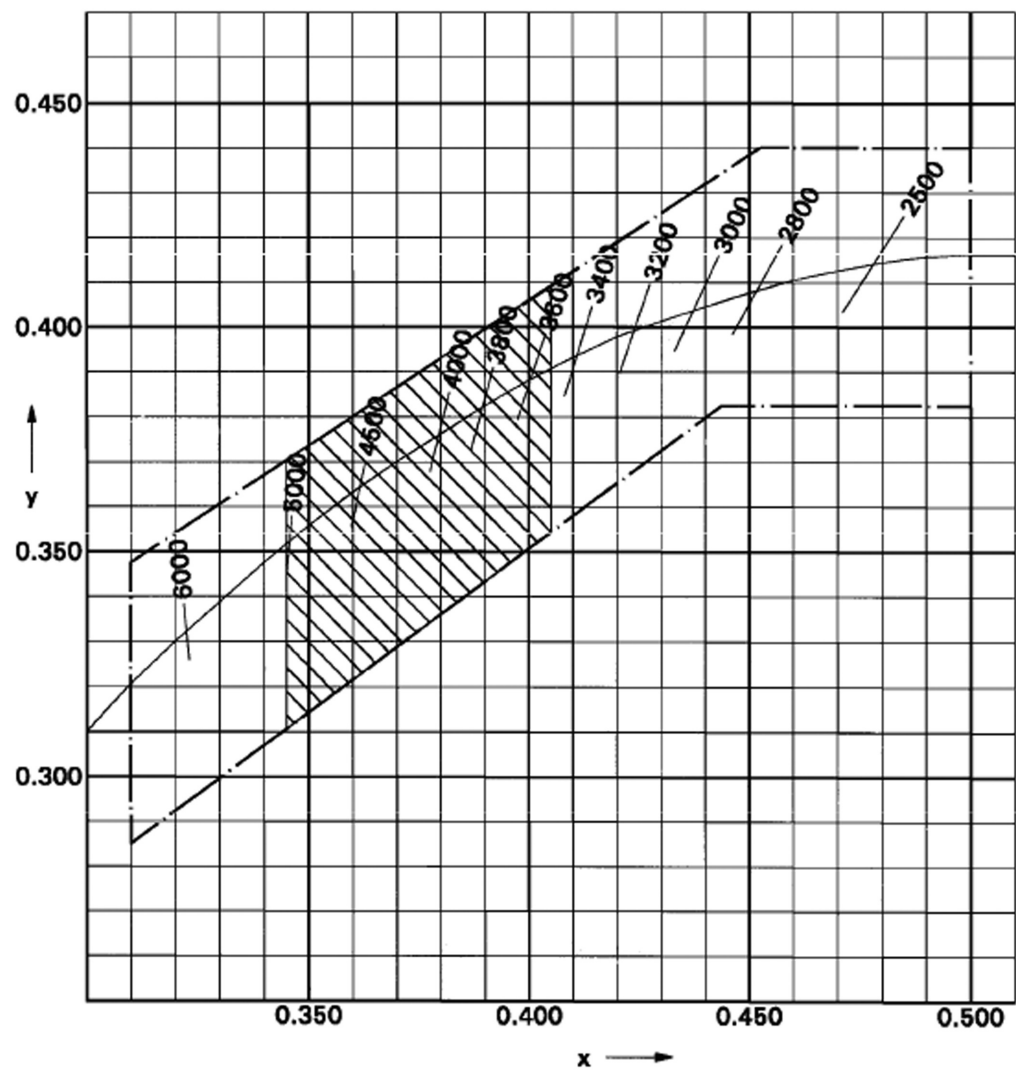
The light source shall be started and be operated with the ballast at test voltage for a period of 15 minutes. Then the supply voltage to the ballast shall be switched off for a switch-off period as indicated on the relevant data sheet and be switched on again.

9. Electrical and photometric test

Before any measurement, the light source shall be stabilized for a period of 15 minutes.

10. Colour

The colour of the light source shall be measured in an integrating sphere using a measuring system which shows the CIE chromaticity co-ordinates of the received light with a resolution of $\pm 0,002$. The following figure shows the colour tolerance area for colour white and the restricted tolerance area for the gas-discharge light sources D1R, D1S, D2R, D2S, D3R, D3S, D4R and D4S.



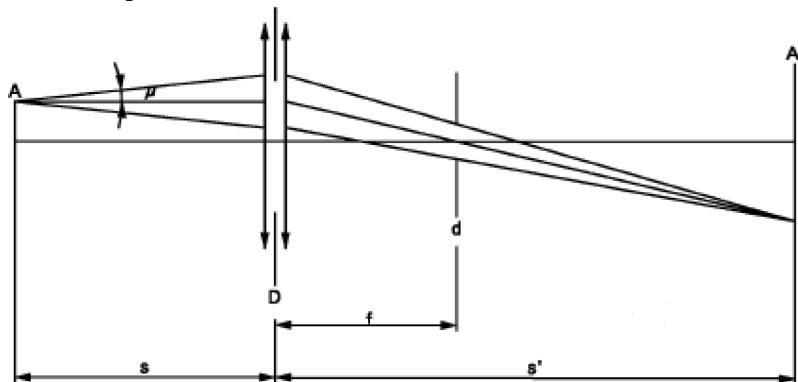
ANNEX 5

Optical setup for the measurement of the position and form of the arc and of the position of the electrodes ⁽¹⁾

The gas-discharge light source shall be positioned as shown:

in figure 1 or figure 2 on sheet DxR/1 or sheet DxS/1;

in figure 3 or figure 4 on sheet DxR/2 or sheet DxS/2.



An optical system shall project a real image A' of the arc A with a magnification of preferably $M = s'/s = 20$ on a screen. The optical system shall be aplanatic and achromatic. In the focus-length f of the optical system a diaphragm d shall cause a projection of the arc with nearly parallel observation directions. To get the angle of the half divergence not larger than $\mu = 0,5^\circ$, the diameter of the focus-diaphragm with respect to the focus-length of the optical system shall be not more than $d = 2f \tan(\mu)$. The active diameter of the optical system shall be not more than:

$$D = (1 + 1/M)d + c + (b_1 + b_2)/2 \quad (c, b_1 \text{ and } b_2 \text{ are given on sheet DxS/5, respectively sheet DxR/5}).$$

A scale on the screen shall enable to measure the position of the electrodes. The calibration of the arrangement advantageously can be done by using a separate projector with a parallel beam in connection with a gauge whose shadow is projected to the screen. The gauge shall show the reference axis and the plane parallel to the reference plane and at distance 'e' mm from it ($e = 27,1$ for D1R, D1S, D2R, D2S, D3R, D3S, D4R and D4S).

In the plane of the screen a receiver has to be mounted movable in a vertical direction on a line corresponding to the plane at 'e' from the reference plane of the gas discharge light source.

The receiver shall have the relative spectral sensitivity of the human eye. The size of the receiver shall be not more than 0,2 M mm in the horizontal and not more than 0,025 M mm in the vertical direction (M = the magnification). The range of measurable movement shall be such that the required measures of the arc bending r and arc diffusion s can be measured.

⁽¹⁾ This method is an example of a measurement method; any method with equivalent measurement accuracy may be used.

ANNEX 6

Minimum requirements for quality control procedures by the manufacturer**1. GENERAL**

The conformity requirements shall be considered satisfied from a photometric (including UV-radiation), geometrical, visual and electrical standpoint if the specified tolerances for production gas-discharge light sources in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of gas-discharge light source the manufacturer or the holder of the approval mark shall carry out tests, in accordance with the provisions of this Regulation, at appropriate intervals.

2.1. Nature of tests

Tests of conformity of these specifications shall cover their photometric, geometrical and optical 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. The application of paragraph 2.2.1 requires regular calibration of test apparatus and its correlation with measurements made by a Competent Authority.

2.3. Nature of sampling

Samples of gas-discharge light sources shall be selected at random from the production of a uniform batch. A uniform batch means a set of gas-discharge light sources of the same type, defined according to the production methods of the manufacturer.

2.4. Inspected and recorded characteristics

The gas-discharge light sources shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, table 1.

2.5. Criteria governing acceptability

The manufacturer or the holder of approval is responsible for carrying out a statistical study of the test results in order to meet the specification laid down for verification of conformity of products in paragraph 4.1 of this Regulation.

Compliance shall be assured if the level of acceptable non-compliance per grouping of characteristics given in table 1 of Annex 7 is not exceeded. This means that the number of gas-discharge light sources not complying with the requirement for any grouping of characteristics of any gas-discharge light source type does not exceed the qualifying limits in the relevant tables 2, 3 or 4 of Annex 7.

Note: Each individual gas-discharge light source requirement shall be considered as a characteristic.

ANNEX 7

Sampling and compliance levels for manufacturer's test records

Table 1

Characteristics

Grouping of characteristics	Grouping (*) of test records between gas-discharge light source types	Minimum 12 monthly sample per grouping (*)	Acceptable level of non-compliance per grouping of characteristics (%)
Marking, legibility and durability	All types with the same external dimensions	315	1
Bulb quality	All types with the same bulb	315	1
External dimensions (excluding cap)	All types of the same category	315	1
Position and dimensions of arc and stripes	All types of the same category	200	6,5
Starting, run-up and hot-restrike	All types of the same category	200	1
Lamp voltage and wattage	All types of the same category	200	1
Luminous flux, colour and UV radiation	All types of the same category	200	1

(*) The assessment shall in general cover series production gas-discharge light sources from individual factories. A manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in table 2 as maximum number of non-compliances. The limits are based on an acceptable level of 1 per cent of non-compliances, assuming an acceptance probability of at least 0,95.

Table 2

Number of test results of each characteristics	Qualifying limits for acceptance
- 200	5
201 - 260	6
261 - 315	7
316 - 370	8
371 - 435	9
436 - 500	10
501 - 570	11
571 - 645	12
646 - 720	13
721 - 800	14
801 - 860	15
861 - 920	16
921 - 990	17
991 - 1 060	18

Number of test results of each characteristics	Qualifying limits for acceptance
1 061 - 1 125	19
1 126 - 1 190	20
1 191 - 1 249	21

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in table 3 given as maximum number of non-compliances. The limits are based on an acceptable level of 6,5 per cent of non-compliances, assuming an acceptance probability of at least 0,95.

Table 3

Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit
200	21	541 - 553	47	894 - 907	73
201 - 213	22	554 - 567	48	908 - 920	74
214 - 227	23	568 - 580	49	921 - 934	75
228 - 240	24	581 - 594	50	935 - 948	76
241 - 254	25	595 - 608	51	949 - 961	77
255 - 268	26	609 - 621	52	962 - 975	78
269 - 281	27	622 - 635	53	976 - 988	79
282 - 295	28	636 - 648	54	989 - 1 002	80
296 - 308	29	649 - 662	55	1 003 - 1 016	81
309 - 322	30	663 - 676	56	1 017 - 1 029	82
323 - 336	31	677 - 689	57	1 030 - 1 043	83
337 - 349	32	690 - 703	58	1 044 - 1 056	84
350 - 363	33	704 - 716	59	1 057 - 1 070	85
364 - 376	34	717 - 730	60	1 071 - 1 084	86
377 - 390	35	731 - 744	61	1 085 - 1 097	87
391 - 404	36	745 - 757	62	1 098 - 1 111	88
405 - 417	37	758 - 771	63	1 112 - 1 124	89
418 - 431	38	772 - 784	64	1 125 - 1 138	90
432 - 444	39	785 - 798	65	1 139 - 1 152	91
445 - 458	40	799 - 812	66	1 153 - 1 165	92
459 - 472	41	813 - 825	67	1 166 - 1 179	93
473 - 485	42	826 - 839	68	1 180 - 1 192	94
486 - 499	43	840 - 852	69	1 193 - 1 206	95
500 - 512	44	853 - 866	70	1 207 - 1 220	96
513 - 526	45	867 - 880	71	1 221 - 1 233	97
527 - 540	46	881 - 893	72	1 234 - 1 249	98

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in table 4 given as a percentage of the results, assuming an acceptance probability of at least 0,95.

Table 4

Number of test results of each characteristic	Qualifying limits shown as a percentage of results. Acceptable level of 1 per cent of non-compliances	Qualifying limits shown as a percentage of results. Acceptable level of 6,5 per cent of non-compliances
1 250	1,68	7,91
2 000	1,52	7,61
4 000	1,37	7,29
6 000	1,30	7,15
8 000	1,26	7,06
10 000	1,23	7,00
20 000	1,16	6,85
40 000	1,12	6,75
80 000	1,09	6,68
100 000	1,08	6,65
1 000 000	1,02	6,55

ANNEX 8

MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR

1. The conformity requirements shall be considered satisfied from a photometric, geometrical, visual and electrical standpoint if the specified tolerances for production gas-discharge light sources in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.
2. The conformity of mass-produced gas-discharge light sources shall not be contested if the results are in agreement with paragraph 5 of this annex.
3. Conformity shall be contested and the manufacturer requested to make the production meet the requirements if the results are not in agreement with paragraph 5 of this annex.
4. If paragraph 3 of this annex is applied, a further sample of 250 gas-discharge light sources, selected at random from a recent production run, shall be taken within two months.
5. Compliance approved or disapproved shall be decided according to the values in table 1. For each grouping of characteristics gas-discharge light sources shall be either accepted or rejected according to the values in table 1 ⁽¹⁾.

Table 1

Sample	1 per cent (*)		6,5 per cent (*)	
	Accept	Reject	Accept	Reject
First sample size: 125	2	5	11	16
If the number of non-conforming units is greater than 2 (11) and less than 5 (16) take a second sample size of 125 and assess the 250	6	7	26	27

(*) The gas-discharge light sources shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, table 1.

⁽¹⁾ The proposed scheme is designed to assess the compliance of gas-discharge light sources to an acceptance level of non-compliance of 1 per cent and 6,5 per cent respectively and is based on the Double Sampling Plan for Normal Inspection in IEC Publication 60410: Sampling Plans and Procedures for Inspection by Attributes.

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 116 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform technical prescriptions concerning the protection of motor vehicles against unauthorised use

Incorporating all valid text up to:

Supplement 2 to the original version of the Regulation — Date of entry into force: 15 October 2008

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4. Approval
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 - 5.2. General specifications
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ANNEXES

Annex 1 — Information document:

Part 1: in accordance with paragraphs 5, 7 and 8 as appropriate of Regulation No 116 relating to ECE system type approval of a vehicle type with regard to the devices to prevent unauthorised use

Part 2: in accordance with paragraph 6 of Regulation No 116 relating to ECE component type approval of an alarm system

Part 3: in accordance with paragraph 8 of Regulation No 116 relating to ECE component type approval of an immobiliser system

Annex 2 — Communication concerning approval granted, extended, refused, withdrawn, production definitively discontinued:

Part 1: of a vehicle type with regard to its devices to prevent unauthorised use pursuant to Regulation No 116

Part 2: of a component type as an alarm system pursuant to Regulation No 116

Part 3: of a component type as an immobiliser pursuant to Regulation No 116

Annex 3 — Arrangements of approval marks

Annex 4 — Part 1: Wear producing test procedure for devices to prevent unauthorised use acting on the steering

Part 2: Test procedure for devices to prevent unauthorised use acting on the steering using a torque limiting device

Annex 5 — (Reserved)

Annex 6 — Model of certificate of conformity

Annex 7 — Model of installation certificate

Annex 8 — Test of systems for the protection of the passenger compartment

Annex 9 — Electromagnetic compatibility

Annex 10 — Specifications for mechanical key switches

1. SCOPE

This Regulation applies to:

- 1.1. PART I — Approval of a vehicle of category M1 and N1 ⁽¹⁾ with regard to its devices to prevent unauthorised use.
- 1.2. PART II — Approval of vehicle alarm systems (VAS) which are intended to be permanently fitted to vehicles of category M1 and those of category N1 with a maximum mass of not more than 2 tonnes ⁽¹⁾.
- 1.3. PART III — Approval of vehicles of category M1 and those of category N1 with a maximum mass of not more than 2 tonnes, with regard to their alarm system(s) ⁽²⁾.
- 1.4. PART IV — Approval of immobilisers and vehicles of category M1 and vehicles of category N1 with a maximum mass of not more than 2 tonnes with regard to immobilisers ⁽¹⁾ ⁽²⁾.
- 1.5. The fitting of devices specified under Part I to vehicles of other categories is optional but any such device fitted is required to comply with all relevant provisions of this Regulation.
- 1.6. The fitting of devices specified under Parts III and IV to vehicles of other categories, or to N1 category vehicles with a maximum mass exceeding 2 tonnes, is optional but any such device fitted is required to comply with all relevant provisions of this Regulation.
- 1.7. At the request of the manufacturer, Contracting Parties may grant approvals under Parts I to IV to vehicles of other categories and devices for fitment to such vehicles.
- 1.8. At the time of application of this Regulation, Contracting Parties shall declare which parts of the Regulation they intend to mandate in their territory for each category of vehicles ⁽³⁾

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, system, component or separate technical unit that is the subject of the approval process.

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 in accordance with the model shown in Annex 1, Part 1, 2 or 3 as appropriate.
- 3.3. Vehicle(s)/component(s) representative of the type(s) to be approved shall be submitted to the technical service responsible for conducting the approval tests.

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 amendment 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.

⁽¹⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3), Annex 7 (document TRANS/WP.29/78/Rev.1, as amended).

⁽²⁾ Only vehicles with 12 volts electrical systems are considered.

⁽³⁾ It is recommended that Contracting Parties apply Parts I and IV to approval of M1 category vehicles and Part I only to approval of N1 category vehicles, the other requirements remaining optional. Parts II, III and IV should apply where such equipment is fitted to vehicle categories shown in paragraphs 1.3 to 1.5.

- 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 a form conforming to the model in Annex 2, Part 1, 2 or 3 as appropriate to this Regulation.
- 4.4. There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle or component 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 approval ⁽¹⁾, and
- 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, and
- 4.4.3. an additional symbol:
- 4.4.3.1. 'A' in the case of an alarm system (Part II);
- 4.4.3.2. 'I' in the case of an immobiliser (Part IV);
- 4.4.3.3. 'AI' in the case of a combination of an alarm system and an immobiliser;
- 4.4.3.4. 'L' in the case of a vehicle approval as regards its devices to prevent unauthorised use (Part I);
- 4.4.3.5. 'LA' in the case of a vehicle approval as regards its devices to prevent unauthorised use (Part I) combined with an alarm system;
- 4.4.3.6. 'LI' in the case of a vehicle approval as regards its devices to prevent unauthorised use (Part I) combined with an immobiliser;
- 4.4.3.7. 'LAI' in the case of a vehicle approval as regards its devices to prevent unauthorised use (Part I) combined with an alarm system and an immobiliser.
- 4.5. 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.
- 4.6. The approval mark shall be clearly legible and be indelible.
- 4.7. In the case of a vehicle, the approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.8. In the case of a component approved separately as an alarm system or immobiliser or both, the approval mark shall be affixed by the manufacturer to the major element(s) of the device.
- 4.9. Annex 3 to this Regulation gives examples of arrangements of approval marks.

⁽¹⁾ 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.

- 4.10. As an alternative to the approval mark described in paragraph 4.4. above, a certificate of conformity shall be issued for every VAS and immobiliser offered for sale.

Where a VAS and/or immobiliser manufacturer supplies an approved unmarked VAS and/or immobiliser to a vehicle manufacturer, for fitment by that manufacturer as original equipment for a vehicle model or range of vehicle models, the VAS and/or immobiliser manufacturer shall supply a number of copies of the certificate of conformity to the vehicle manufacturer, sufficient for that manufacturer to obtain the vehicle approval to Parts II, III and IV, as appropriate, of this Regulation.

If the VAS or immobiliser is made up of separate components, its main component(s) shall bear a reference mark and the certificate of conformity shall provide a list of such reference marks.

A model of the certificate of conformity is given in Annex 6 to this Regulation.

5. PART I: APPROVAL OF A VEHICLE OF CATEGORY M1 AND N1 WITH REGARD TO ITS DEVICES TO PREVENT UNAUTHORISED USE

- 5.1. DEFINITIONS

For the purpose of Part I of this Regulation,

- 5.1.1. 'Vehicle type' means a category of motor vehicles that do not differ in such essential respects as:

- 5.1.1.1. the manufacturer's type designation;

- 5.1.1.2. the arrangement and design of the vehicle component or components on which the device to prevent unauthorised use acts;

- 5.1.1.3. the type of device to prevent unauthorised use.

- 5.1.2. Device to prevent unauthorised use means a system designed to prevent unauthorised normal activation of the engine or other source of main engine power of the vehicle in combination with at least one system which:

(a) locks the steering; or

(b) locks the transmission; or

(c) locks the gearshift control; or

(d) locks brakes.

In the case of a system that locks brakes, deactivation of the device shall not automatically release the brakes contrary to the driver's intention.

- 5.1.3. 'Steering' means the steering control, the steering column and its accessory cladding, the steering shaft, the steering gearbox and all other components that directly affect the effectiveness of the device to prevent unauthorised use.

- 5.1.4. 'Combination' means one of the specifically developed and constructed variations of a locking system which, when properly activated, permits operation of the locking system.

- 5.1.5. 'Key' means any device designed and constructed to provide a method of operating a locking system that is designed and constructed to be operated only by that device.

- 5.1.6. 'Rolling code' means an electronic code consisting of several elements the combination of which changes at random after each operation of the transmitting unit.

- 5.2. GENERAL SPECIFICATIONS
- 5.2.1. The device to prevent unauthorised use shall be so designed that it is necessary to put it out of action in order to enable:
- 5.2.1.1. the engine to be started by means of the normal control; and
- 5.2.1.2. the vehicle to be steered, driven or moved forward under its own power.
- 5.2.1.3. The requirement of paragraph 5.2.1 can be achieved at the same time as or before to the actions described at paragraphs 5.2.1.1 and 5.2.1.2.
- 5.2.2. The requirements of paragraph 5.2.1 shall be met by the application of a single key.
- 5.2.3. Except in the case provided for in paragraph 5.3.1.5, a system operated with a key inserted in a lock shall not permit removal of the key before the device referred to in paragraph 5.2.1 has come into action or has been set to act.
- 5.2.4. The device to prevent unauthorised use referred to in paragraph 5.2.1 above, and the vehicle components on which it operates, shall be so designed that it cannot rapidly and without attracting attention be opened, rendered ineffective or destroyed by, for example, the use of low-cost, easily concealed tools, equipment or fabrications readily available to the public at large.
- 5.2.5. The device to prevent unauthorised use shall be fitted to the vehicle as an item of original equipment (i.e. equipment installed by the vehicle manufacturer prior to first retail sale). It shall be fitted in such a way that even after removal of its housing it cannot, when in the blocked condition, be dismantled otherwise than with special tools. If it is possible to render the device to prevent unauthorised use ineffective by the removal of screws, those screws shall, unless they are of the non-removable type, be covered by parts of the blocked protective device.
- 5.2.6. Mechanical locking systems shall provide at least 1 000 different key combinations or a number equal to the total number of vehicles manufactured annually if less than 1 000. In vehicles of one type the frequency of occurrence of each combination shall be roughly one per 1 000.
- 5.2.7. Electrical/electronic locking systems, e.g. remote control, shall have at least 50 000 variants and shall incorporate a rolling code and/or have a minimum scan time of ten days, e.g. a maximum of 5 000 variants per 24 hours for 50 000 variants minimum.
- 5.2.8. Regarding the nature of the device to prevent the unauthorised use, paragraph 5.2.6 or 5.2.7, shall be applied.
- 5.2.9. The key and lock shall not be visibly coded.
- 5.2.10. The lock shall be so designed, constructed and fitted that turning of the lock cylinder, when in the locked position, with a torque of less than 2,45 Nm is not possible with any key other than the mating key, and
- 5.2.10.1. for lock cylinders with pin tumblers no more than two identical tumblers operating in the same direction shall be positioned adjacent to each other, and in a lock there shall not be more than 60 per cent identical tumblers;
- 5.2.10.2. for lock cylinders with disc tumblers no more than two identical tumblers operating in the same direction shall be positioned adjacent to each other, and in a lock there shall not be more than 50 per cent identical tumblers.
- 5.2.11. Devices to prevent unauthorised use shall be such as to exclude any risk of accidental operating failure while the engine is running, particularly in the case of blockage likely to compromise safety.

- 5.2.11.1. It shall not be possible to activate devices to prevent unauthorised use without first setting the engine controls to a stop condition and then performing an action which is not an uninterrupted continuation of stopping the engine or without first setting the engine controls to a stop condition and when the vehicle is stationary with the parking brake applied or the speed of the vehicle does not exceed 4 km/h.
- 5.2.11.2. In the case of devices to prevent unauthorised use, if the action of key withdrawal activates the device it shall either necessitate a minimum movement of 2 mm before activation of the device or incorporate an override facility to prevent accidental removal or partial withdrawal of the key.
- 5.2.11.3. Paragraphs 5.2.10, 5.2.10.1 or 5.2.10.2, and 5.2.11.2 are only applicable to devices that include mechanical keys.
- 5.2.12. Power assistance may be used only to activate the locking and/or unlocking action of the device to prevent unauthorised use. The device shall be kept in its operating position by any suitable means which does not need a power supply.
- 5.2.13. It shall not be possible to activate the motive power of the vehicle by normal means until the device to prevent unauthorised use has been deactivated.
- 5.2.14. Devices to prevent unauthorised use by preventing release of the brakes of the vehicle shall only be permitted when the working parts of the brakes are held in a locked position by a purely mechanical device. In this case the prescriptions of paragraph 5.2.13. do not apply.
- 5.2.15. If the device to prevent unauthorised use is equipped with a driver warning feature it shall be activated when the operator opens the driver's side door, unless the device has been activated and the key removed by the operator.
- 5.3. PARTICULAR SPECIFICATIONS
- In addition to the general specifications prescribed in paragraph 5.2, the device to prevent unauthorised use shall meet the particular conditions prescribed below:
- 5.3.1. Devices to prevent unauthorised use acting on the steering
- 5.3.1.1. A device to prevent unauthorised use acting on the steering shall render the steering inoperative. Before the engine can be started, the normal steering operation must be restored.
- 5.3.1.2. When the device to prevent unauthorised use is set to act, it shall not be possible to prevent the device from functioning.
- 5.3.1.3. The device to prevent unauthorised use must continue to meet the requirements of paragraphs 5.2.11, 5.3.1.1, 5.3.1.2 and 5.3.1.4 after it has undergone 2 500 locking cycles in each direction of the wear producing test specified in Part 1 of Annex 4 to this Regulation.
- 5.3.1.4. The device to prevent unauthorised use shall, in its activated position, satisfy one of the following criteria:
- 5.3.1.4.1. it shall be strong enough to withstand, without damage to the steering mechanism likely to compromise safety, the application of a torque of 300 Nm about the axis of the steering spindle in both directions under static conditions;
- 5.3.1.4.2. it shall incorporate a mechanism designed to yield or slip, such that the system will withstand, either continuously or intermittently, the application of a torque of at least 100 Nm. The locking system must still withstand the application of this torque after the test specified in Part 2 of Annex 4 to this Regulation;
- 5.3.1.4.3. it shall incorporate a mechanism designed to permit the steering wheel to rotate freely on the blocked steering spindle. The blocking mechanism shall be strong enough to withstand the application of a torque of 200 Nm about the axis of the steering spindle in both directions under static conditions.

- 5.3.1.5. If the device to prevent unauthorised use is such that the key can be removed in a position other than the position in which the steering is inoperative, it shall be so designed that the manoeuvre required to reach that position and remove the key cannot be effected inadvertently.
- 5.3.1.6. If a component fails such that the torque requirements specified in paragraphs 5.3.1.4.1, 5.3.1.4.2 and 5.3.1.4.3 cannot be easily applied, yet the steering system remains blocked, the system shall satisfy the requirements.
- 5.3.2. Devices to prevent unauthorised use by acting on the transmission or on brakes
 - 5.3.2.1. A device to prevent unauthorised use acting on the transmission shall prevent the rotation of the vehicle's driving wheels.
 - 5.3.2.2. A device to prevent unauthorised use by acting on brakes shall brake at least one wheel on each side of at least one axle.
 - 5.3.2.3. When the device to prevent unauthorised use is set to act, it shall not be possible to prevent the device from functioning.
 - 5.3.2.4. It shall not be possible for the transmission or brakes to be blocked inadvertently when the key is in the lock of the device to prevent unauthorised use, even if the device preventing starting of the engine has come into action or been set to act. This does not apply wherever the requirements of paragraph 5.3.2 of this Regulation are met by devices used for another purpose in addition and the lock under the conditions above is necessary for this additional function (e.g. electrical parking brake).
 - 5.3.2.5. The device to prevent unauthorised use shall be so designed and constructed that it remains fully effective even after some degree of wear as a result of 2 500 locking cycles in each direction. In the case of protective device acting on brakes, each mechanical or electrical sub-part of the device is concerned.
 - 5.3.2.6. If the device to prevent unauthorised use is such that the key can be removed in a position other than the position in which the transmission or brakes are locked, it shall be so designed that the manoeuvre required to reach that position and remove the key cannot be executed inadvertently.
 - 5.3.2.7. In the case when the protective device acting on the transmission is used, it shall be strong enough to withstand, without damage likely to compromise safety, the application in both directions and in static conditions of a torque 50 per cent greater than the maximum torque that can normally be applied to the transmission. In determining the level of this testing torque account shall be taken, not of the maximum engine torque, but of the maximum torque that can be transmitted by the clutch or by the automatic transmission.
 - 5.3.2.8. In the case of a vehicle equipped with protective device acting on brakes, the device must be capable of holding the laden vehicle stationary on a 20 per cent up or down-gradient.
 - 5.3.2.9. In the case of a vehicle equipped with protective device acting on brakes, the requirements of this Regulation shall not be construed as a departure from the requirements of Regulation No 13 or 13-H even in the case of a failure.
- 5.3.3. Devices to prevent unauthorised use acting on the gearshift control
 - 5.3.3.1. A device to prevent unauthorised use acting on the gearshift control shall be capable of preventing any change of gear.
 - 5.3.3.2. In the case of manual gearboxes it must be possible to lock the gearshift lever in reverse only; in addition locking in neutral shall be permitted.

- 5.3.3.3. In the case of automatic gearboxes provided with a 'parking' position it must be possible to lock the mechanism in the parking position only; in addition locking in neutral and/or reverse shall be permitted.
- 5.3.3.4. In the case of automatic gearboxes not provided with a 'parking' position it must be possible to lock the mechanism in the following positions only: neutral and/or reverse.
- 5.3.3.5. The device to prevent unauthorised use shall be so designed and constructed that it remains fully effective even after some degree of wear as a result of 2 500 locking cycles in each direction.

5.4. ELECTROMECHANICAL AND ELECTRONIC DEVICES TO PREVENT UNAUTHORISED USE

Electromechanical and electronic devices to prevent unauthorised use, where fitted, shall comply with the requirements of paragraphs 5.2 and 5.3 above and paragraph 8.4 below, *mutatis mutandis*.

If the technology of the device is such that paragraphs 5, 6, and 8.4 are not applicable it shall be verified that care has been taken to preserve safety of the vehicle. The functioning process of these devices shall incorporate secure means to prevent any risk of blocking or accidental disfunctioning that could compromise the safety of the vehicle.

6. PART II: APPROVAL OF VEHICLE ALARM SYSTEMS

6.1. DEFINITIONS

For the purpose of Part II of this Regulation,

- 6.1.2. 'Vehicle alarm system' (VAS) means a system intended for installation on (a) type(s) of vehicle(s), designed to indicate intrusion into or interference with the vehicle; these systems may provide additional protection against unauthorised use of the vehicle.
- 6.1.3. 'Sensor' means a device that senses a change that could be caused by intrusion into or interference with a vehicle.
- 6.1.4. 'Warning device' means a device indicating that intrusion into or interference has occurred.
- 6.1.5. 'Control equipment' means equipment necessary for the setting, unsetting and testing of a VAS and for sending an alarm condition to warning devices.
- 6.1.6. 'Set' means the state of a VAS in which an alarm condition can be transmitted to warning devices.
- 6.1.7. 'Unset' means the state of a VAS in which an alarm condition cannot be transmitted to warning devices.
- 6.1.8. 'Key' means any device designed and constructed to provide a method of operating a locking system that is designed and constructed to be operated only by that device.
- 6.1.9. 'Type of vehicle alarm system' means systems that do not differ significantly in such essential aspects as:
- (a) the manufacturer's trade name or mark;
 - (b) the kind of sensor;
 - (c) the kind of warning device;
 - (d) the kind of control equipment.
- 6.1.10. 'Approval of a vehicle alarm system' means the approval of a type of VAS with respect to the requirements laid down in paragraphs 6.2, 6.3 and 6.4 below.

- 6.1.11. 'Immobiliser' means a device which is intended to prevent the vehicle being driven away powered by its own engine.
- 6.1.12. 'Panic alarm' means a device that enables a person to use an alarm, installed on the vehicle, to summon assistance in an emergency.
- 6.2. GENERAL SPECIFICATIONS
- 6.2.1. VAS shall, in the event of intrusion into or interference with a vehicle, provide a warning signal. The warning signal shall be audible and in addition may include optical warning devices, or be a radio alarm or any combination of the above.
- 6.2.2. VASs shall be designed, constructed and installed in such a way that the vehicle when equipped shall continue to comply with the relevant technical requirements, especially with regard to electromagnetic compatibility (EMC).
- 6.2.3. If the VAS includes the possibility of a radio transmission, e.g. for setting or unsetting of the alarm or for alarm transmission, it shall comply with the relevant ETSI Standards ⁽¹⁾, e.g. EN 300 220-1 V1.3.1. (2000-09), EN 300 220-2 V1.3.1. (2000-09), EN 300 220-3 V1.1.1. (2000-09) and EN 301 489-3 V1.2.1. (2000-08) (including any advisory requirements). The frequency and maximum radiated power of radio transmissions for the setting and unsetting of the alarm system must comply with the CEPT/ERC ⁽²⁾ Recommendation 70-03 (17 February 2000) relating to the use of short range devices ⁽³⁾.
- 6.2.4. The installation of a VAS in a vehicle shall not be capable of influencing the vehicle's performance (in the unset state), or its safe operation.
- 6.2.5. The VAS and components thereof shall not activate inadvertently, particularly whilst the engine is in its running mode.
- 6.2.6. Failure of the VAS, or failure of its electrical supply shall not affect the safe operation of the vehicle.
- 6.2.7. The VAS, its components and the parts controlled by them shall be designed, built and installed in such a way as to minimise the risk for anyone to make them inoperable or to destroy them rapidly and without calling attention, e.g. using low-cost, easily-concealed tools, equipment or fabrications readily available to the public at large.
- 6.2.8. The means of setting and unsetting of the VAS shall be designed in such a way that it does not invalidate the requirements of Part I above. Electrical connections to components covered by Part I of this Regulation are allowed.
- 6.2.9. The system shall be so arranged that the shorting out of any warning signal circuit shall not render inoperative any aspects of the alarm system, other than the circuit that is shorted out.
- 6.2.10. VAS may include an immobiliser that shall comply with the requirements of Part IV of this Regulation.
- 6.3. PARTICULAR SPECIFICATIONS
- 6.3.1. Protection range

⁽¹⁾ ETSI: European Telecommunications Standards Institute. If these Standards are not available when this Regulation comes into force, then the relevant domestic requirements shall apply.

⁽²⁾ CEPT: Conference of European Posts and Telecommunications
ERC: European Radiocommunications Committee

⁽³⁾ Contracting Parties may prohibit the frequency and/or the power and may permit the use of other frequency and/or power.

6.3.1.1. Specific requirements

The VAS shall at least detect and signal the opening of any vehicle door, engine bonnet and luggage compartment. The failure or switching off of light sources, e.g. passenger compartment light, shall not impair the control operation.

Additional efficient sensors for information/display, e.g.:

- (i) of intrusions into the vehicle, e.g. passenger compartment control, window glass control, breakage of any glazed area; or
- (ii) of attempted vehicle theft, e.g. inclination sensor;

are allowed, taking account of measures to prevent any unnecessary sounding of the alarm (= false alarm, see paragraph 6.3.1.2 below).

In so far as these additional sensors generate an alarm signal even after an intrusion has occurred (e.g. by breakage of a glazed area) or under external influences (e.g. wind), the alarm signal, activated by one of the above-mentioned sensors, shall be activated not more than 10 times within the same activation period of the VAS.

In this case the activation period shall be limited by the authorised unsetting of the system as a result of the vehicle user's action.

Some kinds of additional sensors, e.g. passenger compartment control (ultrasonic, infrared) or inclination sensor etc., may be intentionally deactivated. In this case, separate deliberate action must be taken each time before the VAS is set. It must not be possible to deactivate the sensors while the alarm system is in a set state.

6.3.1.2. Safety against false alarm

6.3.1.2.1. By adequate measures, e.g.

- (i) mechanical design and design of the electrical circuit according to conditions specific to motor vehicles;
- (ii) selection and application of operation and control principles for the alarm system and components thereof;

it shall be ensured that the VAS both in set and unset conditions, cannot cause the alarm signal to sound unnecessarily, in the event of:

- (a) an impact on the vehicle: test specified in paragraph 6.4.2.13;
- (b) electromagnetic compatibility: tests specified in paragraph 6.4.2.12;
- (c) reduction of battery voltage by continuous discharge: test specified in paragraph 6.4.2.14;
- (d) false alarm of the passenger compartment control: test specified in paragraph 6.4.2.15.

6.3.1.2.2. If the applicant for approval can demonstrate, e.g. by technical data, that safety against false alarm is satisfactorily ensured, the technical service responsible for conducting approval tests may not require some of the above tests.

6.3.2. Audible alarm

6.3.2.1. General

The warning signal shall be clearly audible and recognisable and shall differ significantly from the other audible signals used in road traffic.

In addition to the original equipment audible warning device, a separate audible warning device may be fitted in the area of the vehicle that is controlled by the VAS, where it shall be protected against easy, rapid access by persons.

If a separate audible warning device according to paragraph 6.3.2.3.1 below is used, the original equipment standard audible warning device may additionally be actuated by the VAS, provided that any tampering with the standard audible warning device (generally more easily accessible) does not affect the operation of the additional audible warning device.

6.3.2.2. Duration of the audible signal

Minimum: 25 s

Maximum: 30 s

The audible signal may sound again only after the next interference with the vehicle, i.e. after the above-mentioned time span (Restrictions: see paragraphs 6.3.1.1 and 6.3.1.2 above).

Unsetting of the alarm system shall immediately cut the signal.

6.3.2.3. Specifications concerning the audible signal

6.3.2.3.1. Constant tone signal device (constant frequency spectrum), e.g. horns: acoustical etc., data according to ECE Regulation No 28, Part I.

Intermittent signal (on/off):

Trigger frequency (2 ± 1) Hz

On time = off time ± 10 per cent

6.3.2.3.2. Audible signal device with frequency modulation: acoustical etc., data according to ECE Regulation No 28, Part I but equal passage of a significant frequency range within the above-mentioned range (1 800 through 3 550 Hz) in both directions.

Passage frequency (2 ± 1) Hz

6.3.2.3.3. Sound level

The sound source shall be:

- (i) either an audible warning device approved under ECE Regulation No 28, Part I; or
- (ii) a device meeting the requirements of ECE Regulation No 28, Part I, paragraphs 6.1 and 6.2.

However, in the case of a different sound source from the original equipment audible warning device, the minimum sound level may be reduced to 100 dB(A), measured under the conditions of ECE Regulation No 28, Part I.

6.3.3. Optical alarm — if fitted

6.3.3.1. General

In the event of intrusion into or interference with the vehicle, the device shall activate an optical signal as specified in paragraphs 6.3.3.2 and 6.3.3.3 below.

6.3.3.2. Duration of the optical signal

The optical signal shall have a duration of between 25 s and 5 min after the alarm has been activated. The unsetting of the alarm system shall immediately stop the signal.

6.3.3.3. Type of optical signal

Flashing of all direction indicators and/or passenger compartment light of the vehicle, including all lamps in the same electrical circuit.

Trigger frequency (2 ± 1) Hz

In relation to the audible signal, also asynchronous signals are allowed.

On time = off time ± 10 per cent

6.3.4. Radio alarm (pager) — if fitted

The VAS may include a facility generating an alarm signal by radio transmission.

6.3.5. Alarm system setting lock

6.3.5.1. When the engine is in its running mode, deliberate or inadvertent setting of the alarm system shall be impossible.

6.3.6. Setting and unsetting of the VAS

6.3.6.1. Setting

Any suitable means of setting of the VAS is allowed, provided that such means does not inadvertently cause false alarms.

6.3.6.2. Unsetting

Unsetting of the VAS shall be achieved by one or a combination of the following devices. Other devices giving an equivalent performance are permitted.

6.3.6.2.1. A mechanical key (complying with the requirements of Annex 10 to this Regulation) which can be coupled with a centralised vehicle locking system comprising at least 1 000 variants, operated from the outside.

6.3.6.2.2. Electrical/electronic device, e.g. remote control, with at least 50 000 variants and shall incorporate rolling codes and/or have a minimum scan time of ten days, e.g. a maximum of 5 000 variants per 24 hours for 50 000 variants minimum.

6.3.6.2.3. A mechanical key or an electrical/electronic device within the protected passenger compartment, with timed exit/entry delay.

6.3.7. Exit delay

If the switching device for setting the VAS is fitted within the protected area, an exit delay shall be provided. It shall be possible for the exit delay to be set to between 15 seconds and 45 seconds after the switch has been operated. The delay period may be adjustable to suit individual operators' circumstances.

6.3.8. Entry delay

If the device for unsetting the VAS is fitted within the protected area, a delay of 5 seconds minimum and 15 seconds maximum shall be allowed before the activation of the audible and optical signals. The delay period may be adjustable to suit individual operators' circumstances.

6.3.9. Status display

6.3.9.1. To provide information on the status of the VAS (set, unset, alarm setting period, alarm has been activated), optical displays inside and outside the passenger compartment are allowed. The light intensity of optical signals installed outside the passenger compartment shall not exceed 0,5 cd.

- 6.3.9.2. If an indication of short-term 'dynamic' processes such as changes from 'set' to 'unset' and vice versa is provided, it shall be optical, according to paragraph 6.3.9.1. Such optical indication may also be produced by the simultaneous operation of the direction indicators and/or passenger compartment lamp(s), provided that the duration of the optical indication by the direction indicators does not exceed 3 seconds.
- 6.3.10. Power supply
- The source of power for the VAS shall either be the vehicle battery or a rechargeable battery. Where provided, an additional rechargeable or non-rechargeable battery may be used. These batteries shall by no means supply energy to other parts of the vehicle electrical system.
- 6.3.11. Specifications for optional functions
- 6.3.11.1. Self check, automatic failure indication
- On setting the VAS, irregular situations, e.g. open doors etc., can be detected by a self-check function (plausibility control), and this situation is indicated.
- 6.3.11.2. Panic alarm
- An optical and/or audible and/or radio alarm is allowed independent of the state (set or unset) and/or function of the VAS. Such an alarm shall be triggered from within the vehicle and shall not affect the state (set or unset) of the VAS. In addition, it must be possible for the vehicle user to switch off the panic alarm. In the case of an audible alarm, its sounding duration per activation shall not be restricted. A panic alarm shall not immobilise the engine or stop it if it is running.
- 6.4. OPERATION PARAMETERS AND TEST CONDITIONS ⁽¹⁾
- 6.4.1. Operation parameters
- All components of the VAS shall operate without any failure under the following conditions.
- 6.4.1.1. Climatic conditions
- Two classes of environmental temperature are defined as follows:
- (a) - 40 °C to + 85 °C for parts to be fitted in the passenger or luggage compartment;
 - (b) - 40 °C to + 125 °C for parts to be fitted in the engine compartment unless otherwise specified.
- 6.4.1.2. Degree of protection for installation
- The following degrees of protection in accordance with IEC Publication 529-1989 shall be provided:
- (i) IP 40 for parts to be fitted in the passenger compartment;
 - (ii) IP 42 for parts to be fitted in the passenger compartment of roadsters/convertibles and cars with moveable roof-panels if the installation location requires a higher degree of protection than IP 40;
 - (iii) IP 54 for all other parts.
- The VAS manufacturer shall specify in the installation instructions any restrictions on the positioning of any part of the installation with respect to dust, water and temperature.
- 6.4.1.3. Weatherability
- 7 days according to IEC 68-2-30-1980.

⁽¹⁾ Lamps which are used as part of the optical warning devices and which are included in the standard car lighting system need not comply with the operation parameters in paragraph 6.4.1 and shall not be submitted to tests listed under paragraph 6.4.2.

6.4.1.4. Electrical conditions

Rated supply voltage: 12 V

Operation supply voltage range: from 9 V to 15 V in the temperature range according to paragraph 6.4.1.1.

Time allowance for excess voltages at 23 °C:

U = 18 V, max. 1 h

U = 24 V, max. 1 min.

6.4.2. Test conditions

6.4.2.1. Operation tests

6.4.2.1.1. Compliance of the VAS with the following specifications shall be checked:

alarm duration according to paragraphs 6.3.2.2 and 6.3.3.2;

frequency and on/off ratio according to paragraphs 6.3.3.3 and 6.3.2.3.1 or 6.3.2.3.2 respectively;

number of alarm cycles according to paragraph 6.3.1.1, if applicable;

alarm system setting lock check according to paragraph 6.3.5.

6.4.2.1.2. Normal test conditions

Voltage U = (12 ± 0,2) V

Temperature T = (23 ± 5) °C

6.4.2.2. Resistance to temperature and voltage changes

Compliance with the specifications defined under paragraph 6.4.2.1.1. shall also be checked under the following conditions:

6.4.2.2.1. Test temperature T (– 40 ± 2) °C

Test voltage U = (9 ± 0,2) V

Storage duration 4 hours

6.4.2.2.2. For parts to be fitted in the passenger or luggage compartment:

Test temperature T = (+ 85 ± 2) °C

Test voltage U = (15 ± 0,2) V

Storage duration 4 hours

6.4.2.2.3. For parts to be fitted in the engine compartment unless otherwise specified:

Test temperature T = (+ 125 ± 2) °C

Test voltage U = (15 ± 0,2) V

Storage duration 4 hours

6.4.2.2.4. The VAS, in both set and unset state, shall be submitted to an excess voltage equal to (18 ± 0,2) V for 1 hour.

6.4.2.2.5. The VAS, in both set and unset state, shall be submitted to an excess voltage equal to (24 ± 0,2) V for 1 min.

- 6.4.2.3. Safe operation after foreign body and water-tightness testing
After the test for tightness to foreign body and water according to IEC 529-1989, for degrees of protection as in paragraph 6.4.1.2, the operation tests according to paragraph 6.4.2.1 shall be repeated.
- 6.4.2.4. Safe operation after condensed water test
After a resistance-to-humidity test to be carried out according to IEC 68-2-30 (1980) the operation tests according to paragraph 6.4.2.1 shall be repeated.
- 6.4.2.5. Test for safety against reversed polarity
The VAS and components thereof shall not be destroyed by reversed polarity up to 13 V during 2 min. After this test the operation tests according to paragraph 6.4.2.1 shall be repeated with fuses changed, if necessary.
- 6.4.2.6. Test for safety against short-circuits
All electrical connections of the VAS must be short-circuit proof against earth, max. 13 V and/or fused. After this test the operation tests according to paragraph 6.4.2.1 shall be repeated, with fuses changed if necessary.
- 6.4.2.7. Energy consumption in the set condition
The energy consumption in set condition under the conditions given in paragraph 6.4.2.1.2 shall not exceed 20 mA on average for the complete alarm system including status display.
- 6.4.2.8. Safe operation after vibration test
- 6.4.2.8.1. For this test, the components are subdivided into two types:
- Type 1: components normally mounted on the vehicle,
- Type 2: components intended for attachment to the engine.
- 6.4.2.8.2. The components/VAS shall be submitted to a sinusoidal vibration mode whose characteristics are as follows:
- 6.4.2.8.2.1. For type 1
- The frequency shall be variable from 10 Hz to 500 Hz with a maximum amplitude of ± 5 mm and maximum acceleration of 3 g (0-peak).
- 6.4.2.8.2.2. For type 2
- The frequency shall be variable from 20 Hz to 300 Hz with a maximum amplitude of ± 2 mm and maximum acceleration of 15 g (0-peak).
- 6.4.2.8.2.3. For both type 1 and type 2
- The frequency variation is 1 octave/min.
- The number of cycle is 10, the test shall be performed along each of the 3 axes.
- The vibrations are applied at low frequencies at a maximum constant amplitude and at a maximum constant acceleration at high frequencies.
- 6.4.2.8.3. During the test the VAS shall be electrically connected and the cable shall be supported after 200 mm.
- 6.4.2.8.4. After the vibration test the operation tests according to paragraph 6.4.2.1 shall be repeated.

6.4.2.9. Durability test

Under the test conditions specified in paragraph 6.4.2.1.2, triggering of 300 complete alarm cycles (audible and/or optical) with a rest time of the audible device of 5 min.

6.4.2.10. Tests for external key switch (installed on the outside of the vehicle)

The following tests shall only be performed if the locking cylinder of the original equipment door lock is not used.

6.4.2.10.1. The key switch shall be so designed and constructed that it remains fully effective even after 2 500 set/unset cycles in each direction, followed by 96 hours minimum of exposure to salt spray test according to IEC 68-2-11-1981, corrosion resistance test.

6.4.2.11. Test of systems for the protection of the passenger compartment

The alarm shall be activated, when a vertical panel of 0,2 x 0,15 m is inserted for 0,3 m (measured from the centre of the vertical plane) through an open front door window into the passenger compartment, towards the front and parallel to the road at a speed of 0,4 m/s and at an angle of 45° with the longitudinal median plane of the vehicle (see drawings in Annex 8 to this Regulation).

6.4.2.12. Electromagnetic compatibility

The VAS shall be submitted to the tests described in Annex 9.

6.4.2.13. Safety against false alarm in the event of an impact on the vehicle

It shall be verified that an impact of up to 4,5 Joules of a hemispherical body with 165 mm in diameter and 70 ± 10 Shore A applied anywhere to the vehicle bodywork or glazing with its curved surface does not cause false alarms.

6.4.2.14. Safety against false alarm in the event of a voltage reduction

It shall be verified that slow reduction of the main battery voltage by continuous discharge of 0,5 V per hour down to 3 V does not cause false alarms.

Test conditions: see paragraph 6.4.2.1.2 above.

6.4.2.15. Test for safety against false alarm of the passenger compartment control

Systems intended for the protection of the passenger compartment according to paragraph 6.3.1.1 above shall be tested together with a vehicle under normal conditions (paragraph 6.4.2.1.2).

The system, installed according to the manufacturer's instructions, shall not be triggered when subjected 5 times to the test described in paragraph 6.4.2.13 above at intervals of 0,5 s.

The presence of a person touching or moving around the outside of the vehicle (windows closed) shall not cause any false alarm.

6.5. INSTRUCTIONS

Each VAS shall be accompanied by:

6.5.1. Instructions for installation:

6.5.1.1. The list of vehicles and vehicle models for which the device is intended. This list may be specific or generic, e.g. 'all cars with petrol engines and 12 V negative earth batteries'.

6.5.1.2. The method of installation illustrated by photographs and/or very clear drawings.

6.5.1.3. In the case of VAS that includes an immobiliser, additional instructions regarding compliance with the requirements of Part IV of this Regulation.

6.5.2. A blank installation certificate, an example of which is given in Annex 7.

- 6.5.3. A general statement to the VAS purchaser calling his attention to the following points:
- the VAS should be installed in accordance with the manufacturer's instructions;
- the selection of a good installer is recommended (the VAS manufacturer may be contacted to indicate appropriate installers);
- the installation certificate supplied with the VAS should be completed by the installer.
- 6.5.4. Instruction for use.
- 6.5.5. Instruction for maintenance.
- 6.5.6. A general warning regarding the danger of making any alterations or additions to the system; such alterations or additions would automatically invalidate the certificate of installation referred to in paragraph 6.5.2 above.
- 6.5.7. Indication of the location(s) of the international approval mark mentioned in paragraph 4.4 of this Regulation and/or the international certificate of conformity mentioned in paragraph 4.10 of this Regulation.
7. PART III: APPROVAL OF A VEHICLE WITH REGARD TO ITS ALARM SYSTEM
- When a VAS approved to Part III of this Regulation is being used in a vehicle submitted for approval to Part IV of this Regulation, tests required to be passed by a VAS in order to obtain approval to Part III of this Regulation shall not be repeated.
- 7.1. DEFINITIONS
- For the purpose of Part III of this Regulation,
- 7.1.1. 'Alarm system(s)' (AS) means an arrangement of components fitted as original equipment in a vehicle type, designed to indicate intrusion into or interference with the vehicle; these systems may provide additional protection against unauthorised use of the vehicle.
- 7.1.2. 'Vehicle type with regard to its alarm system' means vehicles that do not differ significantly in such essential aspects as:
- (a) the manufacturer's trade name or mark;
- (b) vehicle features that significantly influence the performances of the AS;
- (c) the type and design of the AS or VAS.
- 7.1.3. 'Approval of a vehicle' means the approval of a vehicle type with regard to the requirements laid down in paragraphs 7.2, 7.3 and 7.4 below.
- 7.1.4. Other definitions applicable to Part III are contained in paragraph 6.1 of this Regulation.
- 7.2. GENERAL SPECIFICATIONS
- 7.2.1. ASs shall be designed and built in such a way that they, in the event of intrusion into or interference with a vehicle, provide a warning signal, and may include an immobiliser.
- The warning signal shall be audible and in addition may include optical warning devices, or be a radio alarm, or any combination of the above.
- 7.2.2. Vehicles that are equipped with alarm systems shall comply with the relevant technical requirements, especially with regard to electromagnetic compatibility (EMC).

- 7.2.3. If the AS includes the possibility of a radio transmission, e.g. for setting or unsetting of the alarm or for alarm transmission, it shall comply with the relevant ETSI Standards (see footnote 5 pertinent to paragraph 6.2.3), e.g. EN 300 220-1 V1.3.1. (2000-09), EN 300 220-2 V1.3.1. (2000-09), EN 300 220-3 V1.1.1. (2000-09) and EN 301 489-3 V1.2.1. (2000-08) (including any advisory requirements). The frequency and maximum radiated power of radio transmissions for the setting and unsetting of the alarm system must comply with the CEPT/ERC (see footnote 6 pertinent to paragraph 6.2.3) Recommendation 70-03 (17 February 2000) relating to the use of short range devices (see footnote 7 pertinent to paragraph 6.2.3).
- 7.2.4. The AS and components thereof shall not activate inadvertently, particularly whilst the engine is in its running mode.
- 7.2.5. Failure of the AS, or failure of its electrical supply shall not affect the safe operation of the vehicle.
- 7.2.6. The alarm system, its components and the parts controlled by them shall be so installed as to minimise the risk for anyone to make them inoperable or to destroy them rapidly and without calling attention, e.g. using low-cost, easily-concealed tools, equipment or fabrications readily available to the public at large.
- 7.2.7. The system shall be so arranged that the shorting out of any warning signal circuit shall not render inoperative any aspects of the alarm system, other than the circuit that is shorted out.
- 7.3. PARTICULAR SPECIFICATIONS
- 7.3.1. Protection range
- 7.3.1.1. Specific requirements

The AS shall at least detect and signal the opening of any vehicle door, engine bonnet and luggage compartment. The failure or switching off of light sources, e.g. passenger compartment light, shall not impair the control operation.

The installation of additional efficient sensors for information/display, e.g.:

- (i) of intrusion into the vehicle, e.g. passenger compartment control, window glass control breakage of any glazed area; or
- (ii) of attempted vehicle theft, e.g. inclination sensor;

are allowed, taking account of measures to prevent any unnecessary sounding of the alarm (= false alarm, see paragraph 7.3.1.2 below).

In so far as these additional sensors generate an alarm signal even after an intrusion has occurred (e.g. by breakage of a glazed area) or under external influences (e.g. wind), the alarm signal, activated by one of the above-mentioned sensors, shall be activated not more than 10 times within the same activation period of the AS.

In this case the activation period shall be limited by the authorised unsetting of the system as a result of the vehicle user's action.

Some kinds of additional sensors, e.g. passenger compartment control (ultrasonic, infrared) or inclination sensor etc., may be intentionally deactivated. In this case, separate deliberate action must be taken each time before the AS is set. It must not be possible to deactivate the sensors while the alarm system is in a set state.

7.3.1.2. Safety against false alarm

7.3.1.2.1. It shall be ensured that the AS both in set and unset conditions, cannot cause the alarm signal to sound unnecessarily, in the event of:

- (a) an impact on the vehicle: test specified in paragraph 6.4.2.13;
- (b) electromagnetic compatibility: tests specified in paragraph 6.4.2.12;
- (c) reduction of battery voltage by continuous discharge: test specified in paragraph 6.4.2.14;
- (d) false alarm of the passenger compartment control: test specified in paragraph 6.4.2.15.

7.3.1.2.2. If the applicant for approval can demonstrate, e.g. by technical data, that safety against false alarm is satisfactorily ensured, the technical service responsible for conducting approval tests may not require some of the above tests.

7.3.2. Audible alarm

7.3.2.1. General

The warning signal shall be clearly audible and recognisable and shall differ significantly from the other audible signals used in road traffic.

In addition to the original equipment audible warning device, a separate audible warning device may be fitted in the area of the vehicle which is controlled by the AS, where it shall be protected against easy, rapid access by persons.

If a separate audible warning device according to paragraph 7.3.2.2 below is used, the original equipment standard audible warning device may additionally be actuated by the AS, provided that any tampering with the standard audible warning device (generally more accessible) does not affect the operation of the additional audible warning device.

7.3.2.2. Duration of the audible signal

Minimum: 25 s

Maximum: 30 s

The audible signal may sound again only after the next interference with the vehicle, i.e. after the above-mentioned time span. (Restrictions: see paragraphs 7.3.1.1 and 7.3.1.2 above).

Unsetting of the alarm system shall immediately cut the signal.

7.3.2.3. Specifications concerning the audible signal

7.3.2.3.1. Constant tone signal device (constant frequency spectrum), e.g. horns: acoustical etc., data according to ECE Regulation No 28, Part I.

Intermittent signal (on/off):

Trigger frequency (2 ± 1) Hz

On time = off time ± 10 per cent

7.3.2.3.2. Audible signal device with frequency modulation: acoustical etc., data according to ECE Regulation No 28, Part I but equal passage of a significant frequency range within the above-mentioned range (1 800 through 3 550 Hz) in both directions.

Passage frequency (2 ± 1) Hz

7.3.2.3.3. Sound level

The sound level shall be:

- (i) either an audible warning device approved under ECE Regulation No 28, Part I; or
- (ii) a device meeting the requirements of ECE Regulation No 28, Part I, paragraph 6.1 and 6.2.

However, in the case of a different sound source from the original equipment audible warning device, the minimum sound level may be reduced to 100 dB(A), measured under the conditions of ECE Regulation No 28, Part I.

7.3.3. Optical alarm — if fitted

7.3.3.1. General

In the event of intrusion into or interference with the vehicle the device shall activate an optical signal as specified in paragraphs 7.3.3.2 and 7.3.3.3 below.

7.3.3.2. Duration of the optical signal

The optical signal shall have a duration between 25 s and 5 min after the alarm has been activated. The unsetting of the alarm system shall immediately stop the signal.

7.3.3.3. Type of optical signal

Flashing of all direction indicators and/or passenger compartment light of the vehicle, including all lamps in the same electrical circuit.

Trigger frequency (2 ± 1) Hz

In relation to the audible signal, also asynchronous signals are allowed.

On time = off time ± 10 per cent

7.3.4. Radio alarm (pager) — if fitted

The AS may include a facility generating an alarm signal by radio transmission.

7.3.5. Alarm system setting lock

7.3.5.1. When the engine is in its running mode, deliberate or inadvertent setting of the alarm system shall be impossible.

7.3.6. Setting and unsetting of the AS

7.3.6.1. Setting

Any suitable means of setting of the AS is allowed, provided that such means does not inadvertently cause false alarms.

7.3.6.2. Unsetting

Unsetting of the AS shall be achieved by one or a combination of the following devices. Other devices giving equivalent performance are permitted.

7.3.6.2.1. A mechanical key (complying with requirements of Annex 10 to this Regulation) which can be coupled with a centralised vehicle locking system comprising of at least 1 000 variants, operated from the outside.

7.3.6.2.2. Electrical/electronic device, e.g. remote control, with at least 50 000 variants and shall incorporate rolling codes and/or have a minimum scan time of ten days, e.g. a maximum of 5 000 variants per 24 hours for 50 000 variants minimum.

7.3.6.2.3. A mechanical key or an electrical/electronic device within the protected passenger compartment, with timed exit/entry delay.

7.3.7. Exit delay

If the switching device for setting the AS is fitted within the protected area, an exit delay shall be provided. It shall be possible for the exit delay to be set to between 15 seconds and 45 seconds after the switch has been operated. The delay period may be adjustable to suit individual operators' circumstances.

7.3.8. Entry delay

If the device for unsetting the VAS is fitted within the protected area, a delay of 5 seconds minimum and 15 seconds maximum shall be allowed before the activation of the audible and optical signals. The delay period may be adjustable to suit individual operators' circumstances.

7.3.9. Status display

7.3.9.1. To provide information on the status of the AS (set, unset, alarm setting period, alarm has been activated), the installation of optical displays is allowed inside and outside the passenger compartment. The light intensity of optical signals installed outside the passenger compartment shall not exceed 0,5 cd.

7.3.9.2. If an indication of short-term 'dynamic' processes such as changes from 'set' to 'unset' and vice versa is provided, it shall be optical according to paragraph 7.3.10.1. Such optical indication may also be produced by the simultaneous operation of the direction indicators and/or passenger compartment lamp(s), provided that the duration of the optical indication by the direction indicators does not exceed 3 seconds.

7.3.10. Power supply

The source of power for the AS shall either be the vehicle battery or a rechargeable battery. Where provided, an additional rechargeable or non-rechargeable battery may be used. These batteries shall by no means supply energy to other parts of the vehicle electrical system.

7.3.11. Specifications for optional functions

7.3.11.1. Self check, automatic failure indication

On setting the AS, irregular situations, e.g. open doors etc., can be detected by a self-check function (plausibility control), and this situation is indicated.

7.3.11.2. Panic alarm

An optical and/or audible and/or radio alarm is allowed independent of the state (set or unset) and/or function of the AS. Such an alarm shall be triggered from within the vehicle and shall not affect the state (set or unset) of the AS. In addition, it must be possible for the vehicle user to switch off the panic alarm. In the case of an audible alarm, its sounding duration per activation shall not be restricted. A panic alarm shall not immobilise the engine or stop it if it is running.

7.4. TEST CONDITIONS

All components of the VAS or AS shall be tested in accordance with procedures described in paragraph 6.4.

This requirement does not apply to:

7.4.1. those components that are fitted and tested as part of the vehicle, whether or not a VAS/AS is fitted (e.g. lamps); or

7.4.2. those components that have previously been tested as part of the vehicle and documentary evidence has been provided.

7.5. INSTRUCTIONS

Each vehicle shall be accompanied by:

7.5.1. Instructions for use.

7.5.2. Instructions for maintenance.

7.5.3. A general warning regarding the danger of making any alterations or additions to the system.

8. PART IV: APPROVAL OF IMMOBILISERS AND APPROVAL OF A VEHICLE WITH REGARD TO ITS IMMOBILISER

8.1. DEFINITIONS

For the purpose of Part IV of this Regulation,

8.1.1. 'Immobiliser' means a device that is intended to prevent normal driving away of a vehicle under its own power (prevention of unauthorised use).

8.1.2. 'Control equipment' means equipment necessary for the setting and/or unsetting of an immobiliser.

8.1.3. 'Status display' means any device intended to indicate the status of the immobiliser (set/unset, change of set to unset and vice versa).

8.1.4. 'Set state' means the state in which the vehicle cannot be driven normally under its own power.

8.1.5. 'Unset state' means the state in which the vehicle can be driven normally.

8.1.6. 'Key' means any device designed and constructed to provide a method of operating a locking system, which is designed and constructed to be operated only by that device.

8.1.7. 'Override' means a design feature that locks the immobiliser in the unset condition.

8.1.8. 'Rolling code' means an electronic code consisting of several elements the combination of which changes at random after each operation of the transmitting unit.

8.1.9. 'Type of immobiliser' means systems that do not differ significantly in such essential aspects as:

(a) the manufacturer's trade name or mark;

(b) the kind of control equipment;

(c) the design of their operation on the relevant vehicle system(s) (as referred to in paragraph 8.3.1 below).

8.1.10. 'Vehicle type with regard to its immobiliser' means vehicles that do not differ significantly in such essential aspects as:

(a) the manufacturer's trade name or mark;

(b) vehicle features that significantly influence the performances of the immobiliser;

(c) the type and design of the immobiliser.

8.2. GENERAL SPECIFICATIONS

8.2.1. It must be possible to set and unset the immobiliser in accordance with these requirements.

8.2.2. If the immobiliser includes the possibility of a radio transmission, e.g. for setting or unsetting, it shall comply with the relevant ETSI Standards (see footnote 5 pertinent to paragraph 6.2.3), e.g. EN 300 220-1 V1.3.1 (2000-09), EN 300 220-2 V1.3.1 (2000-09), EN 300 220-3 V1.1.1 (2000-09) and EN 301 489-3 V1.2.1 (2000-08) (including any advisory requirements). The frequency and maximum radiated power of radio transmissions for the setting and unsetting of the immobiliser must comply with the CEPT/ERC (see footnote 6 pertinent to paragraph 6.2.3) Recommendation 70-03 (17 February 2000) relating to the use of short range devices (see footnote 7 pertinent to paragraph 6.2.3).

- 8.2.3. An immobiliser and its installation shall be so designed that any equipped vehicle continues to meet the technical requirements.
- 8.2.4. It shall not be possible for an immobiliser to enter the set state when the ignition key is in the engine running mode, except when:
- (a) the vehicle is equipped on intended to be equipped for ambulance, fire brigade or police purposes; or
 - (b) the engine is required to:
 - (i) drive machinery forming part of, or mounted on, the vehicle for purposes other than driving the vehicle; or
 - (ii) maintain the electrical power of the batteries of the vehicle at a level required for driving that machinery or apparatus;
- and the vehicle is stationary with the parking brake applied. When this exception is used, this fact shall be stated under item 2 of the addendum to the communication document (Annex 2 to this Regulation).
- 8.2.5. It shall not be possible to permanently override an immobiliser.
- 8.2.6. The immobiliser shall be designed and built such that when installed it shall not adversely affect the designed function and the safe operation of the vehicle, even in the case of malfunction.
- 8.2.7. An immobiliser shall be designed and built such that, when installed on a vehicle, according to the manufacturer's instructions, it cannot rapidly and without attracting attention be rendered ineffective or destroyed by, e.g. the use of low cost easily concealed tools, equipment or fabrications readily available to the public at large. It shall be difficult and time consuming to replace a major component or assembly in order to bypass the immobiliser.
- 8.2.8. An immobiliser shall be so designed and built such that when installed as specified by the manufacturer it is able to withstand the environment within the vehicle for a reasonable lifetime (for testing see paragraph 8.4). More particularly the electrical properties of the on-board circuitry shall not be adversely affected by the addition of the immobiliser (lead cross-sections, contact safety, etc.).
- 8.2.9. An immobiliser may be combined with other vehicle systems or may be integrated into them (e.g. engine management, alarm systems).
- 8.2.10. It shall not be possible for an immobiliser to prevent the release of the brakes of the vehicle, except in the case of an immobiliser which prevents the release of pneumatically released spring brakes ⁽¹⁾ and functions in such a way that in normal operation, or in failure conditions, the technical requirements of Regulation No 13 in force at the time of application for type approval under this Regulation are satisfied.
- Compliance with this paragraph does not exempt an immobiliser that prevents the release of pneumatically released spring brakes from the technical requirements set out in this Regulation.
- 8.2.11. It shall not be possible for an immobiliser to operate in such a manner as to apply the brakes of the vehicle.
- 8.3. PARTICULAR SPECIFICATIONS
- 8.3.1. Extent of disablement

⁽¹⁾ As defined in Annex 8 to ECE Regulation No 13, as amended.

- 8.3.1.1. An immobiliser shall be designed so as to prevent the operation of the vehicle under its own power by at least one of the following means:
- 8.3.1.1.1. disable, in the case of after-market fitting, or vehicle equipped with diesel engine, at least two separate vehicle circuits that are needed for vehicle operation under its own power (e.g. starter motor, ignition, fuel supply, pneumatically released spring brakes, etc.);
- 8.3.1.1.2. interference by code of at least one control unit required for the operation of the vehicle.
- 8.3.1.2. An immobiliser for fitment to a vehicle equipped with a catalytic converter shall not cause unburnt fuel to enter the exhaust.
- 8.3.2. Operating reliability
- Operating reliability shall be achieved by suitable design of the immobiliser, account being taken of specific environmental conditions in the vehicle (see paragraphs 8.2.8 and 8.4).
- 8.3.3. Operating safety
- It shall be ensured that the immobiliser does not change its state (set/unset) as a result of any of the tests in paragraph 8.4.
- 8.3.4. Setting of the immobiliser
- 8.3.4.1. The immobiliser must be set without supplementary action from the driver by at least one of the following means:
- (a) at rotation of the ignition key into the '0' position in the ignition lock and activation of a door; in addition, immobilisers which unset immediately before or during the normal starting procedure of the vehicle are permitted to set on turning the ignition off;
- (b) a maximum of 1 minute after removing the key of the ignition lock.
- 8.3.4.2. If the immobiliser can enter the set state when the ignition key is in the engine running mode as provided for in paragraph 8.2.4, the immobiliser may also be set by the opening of the driver's door and/or the authorised user carrying out a deliberate action.
- 8.3.5. Unsetting
- 8.3.5.1. Unsetting shall be achieved by using one or a combination of the following devices. Other devices with an equivalent level of security giving equivalent performance are permitted.
- 8.3.5.1.1. A key pad for inputting an individually selectable code having at least 10 000 variants.
- 8.3.5.1.2. Electrical/electronic device, e.g. remote control, with at least 50 000 variants and shall incorporate rolling codes and/or have a minimum scan time of ten days, e.g. a maximum of 5 000 variants per 24 hours for 50 000 variants minimum.
- 8.3.5.1.3. If unsetting can be achieved via a remote control, the immobiliser must return to the set condition within 5 minutes after unsetting if no supplementary action on the starter circuit has been undertaken.
- 8.3.6. Status display
- 8.3.6.1. To provide information on the status of the immobiliser (set/unset, change of set to unset and vice versa), optical displays inside and outside the passenger compartment are allowed. The light intensity of optical signals installed outside the passenger compartment shall not exceed 0,5 cd.
- 8.3.6.2. If an indication of short-term 'dynamic' processes such as changes from 'set' to 'unset' and vice versa is provided, it shall be optical, according to paragraph 8.3.6.1. Such optical indication may also be produced by the simultaneous operation of the direction indicators and/or passenger compartment lamp(s), provided that the duration of the optical indication by the direction indicators does not exceed 3 seconds.

8.4. OPERATION PARAMETERS AND TEST CONDITIONS

8.4.1. Operation parameters

All components of the immobiliser shall comply with prescriptions given in paragraph 6.4. of this Regulation.

This requirement does not apply to:

- (i) those components that are fitted and tested as part of the vehicle, whether or not an immobiliser is fitted (e.g. lamps); or
- (ii) those components that have previously been tested as part of the vehicle and documentary evidence has been provided.

8.4.2. Test conditions

All the tests shall be carried out in sequence on a single immobiliser. However, at the discretion of the test authority, other samples may be used if this is not considered to affect the results of the other tests.

8.4.3. Operation test

Upon completion of all the tests specified below, the immobiliser shall be tested under the normal test conditions specified in paragraph 6.4.2.1.2 of this Regulation to check that it continues to function normally. Where necessary, fuses may be replaced prior to the test.

All components of the immobiliser shall comply with prescriptions given in paragraphs 6.4.2.2 to 6.4.2.8 and 6.4.2.12 of this Regulation.

8.5. INSTRUCTIONS

(Paragraphs 8.5.1 to 8.5.3 for the purposes of aftermarket installation only).

Each immobiliser shall be accompanied by:

8.5.1. Instructions for installation.

8.5.1.1. The list of vehicles and vehicle models for which the device is intended. This list may be specific or generic, e.g. 'all cars with petrol engines and 12 V negative earth batteries'.

8.5.1.2. The method of installation illustrated by photographs and/or very clear drawings.

8.5.1.3. Detailed installation instructions provided by the supplier shall be such that when correctly followed by a competent installer, the safety and reliability of the vehicle is not affected.

8.5.1.4. The supplied installation instructions shall identify the electrical power requirements of the immobiliser and, where relevant, shall advise an increasing of battery size.

8.5.1.5. The supplier shall provide post installation procedures for checking the vehicle. Particular attention shall be drawn to safety related features.

8.5.2. A blank installation certificate, an example of which is given in Annex 7.

8.5.3. A general statement to the immobiliser purchaser calling his attention to the following points:

8.5.3.1. the immobiliser should be installed in accordance with the manufacturer's instructions;

8.5.3.2. the selection of a good installer is recommended (the immobiliser manufacturer may be contacted to indicate appropriate installers);

8.5.3.3. the installation certificate supplied with the immobiliser should be completed by the installer.

8.5.4. Instructions for use.

8.5.5. Instructions for maintenance.

8.5.6. A general warning regarding the dangers of making any alterations or additions to the immobiliser; such alterations and additions would automatically invalidate the certificate of installation referred to in paragraph 8.5.2 above.

9. MODIFICATION OF THE TYPE AND EXTENSION OF APPROVAL
 - 9.1. Every modification of a vehicle or component type with regard to this Regulation shall be notified to the administrative department that approved the vehicle or component 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 component or the vehicle still complies with the requirements; or
 - 9.1.2. require a further report from the technical service responsible for conducting the tests.
 - 9.2. Confirmation or refusal of approval, specifying the alteration, shall be communicated by the procedure specified in paragraph 4.3 above to the Contracting Parties to the Agreement applying this Regulation.
 - 9.3. The competent authority issuing the extension of approval shall assign a serial number to each communication form drawn up for such an extension.
10. CONFORMITY OF PRODUCTION PROCEDURES

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. Vehicles/components 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.
 - 10.2. For each type of vehicle or component the tests prescribed in the relevant part(s) of this Regulation shall be carried out on a statistically controlled and random basis, in accordance with one of the regular quality assurance procedures.
 - 10.3. The authority that has granted 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.
11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION
 - 11.1. The approval granted in respect of a vehicle/component type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraph 10 above are not complied with.
 - 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 form conforming to the model in Annex 2, Part 1, 2 or 3 as appropriate.
12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a vehicle/component type approved in accordance with this Regulation, he shall so inform the authority that granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Contracting Parties to the Agreement applying this Regulation by means of a form conforming to the model in Annex 2, Part 1, 2 or 3 as appropriate.
13. TRANSITIONAL PROVISIONS

Contracting Parties applying this Regulation shall not refuse existing approvals or extensions to such approvals granted to Regulations No 18 and No 97, other than in accordance with the transitional provisions specified in those Regulations.

 - 13.1. Type approval of an immobiliser
 - 13.1.1. As from 36 months after the date of entry into force of Supplement 1 to the original version of the Regulation, Contracting Parties applying this Regulation shall grant approvals only if the type of component or separate technical unit to be approved meets the requirements of this Regulation as amended by Supplement 1 to the original version of the Regulation.

- 13.1.2. Contracting Parties applying this Regulation shall continue to grant approvals to those types of component or separate technical unit which comply with the requirements of the original version of the Regulation, provided that the component or separate technical unit is intended as a replacement for fitting on vehicles in use and that it would not be technically feasible to fit a component or separate technical unit which satisfies the requirements contained in this Regulation as amended by Supplement 1 to the original version of this Regulation.
- 13.2. Approval of a vehicle type
- As from the date 36 months after the date of entry into force of Supplement 1 to the original version of the Regulation, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by Supplement 1 to the original version of the Regulation.
14. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS
- The Contracting Parties to the Agreement applying this Regulation shall communicate to the United Nations secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries are to be sent.
-

ANNEX 1

Part 1

(Maximum format: A4 (210 mm × 297 mm))

INFORMATION DOCUMENT

in accordance with paragraphs 5, 7 and 8 as appropriate of Regulation No 116 relating to ECE system type approval of a vehicle type with regard to the devices to prevent unauthorised use

without/including an alarm system ⁽¹⁾,

without/including an immobiliser ⁽¹⁾,

1. GENERAL

1.1. Make (trade name of manufacturer):

1.2. Type:

1.3. Means of identification of type, if marked on the device ⁽²⁾:

1.3.1. Location of that marking:

1.4. Category of vehicle ⁽³⁾:

1.5. Name and address of the manufacturer:

1.6. Location of the ECE approval mark:

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:

2.2. Hand of drive: left/right ⁽¹⁾

3. MISCELLANEOUS

3.1. Devices to prevent unauthorised use of the vehicle

3.1.1. Protective device:

3.1.1.1. A detailed description of the vehicle type with regard to the arrangement and design of the control or of the unit on which the protective device acts:

3.1.1.2. Drawings of the protective device and of its mounting on the vehicle:

3.1.1.3. A technical description of the device:

3.1.1.4. Details of the lock combinations use:

3.1.2. Vehicle immobiliser:

3.1.2.1. type approval number, if available:

3.1.2.2. For immobilisers not yet approved

3.1.2.2.1. A detailed technical description of the vehicle immobiliser and of the measures taken against inadvertent activation:

⁽¹⁾ Strike out what does not apply (there are cases where nothing needs to be deleted, when more than one entry is applicable).

⁽²⁾ 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??).

⁽³⁾ As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.1, as amended).

3.1.2.2.2. The system(s) on which the vehicle immobiliser acts:

3.1.2.2.3. Number of effective interchangeable codes, if applicable:

3.1.3. Alarm system, if any:

3.1.3.1. type approval number, if available:

3.1.3.2. For alarm systems not yet approved

3.1.3.2.1. A detailed description of the alarm system and of the vehicle parts related to the alarm system installed:

3.1.3.2.2. A list of the main components comprising the alarm system:

Part 2

(Maximum format: A4 (210 mm × 297 mm))

INFORMATION DOCUMENT

in accordance with paragraph 6 of Regulation No 116 relating to ECE component type approval of an alarm system

1. GENERAL

- 1.1. Make (trade name of manufacturer):
- 1.2. Type:
- 1.3. Means of identification of type, if marked on the device ⁽¹⁾:
 - 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):

2. DESCRIPTION OF THE DEVICE

- 2.1. A detailed description of the alarm system and of the vehicle parts related to the alarm system installed:
 - 2.1.1. A list of the main components comprising the alarm system:
 - 2.1.2. The measures taken against false alarms:
- 2.2. Range of protection offered by the device:
- 2.3. Method of setting/unsetting the device:
- 2.4. Number of effective interchangeable codes, if applicable:
- 2.5. List of main components comprising the device and, if applicable, their reference marks:

3. DRAWINGS

- 3.1. Drawings of the main components of the device (the drawings must show the intended space for ECE type approval mark or reference mark, as applicable):

4. INSTRUCTIONS

- 4.1. List of vehicles to which the device is intended to be fitted:
- 4.2. Description of the method of installation illustrated by photographs and/or drawings:
- 4.3. Instructions for use:
- 4.4. Instructions for maintenance, if any:

⁽¹⁾ 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??).

Part 3

(Maximum format: A4 (210 mm × 297 mm))

INFORMATION DOCUMENT

in accordance with paragraph 8 of Regulation No 116 relating to ECE component type approval of an immobiliser system

1. GENERAL

1.1. Make (trade name of manufacturer):

1.2. Type:

1.3. Means of identification of type, if marked on the device ⁽¹⁾:

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):

2. DESCRIPTION OF THE DEVICE

2.1. A detailed technical description of the vehicle immobiliser and of the measures taken against inadvertent activation:

2.2. The vehicle system(s) on which the vehicle immobiliser acts:

2.3. Method of setting/unsetting the device:

2.4. Number of effective interchangeable codes, if applicable:

2.5. List of main components comprising the device and, if applicable, their reference marks:

3. DRAWINGS

3.1. Drawings of the main components of the device (the drawings must show the intended space for ECE type approval mark):

4. INSTRUCTIONS

4.1. List of vehicles to which the device is intended to be fitted:

4.2. Description of the method of installation illustrated by photographs and/or drawings:

4.3. Instructions for use:

4.4. Instructions for maintenance, if any:

⁽¹⁾ 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 2

Part 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 vehicle type with regard to its devices to prevent unauthorised use pursuant to Regulation No 116

without/including an alarm system ⁽²⁾,

without/including an immobiliser ⁽²⁾,

Approval No Extension No

Reason for extension:

SECTION I

1. 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): see addendum

2. Technical service responsible for carrying out the tests:

3. Date of test report:

4. Number of test report:

5. Remarks (if any): see addendum

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 that 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??).

⁽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, as amended).

Addendum

to ECE type approval certificate No ...

concerning the type approval of a vehicle with regard to Regulation No 116

1. Additional information:

1.1. Brief description of the device(s) against unauthorised use and the vehicle parts on which it (they) act(s):

1.2. Brief description of the immobiliser:

1.3. Brief description of the alarm system, if applicable, including rated supply voltage ⁽¹⁾:

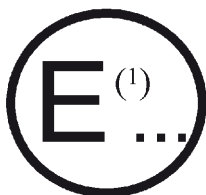
2. Remarks:

⁽¹⁾ To be indicated only for vehicle alarm systems (VAS) to be used in vehicles whose rated supply voltage is not 12 Volts.

Part 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 component type as an alarm system pursuant to Regulation No 116

Approval No Extension No

Reason for extension:

SECTION I

1. 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): see addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see addendum
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 that 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??).

Addendum

to ECE type approval certificate No ...

concerning the type approval of a vehicle alarm system with regard to Regulation No 116

1. Additional information:

1.1. Brief description of the alarm system, if applicable, including rated supply voltage ⁽¹⁾:

1.2. List of vehicles to which the alarm system is intended to be fitted:

1.3. Types of vehicles on which the alarm system has been tested:

1.4. List of main components, duly identified, comprising the alarm system:

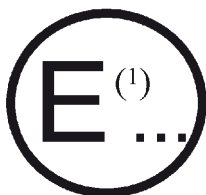
2. Remarks:

⁽¹⁾ To be indicated only for vehicle alarm systems (VAS) to be used in vehicles whose rated supply voltage is not 12 Volts.

Part 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 component type as an immobiliser pursuant to Regulation No 116

Approval No Extension No

Reason for extension:

SECTION I

1. GENERAL

Make (trade name of manufacturer):

Type:

Means of identification of type, if marked on the device ⁽³⁾:

Location of that marking:

Name and address of manufacturer:

Location of the ECE approval mark:

Address(es) of assembly plant(s):

SECTION II

1. Additional information (where applicable): see addendum
2. Technical service responsible for carrying out the tests:
3. Date of test report:
4. Number of test report:
5. Remarks (if any): see addendum
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 that 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??).

Addendum

to ECE type approval certificate No ...

concerning the type approval of an immobiliser with regard to Regulation No 116

1. Additional information:

1.1. Brief description of the immobiliser:

1.2. List of vehicles to which the immobiliser is intended to be fitted:

1.3. Types of vehicles on which the immobiliser has been tested:

1.4. List of main components, duly identified, comprising the immobiliser:

2. Remarks:

ANNEX 3

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

(see paragraph 4.4 of this Regulation)

Figure 1

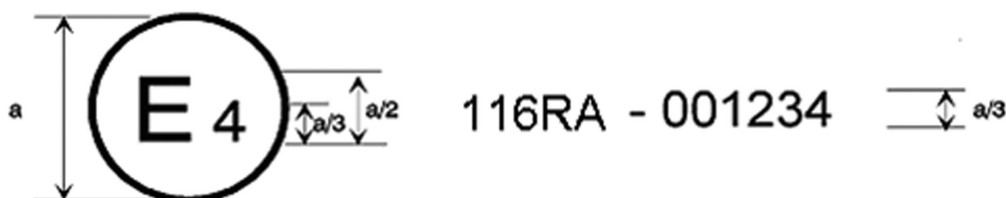
(see paragraph 4.4.3.4 of this Regulation)

 $a = 8 \text{ mm min}$

The above approval mark figure 1 affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Part I of Regulation No 116 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 116 in its original form.

Figure 2

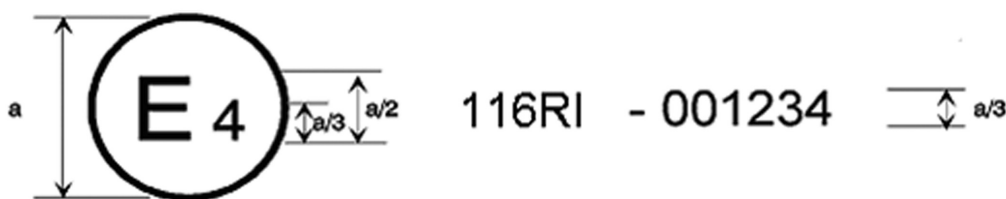
(see paragraph 4.4.3.1 of this Regulation)

 $a = 8 \text{ mm min}$

The above approval mark figure 2 affixed to a VAS shows that the type concerned was approved in the Netherlands (E4) pursuant to Part II of Regulation No 116 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 116 in its original form.

Figure 3

(see paragraph 4.4.3.2 of this Regulation)

 $a = 8 \text{ mm min}$

The above approval mark figure 3 affixed to an immobiliser shows that the type concerned was approved in the Netherlands (E 4) pursuant to Part IV of Regulation No 116 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 116 in its original form.

Figure 4

(see paragraph 4.4.3.5 of this Regulation)

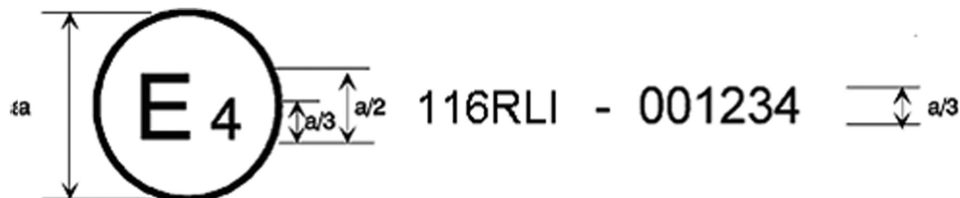


$a = 8 \text{ mm min}$

The above approval mark figure 4 affixed to a vehicle shows that the type concerned was approved in the Netherlands (E 4) pursuant to Part III of Regulation No 116 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 116 in its original form.

Figure 5

(see paragraph 4.4.3.6 of this Regulation)

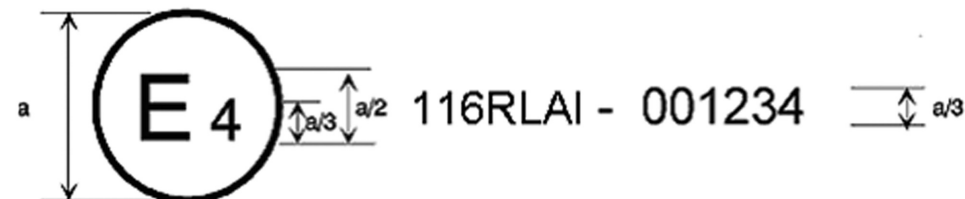


$a = 8 \text{ mm min}$

The above approval mark figure 5 affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Part I and IV of Regulation No 116 under approval mark 001234. The first two digits (00) of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 116 in its original form.

Figure 6

(see paragraph 4.4.3.7 of this Regulation)



$a = 8 \text{ mm min}$

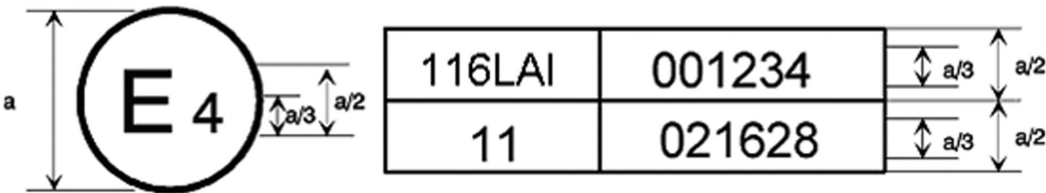
The above approval mark figure 6 affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Part I, II and IV of Regulation No 116 under approval No 001234. The first two digits (00) of the approval number indicate that the approval was granted in accordance with the requirements of Regulation No 116 in its original form.

MODEL B

(see paragraph 4.5 of this Regulation)

Figure 7

(example)



a = 8 mm min

The above approval mark affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Parts I, II and IV of Regulation No 116 and to Regulation No 11. The first two digits of the approval number indicate that on the dates on which these approvals were granted, Regulation No 116 was in its original form and Regulation No 11 included the 02 series of amendments.

ANNEX 4

Part I**WEAR PRODUCING TEST PROCEDURE FOR DEVICES TO PREVENT UNAUTHORISED USE ACTING ON THE STEERING****1. Test equipment**

The test equipment shall consist of:

- 1.1. A fixture suitable for mounting the sample steering complete with the device to prevent unauthorised use attached, as defined in paragraph 5.1.2 of this Regulation.
- 1.2. A means for activating and deactivating the device to prevent unauthorised use, which shall include the use of the key.
- 1.3. A means for rotating the steering shaft relative to the device to prevent unauthorised use.

2. Test method

- 2.1. A sample of the steering complete with the device to prevent unauthorised use is attached to the fixture referred to in paragraph 1.1 above.
- 2.2. One cycle of the test procedure shall consist of the following operations:
 - 2.2.1. Start position. The device to prevent unauthorised use shall be deactivated and the steering shaft shall be rotated to a position that prevents engagement of the device to prevent unauthorised use, unless it is of the type that permits locking in any position of the steering.
 - 2.2.2. Set to activate. The device to prevent unauthorised use shall be moved from the deactivated to the activated position, using the key.
 - 2.2.3. ⁽¹⁾ Activated. The steering spindle shall be rotated such that the torque on it, at the instant of engagement of the device to prevent unauthorised use, shall be $40 \text{ Nm} \pm 2 \text{ Nm}$.
 - 2.2.4. Deactivated. The device to prevent unauthorised use shall be deactivated by the normal means, the torque being reduced to zero to facilitate disengagement.
 - 2.2.5. ⁽¹⁾ Return. The steering spindle shall be rotated to a position that prevents engagement of the device to prevent unauthorised use.
 - 2.2.6. Opposite rotation. Repeat procedures described in paragraphs 2.2.2, 2.2.3, 2.2.4 and 2.2.5, but in the opposite direction of rotation of the steering spindle.
 - 2.2.7. The time interval between two successive engagements of the device shall be at least 10 seconds.
- 2.3. The wear-producing cycle shall be repeated the number of times specified in paragraph 5.3.1.3 of this Regulation.

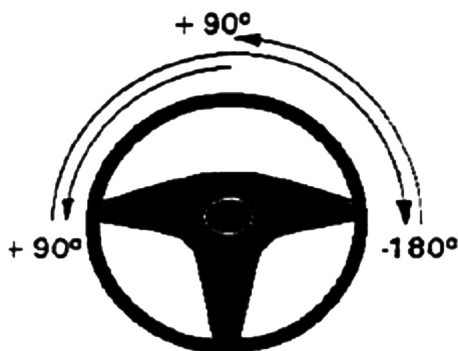
Part 2**TEST PROCEDURE FOR DEVICES TO PREVENT UNAUTHORISED USE ACTING ON THE STEERING USING A TORQUE LIMITING DEVICE****1. Test equipment**

The test equipment shall consist of:

- 1.1. A fixture suitable for holding the relevant parts of a steering system or, if the test is carried out on a complete vehicle, a jacking system capable of lifting all the steered wheels clear of the ground, and
- 1.2. A device or devices capable of producing, and measuring, a torque applied to the steering control as prescribed in paragraph 2.3. The measurement precision must be less than or equal to 2 per cent.

⁽¹⁾ If the device to prevent unauthorised use permits locking in any position of the steering, the procedures described in paragraphs 2.2.3 and 2.2.5 shall be omitted.

2. Test procedure description
- 2.1. If the test is carried out on a complete vehicle, the test shall be carried out with all the steered wheels of the vehicle held clear of the ground.
- 2.2. The steering lock shall be activated such that the steering is blocked.
- 2.3. A torque shall be applied to the steering control such that it rotates.
- 2.4. The test cycle includes a rotation of the steering control of 90° followed by a rotation in the opposite direction of 180° , and a new rotation of 90° in the original direction (see figure);
- 1 cycle = $+90^\circ / -180^\circ / +90^\circ$ with a tolerance of ± 10 per cent.



- 2.5. A cycle duration is equal to $20\text{ s} \pm 2\text{ s}$.
- 2.6. Five test cycles shall be carried out.
- 2.7. During each of the test cycles the minimum recorded value of the torque shall be higher than that given in paragraph 5.3.1.4.2 of this Regulation.
-

ANNEX 5

(Reserved)

ANNEX 6

MODEL OF CERTIFICATE OF CONFORMITY

I the undersigned
(surname and name)

Testify that the vehicle alarm system/immobiliser ⁽¹⁾ described below:

Make:

Type:

is in total conformity with the type approved

at on
(place of approval) (date)

as described in the communication form bearing approval No

Identification of the main component(s):

Component: Marking:

Done at: on:

Manufacturer's full address and stamp:

Signature: (please specify position)

⁽¹⁾ Strike out what does not apply.

ANNEX 7

MODEL OF INSTALLATION CERTIFICATE

I the undersigned
professional installer, certify that the installation of the vehicle alarm system/immobiliser ⁽¹⁾ described below has been
carried out by myself pursuant to the mounting instructions supplied by the manufacturer of the system.
Description of the vehicle

Make:

Type:

Serial number:

Registration number:

Description of the vehicle alarm system/or immobiliser ⁽¹⁾

Make:

Type:

Approval number:

Done at: on:

Installer's full address and stamp:

.....

.....

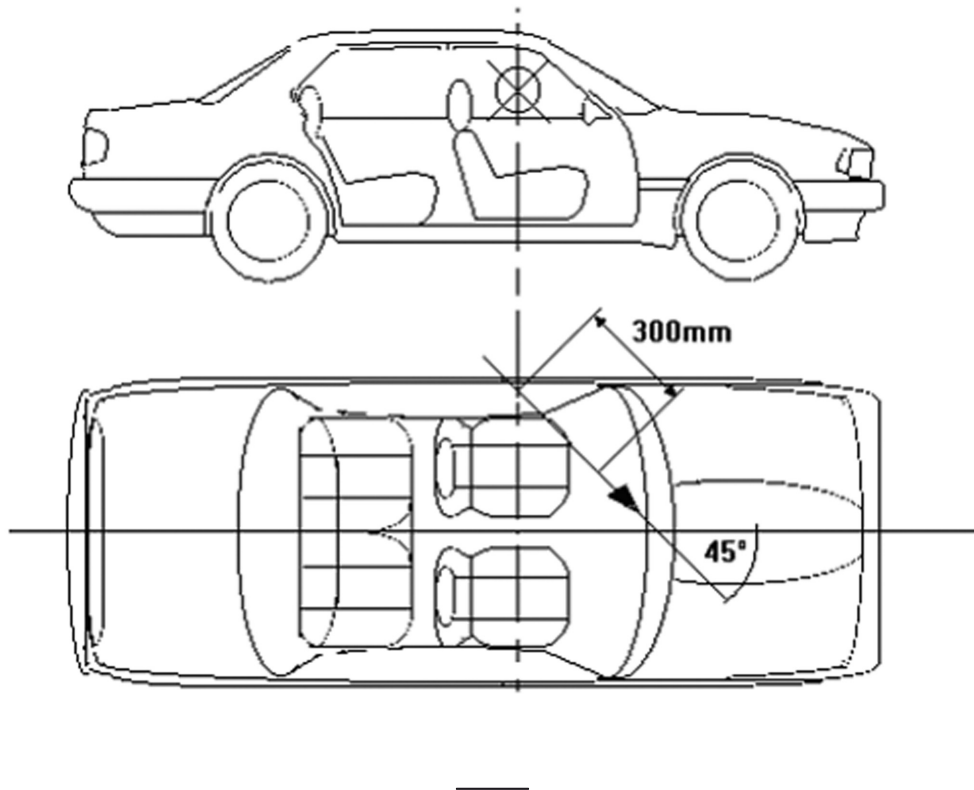
Signature: (please specify position)

⁽¹⁾ Strike out what does not apply.

ANNEX 8

Paragraphs 6.4.2.11 and 7.4

TEST OF SYSTEMS FOR THE PROTECTION OF THE PASSENGER COMPARTMENT



ANNEX 9

ELECTROMAGNETIC COMPATIBILITY

Note: To test the electromagnetic compatibility, either paragraph 1 or paragraph 2 shall be used, depending on the test facilities.

1. Method iso

Immunity against disturbances conducted along supply lines

Apply the test pulses 1, 2, 3a, 3b, 4 and 5 according to the International Standard ISO 7637-1:1990 to the supply lines as well as to other connections of VAS/AS that may be operationally connected to supply lines.

VAS/AS in unset state

The test pulses 1 through 5, shall be applied with a degree of severity III. The required functional status for all applied test pulses shall be A.

VAS/AS in set state

The test pulses 1 through 5 shall be applied. The required functional status for all applied test pulses is given in table 1.

Table 1
Severity/functional status (for supply lines)

Test pulse number	Test level	Functional status
1	III	C
2	III	A
3a	III	C
3b	III	A
4	III	B
4	I	A
5	III	A

Immunity against disturbance coupled on signal lines

Leads that are not connected to supply lines (e.g. special signal lines) shall be tested in accordance with the International Standard ISO7637-3:1995 (and Corr.1). The required functional status for all applied test pulses is given in table 2.

Table 2
Test level/functional status (for signal lines)

Test pulse number	Test level	Functional status
3a	III	C
3b	III	A

Immunity against radiated high frequency disturbances

Testing of the immunity of a VAS/AS in a vehicle may be performed according to the prescriptions in Regulation No 10, 02 series of amendments and test methods described in Annex 6 for the vehicles and Annex 9 for a separate technical unit.

Electrical disturbance from electrostatic discharges

Immunity against electrical disturbances shall be tested in accordance with Technical Report ISO/TR 10605-1993.

Radiated emissions

Tests shall be performed according to Regulation No 10, 02 series of amendments prescriptions and according to the test methods described in Annexes 4 and 5 for vehicles or Annexes 7 and 8, for a separate technical unit.

2. Method iec

Electromagnetic field

The VAS/AS shall undergo the basic test. It shall be subjected to the electromagnetic field test described in IEC Publication 839-1-3-1998 test A-13 with a frequency range from 20 to 1 000 MHz, and for a field strength level of 30 V/m.

In addition, the VAS/AS shall be subjected to the electrical transient conducted and coupled tests described in the International Standard ISO 7637 Parts 1:1990, 2:1990 and 3:1995, as appropriate.

Electrical disturbance from electrostatic discharges

The VAS/AS shall undergo the basic test. It shall be subjected to testing for immunity against electrostatic discharge as described in either EN 61000-4-2, or ISO/TR 10605-1993, at the manufacturer's choice.

Radiated emissions

The VAS/AS shall be subjected to testing for the suppression of radio frequency interference according to tests prescribed in Regulation No 10, 02 series of amendments and according to tests method described in Annexes 4 and 5 for vehicles and Annexes 7 and 8 for a separate technical unit.

ANNEX 10

SPECIFICATIONS FOR MECHANICAL KEY SWITCHES

1. The cylinder of the key switch shall not protrude by more than 1 mm from the cowling, and the protruding part shall be conical.
 2. The joint between the cylinder core and the cylinder casing shall be capable of withstanding a tensile force of 600 N and a torque of 25 Nm.
 3. The key switch shall be provided with a cylinder drill obstruction.
 4. The key profile shall have at least 1 000 effective permutations.
 5. The key switch shall not be operable by a key that differs by only one permutation from the key matching the key switch.
 6. The key aperture to an external key switch shall be shuttered or otherwise protected against the penetration of dirt and/or water.
-

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 122 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform technical prescriptions concerning the approval of vehicles of categories M, N and O with regard to their heating systems

Incorporating all valid text up to:

Corrigendum 2 to the original version of the Regulation, subject of Depositary Notification C.N.1156.2006.TREATIES-2 dated 13 December 2006

Supplement 1 to the original version of the Regulation — Date of entry into force: 22 July 2009

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1. SCOPE

- 1.1. This regulation applies to all vehicles in categories M, N and O ⁽¹⁾ in which a heating system is fitted.

Type approvals are granted according to:

- 1.2. Part I — Approval of a vehicle type with regard to its heating system.
- 1.3. Part II — Approval of a heating system with regard to its operational safety.

2. DEFINITIONS: GENERAL

For the purposes of this Regulation:

- 2.1. 'Vehicle' means a vehicle of category M, N or O ⁽¹⁾ in which a heating system is fitted.
- 2.2. '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.
- 2.3. 'Interior' means the enclosed parts of a vehicle used for the accommodation of the vehicle occupants and/or the load.
- 2.4. 'Heating system for the passenger compartment' means any type of device designed to increase the temperature of the passenger compartment.
- 2.5. 'Heating system for the load area' means any type of device designed to increase the temperature of the load area.
- 2.6. 'Load area' means the interior part of the vehicle used to accommodate the non-passenger load.
- 2.7. 'Passenger compartment' means the interior part of the vehicle used to accommodate the driver and any passengers.
- 2.8. 'Gaseous fuel' includes fuels that are gaseous at normal temperature and pressure (288,2 K and 101,33 kPa), such as liquefied petroleum gas (LPG) and compressed natural gas (CNG).
- 2.9. 'Overheating' means the condition that exists when the air inlet for the heating air to the combustion heater is completely blocked.

3. APPLICATION FOR APPROVAL

- 3.1. APPLICATION FOR APPROVAL OF A TYPE OF VEHICLE WITH REGARD TO ITS HEATING SYSTEM
- 3.1.1. The application for approval of a vehicle type with regard to its heating system shall be submitted by the manufacturer of the vehicle or by his duly accredited representative.

⁽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).

- 3.1.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
 - 3.1.2.1. a detailed description of the vehicle type with respect to its structure, dimensions, configuration and constituent materials;
 - 3.1.2.2. drawings of the heating system and its general arrangement
- 3.1.3. A model for the information document is given in Annex 1, Part 1, Appendix 1.
- 3.1.4. A vehicle representative of the type to be approved must be submitted to the technical service responsible for conducting the type-approval tests.
- 3.1.5. If the vehicle to be approved is equipped with a heater with an ECE type approval, the type approval number and the maker's type designations of this type of heater shall be enclosed in the application for the vehicle type approval.
- 3.1.6. If the vehicle to be approved is equipped with a heater without ECE type approval, one sample representative of the type to be approved shall be submitted to the technical service.
- 3.2. APPLICATION FOR APPROVAL OF A TYPE OF HEATER
 - 3.2.1. The application for approval of a type of heater as a component shall be submitted by the manufacturer of the heating system.
 - 3.2.2. It shall be accompanied by the undermentioned documents in triplicate and by the following particulars:
 - 3.2.2.1. a detailed description of the heating system type with respect to its structure, dimensions, configuration and constituent materials;
 - 3.2.2.2. drawings of the heating system and its general arrangement
 - 3.2.3. A model for the information document is given in Annex 1 Part 1, Appendix 2.
 - 3.2.4. One sample heater representative of the type to be approved shall be submitted to the technical service.
 - 3.2.5. The sample 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 heating system 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 Annex 1, Part 2, 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 and to every component supplied separately conforming to a type approved under this Regulation, a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted type approval ⁽¹⁾.
- 4.5. In the case of a component type-approval, the number of this Regulation, followed by the letter 'R', a dash and the approval number according to paragraph 4.2.
- 4.6. 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 4.2. needs not be repeated; in such a case, the Regulation(s) 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 4.2.
- 4.7. The approval mark shall be clearly legible and be indelible.
- 4.8. In the case of a vehicle, the approval mark shall be placed close to or on the vehicle data plate affixed by the manufacturer.
- 4.9. Annex 2 to this Regulation gives examples of arrangements of approval marks.
5. PART I — APPROVAL OF A VEHICLE TYPE WITH REGARD TO ITS HEATING SYSTEM
- 5.1. Definition
- For the purpose of Part I of this Regulation,
- 5.1.1. 'Vehicle type with regard to heating system' means vehicles which do not differ in essential respects such as the functioning principle(s) of the heating system.
- 5.2. Specifications
- 5.2.1. The passenger compartment of every vehicle shall be fitted with a heating system. If a heating system for the load area is provided in a vehicle, it shall comply with this Regulation.
- 5.2.2. The heating system of the vehicle to be type approved shall meet the technical requirements of Part II of this Regulation.
- 5.3. Vehicle Installation Requirements for Combustion Heaters
- 5.3.1. Scope
- 5.3.1.1. Subject to paragraph 5.3.1.2, combustion heaters shall be installed according to the requirements of paragraph 5.3.

⁽¹⁾ 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.

- 5.3.1.2. Vehicles of category O having liquid fuel heaters are deemed to comply with the requirements of paragraph 5.3.
- 5.3.2. Positioning of combustion heater
- 5.3.2.1. Body sections and any other components in the vicinity of the heater must be protected from excessive heat and the possibility of fuel or oil contamination.
- 5.3.2.2. The combustion heater shall not constitute a risk of fire, even in the case of overheating. This requirement shall be deemed to be met if the installation ensures an adequate distance to all parts and suitable ventilation, by the use of fire resistant materials or by the use of heat shields.
- 5.3.2.3. In the case of M2 and M3 vehicles, the combustion heater must not be positioned in the passenger compartment. However, an installation in an effectively sealed envelope which also complies with the conditions in paragraph 5.3.2.2 may be used.
- 5.3.2.4. The label referred to in Annex 7, paragraph 4, or a duplicate, must be positioned so that it can be easily read when the heater is installed in the vehicle.
- 5.3.2.5. Every reasonable precaution should be taken in positioning the heater to minimize the risk of injury and damage to personal property.
- 5.3.3. Fuel supply
- 5.3.3.1. The fuel filler must not be situated in the passenger compartment and must be provided with an effective cap to prevent fuel spillage.
- 5.3.3.2. In the case of liquid fuel heaters, where a supply separate from that of the vehicle is provided, the type of fuel and its filler point must be clearly labelled.
- 5.3.3.3. A notice, indicating that the heater must be shut down before refuelling, must be affixed to the fuelling point. In addition a suitable instruction must be included in the manufacturer's operating manual.
- 5.3.4. Exhaust system
- 5.3.4.1. The exhaust outlet must be located so as to prevent emissions from entering the vehicle through ventilators, heated air inlets or opening windows.
- 5.3.5. Combustion air inlet
- 5.3.5.1. The air for the combustion chamber of the heater must not be drawn from the passenger compartment of the vehicle.
- 5.3.5.2. The air inlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.
- 5.3.6. Heating air inlet
- 5.3.6.1. The heating air supply may be fresh or re-circulated air and must be drawn from a clean area not likely to be contaminated by exhaust fumes emitted either by the propulsion engine, the combustion heater or any other vehicle source.
- 5.3.6.2. The inlet duct must be protected by mesh or other suitable means.

5.3.7. Heating air outlet

5.3.7.1. Any ducting used to route the hot air through the vehicle must be so positioned or protected that no injury or damage could be caused if it were to be touched.

5.3.7.2. The air outlet must be so positioned or guarded that blocking by rubbish or luggage is unlikely.

5.3.8. Automatic control of the heating system

5.3.8.1. The heating system must be switched off automatically and the supply of fuel must be stopped within five seconds when the vehicle's engine stops running. If a manual device is already activated, the heating system can stay in operation.

6. PART II — APPROVAL OF A HEATING SYSTEM WITH REGARD TO ITS OPERATIONAL SAFETY

6.1. Definitions

For the purpose of Part II of this Regulation,

6.1.1. 'Heating system' means any type of device which is designed to increase the temperature of the interior of a vehicle, including any load area.

6.1.2. 'Combustion heater' means a device directly using liquid or gaseous fuel and not using the waste heat from the engine used for propulsion of the vehicle.

6.1.3. 'Type of combustion heater' means devices which do not differ in essential respects such as:

— fuel type (e.g. liquid or gaseous),

— transfer medium (e.g. air or water),

— vehicle location (e.g. passenger compartment or load area).

6.1.4. 'Waste-heat heating system' means any type of device using the waste heat from the engine used for propulsion of the vehicle to increase the temperature of the interior of the vehicle, this may include water, oil or air as the transfer medium.

6.2. Specifications: General

The requirements for heating systems are that:

— the heated air entering the passenger compartment shall be no more polluted than the air at the point of inlet to the vehicle,

— the driver and passengers, during road use, will not be able to come into contact with parts of the vehicle or heated air liable to cause burns,

— the exhaust emissions from combustion heaters are within acceptable limits.

The test procedures for verification of each of these requirements are set out in Annexes 4, 5 and 6.

- 6.2.1. The following table indicates which annexes apply to each type of heating system within each vehicle category:

Heating system	Vehicle category	Annex 4 Air quality	Annex 5 Temperature	Annex 6 Exhaust	Annex 8 LPG safety
Engine waste heat — water	M				
	N				
	O				
Engine waste heat — air See Note 1	M	Yes	Yes		
	N	Yes	Yes		
	O				
Engine waste heat — oil	M	Yes	Yes		
	N	Yes	Yes		
	O				
Gaseous fuel heater — See Note 2	M	Yes	Yes	Yes	Yes
	N	Yes	Yes	Yes	Yes
	O	Yes	Yes	Yes	Yes
Liquid fuel heater — See Note 2	M	Yes	Yes	Yes	
	N	Yes	Yes	Yes	
	O	Yes	Yes	Yes	

Note 1: Heating systems which comply with the requirements of Annex 3 are exempt from these test requirements.

Note 2: Combustion heaters located outside the passenger compartment, using water as a transfer medium, are deemed to comply with Annexes 4 and 5.

6.3. Specifications: Combustion heaters

Additional requirements for combustion heaters are laid down in Annex 7.

7. MODIFICATION AND EXTENSION OF APPROVAL OF A VEHICLE OR COMPONENT TYPE

- 7.1. Every modification of the type shall be notified to the administrative department which approved the type. That 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 vehicle or component 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 modifications, shall be communicated by the procedure specified in paragraph 4.3. to the Contracting Parties to the Agreement which apply this Regulation.

7.3. The competent authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1, Part 2, Appendix 1 or 2 as appropriate 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 and components approved to this regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5 and 6 above.
- 8.2. The competent authority which has granted type-approval may at any time verify the conformity control methods applicable to each production facility. The normal frequency of these verifications shall be once per two years.

9. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

- 9.1. The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirements laid down in paragraphs 5 and 6 above are not complied with.
- 9.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in Annex 1, Part 2, Appendix 1 or 2 to this Regulation.

10. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of vehicle or component under 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, Part 2, Appendix 1 or 2 to this Regulation.

11. NAMES AND ADDRESSES OF TECHNICAL SERVICES CONDUCTING APPROVAL TESTS, AND ADMINISTRATIVE DEPARTMENTS

The Contracting Parties to the Agreement which apply this Regulation shall communicate to the Secretariat of the United Nations the names and addresses of the technical services 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

PART 1

Appendix 1

MODEL INFORMATION DOCUMENT

(for a vehicle type in accordance with paragraph 4.3 of the Regulation relating to the ECE Type Approval of a heating system and of a vehicle with regard to its heating system)

If the heating system or its component parts have electronic controls, information concerning their performance must be supplied

0. GENERAL

- 0.1. Make (trade name of manufacturer):
- 0.2. Type and general commercial description(s):
- 0.3. Means of identification of type, if marked on the vehicle:
- 0.4. Location of that marking:
- 0.5. Category of vehicle ⁽¹⁾:
- 0.6. Name and address of manufacturer:
- 0.7. Address(es) of assembly plant(s):

1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE

- 1.1. Photographs and/or drawings of a representative vehicle:

2. POWER PLANT

- 2.1. Manufacturer's engine code:(as marked on the engine, or other means of identification)
- 2.2. Working principle: positive ignition/compression ignition, four stroke/two stroke ⁽²⁾
- 2.3. Number and arrangement of cylinders:
- 2.4. Maximum net power:kW at min⁻¹ (manufacturer's declared value)
- 2.5. Cooling system (liquid/air) ⁽²⁾
- 2.6. Nominal setting of the engine temperature control mechanism:
- 2.7. Pressure charger: Yes/No ⁽²⁾
- 2.7.1. Type(s)
- 2.7.2. Description of the system (e.g. maximum charge pressure:kPa, wastegate if applicable)

3. BODYWORK

- 3.1. A brief description of the vehicle with regard to the heating system if the heating system uses the heat of the engine cooling fluid
- 3.2. A brief description of the vehicle type with regard to the heating system if the cooling air or the exhaust gases of the engine are used as the heat source, including:
- 3.2.1. Layout of the heating system showing its position in the vehicle:
- 3.2.2. Layout drawing of the heat exchanger for heating systems using the exhaust gases for heating or of the parts where the heat exchange takes place (for heating systems using the engine cooling air for heating):

- 3.2.3. Sectional drawing of the heat exchanger or the parts respectively where the heat exchange takes place, indicating the thickness of the wall, materials used and the characteristics of the surface:
- 3.2.4. Specifications shall be given for further important components of the heating system, such as e.g. the heater fan, with regard to their method of construction and technical data
- 3.3. A brief description of the vehicle type with regard to the combustion heating system and the automatic control:
- 3.3.1. layout drawing of the combustion heater, the air inlet system, the exhaust system, the fuel tank, the fuel supply system (including the valves) and the electrical connections showing their positions in the vehicle.
- 3.4. Maximum electrical consumption:kW

(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, as last amended by Amend.4).

(²) Strike out which does not apply.

Appendix 2

MODEL INFORMATION DOCUMENT

(for a heating system type in accordance with paragraph 4.3 of the Regulation relating to the ECE Type approval of heating system with regard to its operational safety)

If the heating system or its component parts 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, location and method of affixing of the ECE approval mark:
- 1.5. Address(es) of assembly plant(s):

2. COMBUSTION HEATER (IF ANY)

- 2.1. Make (trade name of manufacturer):
- 2.2. Type and general commercial description(s):
- 2.3. Means of identification of type, if marked on the heating system:
- 2.4. Location of that marking:
- 2.5. Name and address of manufacturer:
- 2.6. Address(es) of assembly plant(s):
- 2.7. Test pressure (in the case of a combustion heater fuelled by liquefied petroleum gas or similar, the pressure applied at the gas inlet connector of the heater):
- 2.8. Detailed description, layout drawings and mounting description of the combustion heater and all its components:
-

PART 2*Appendix 1*

(Maximum format: A4 (210 mm × 297 mm))

COMMUNICATION



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 122

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: ⁽²⁾
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.
10. The vehicle is approved according to the requirements of Annex 9 (ADR): Yes/No ⁽²⁾.

⁽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 last amended by Amend.4).

Appendix 2

(Maximum format: A4 (210 mm × 297 mm))

COMMUNICATION



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 122

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)

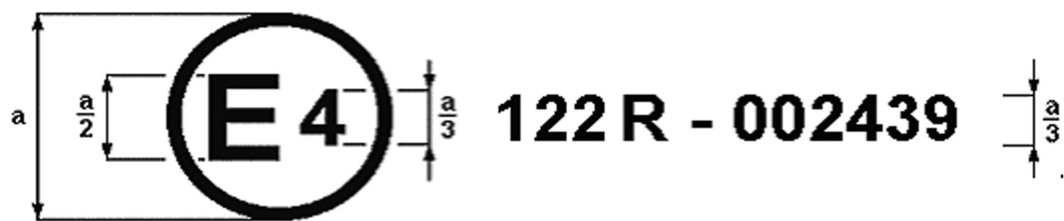
⁽³⁾ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered in this information document, such characters shall be represented in the documentation by the symbol '?' (e.g. ABC??123??)

ANNEX 2

ARRANGEMENTS OF APPROVAL MARKS

MODEL A

(See paragraph 4.5 of this Regulation)

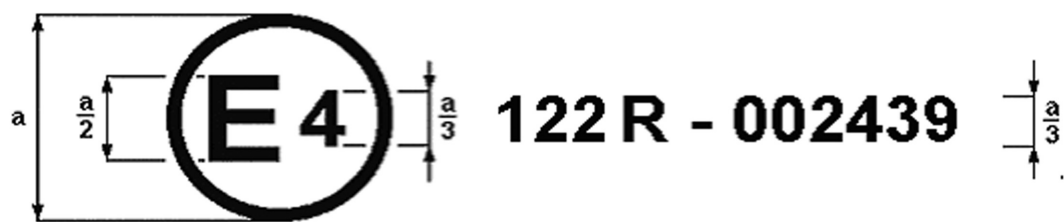


a = 8 mm min

The above approval mark affixed to a heating system shows that the component type concerned has, with regard to its constructional features, been approved in the Netherlands (E 4) pursuant to Regulation No 122 under approval number 002439. The approval number indicates that the approval was granted according to the requirements of Regulation No 122 in its original form.

MODEL B

(See paragraph 4.4 of this Regulation)

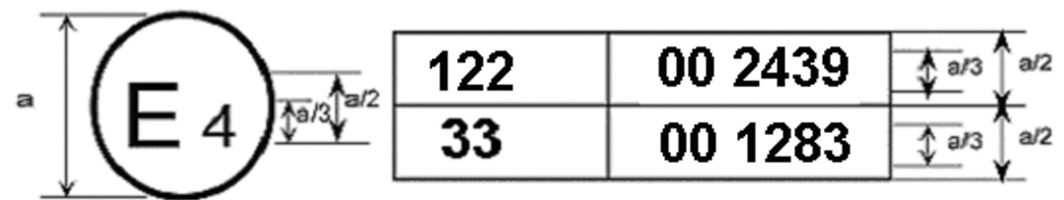


a = 8 mm min

The above approval mark affixed to a vehicle shows that the vehicle type concerned has, with regard to its heating system(s), been approved in the Netherlands (E 4) for Class III, pursuant to Regulation No 122. The number 00 indicates that the approval was granted according to the requirements of Regulation No 122 in its original form.

MODEL C

(See paragraph 4.6 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 (E 4) pursuant to Regulations No 122 and No 33. (*) The numbers 00 indicate that, at the dates when the respective approvals were given, both Regulations were in their original forms.

(*) This number is given merely as an example.

ANNEX 3

REQUIREMENTS FOR WASTE HEATING SYSTEMS – AIR

1. The requirements set out in paragraph 6.2. of this Regulation are considered satisfied in respect of heating systems which include a heat exchanger, the primary circuit of which is passed over by exhaust gases or polluted air, provided that the following conditions are satisfied:
2. the walls of the primary circuit of the heat exchanger must be leak tight at any pressure up to and including 2 bar;
3. the walls of the primary circuit of the heat exchanger must not include any detachable component;
4. the wall of the heat exchanger where the exchange of heat takes place must be at least 2 mm thick if made of non-alloy steels;
- 4.1. in cases where other materials are used (including composite or coated materials), the thickness of the wall must be such as to ensure that the heat exchanger has the same service life as in the case referred to in paragraph 4;
- 4.2. if the wall of the heat exchanger where the exchange of heat takes place is enamelled, the wall where such enamel has been applied must be at least 1 mm thick and this enamel must be durable, leak tight and not porous;
5. the pipe conducting the exhaust gases must include a corrosion test zone at least 30 mm long, this zone being situated directly downstream of the heat exchanger, uncovered and easily accessible;
- 5.1. the wall of this corrosion test zone must not be thicker than the pipes for the exhaust gases situated inside the heat exchanger and the materials and surface properties of this section must be comparable with those of these pipes;
- 5.2. if the heat exchanger forms a single unit with the vehicle exhaust silencer, the external wall of the latter must be regarded as the zone complying with point 5.1 where any corrosion should occur.
6. In the case of waste heat heating systems using the cooling air of the engine for heating purposes, the conditions of paragraph 6.2 of this Regulation are considered satisfied without the use of a heat exchanger provided that the following conditions are satisfied:
- 6.1. the cooling air which is used for heating purposes comes into contact only with surfaces of the engine which do not include any detachable part, and
- 6.2. the connections between the walls of this cooling air circuit and the surfaces used for the transfer of heat are gastight and oil-resistant.

These conditions are considered satisfied if, for example:

- a sheath around each sparking plug draws off any gas leaks outside the heating air circuit;
 - the joint between the cylinder head and the exhaust manifold is situated outside the heating air circuit;
 - there is double leak protection between the cylinder head and the cylinder and any leaks from the first joint are drawn off outside the heating air circuit, or the leak protection between the cylinder head and the cylinder still holds when the cylinder head nuts are cold-tightened at one-third of the nominal torque prescribed by the manufacturer, or
 - the area where the cylinder head is joined to the cylinder is situated outside the heating air circuit.
-

ANNEX 4

TEST PROCEDURE FOR AIR QUALITY

1. In the case of vehicle type-approval the following test shall be carried out:
 - 1.1. Operate the heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s), with all windows closed and, in the case of a combustion heater, the propulsion engine switched off. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made before switch-off.
 - 1.2. The proportion of CO in the ambient air shall be measured by taking samples from:
 - 1.2.1. a point outside the vehicle as close as possible to the heating air inlet, and
 - 1.2.2. a point inside the vehicle less than 1 m from the heated air outlet.
 - 1.3. Readings shall be taken for a representative time of 10 minutes.
 - 1.4. The reading from position described in paragraph 1.2.2 shall be less than 20 ppm CO higher than from position described in paragraph 1.2.1.
 2. In the case of type-approval of heaters as components the following test shall be carried out after the tests of Annexes 5, 6 and paragraph 1.3 of Annex 7.
 - 2.1. The primary circuit of the heat exchanger shall be subjected to a leakage test to ensure that polluted air cannot enter the heated air intended for the passenger compartment.
 - 2.2. This requirement shall be considered to be fulfilled if, at a gauge pressure of 0,5 hPa, the leakage rate from the heat exchanger is less than or equal to 30 dm³/h.
-

ANNEX 5

TEST PROCEDURE FOR TEMPERATURE

1. Operate the heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s), with all windows closed. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made earlier. If the heated air is drawn from outside the vehicle the test shall be carried out at an ambient temperature of not less than 15 °C.
2. The surface temperature of any part of the heating system likely to come into contact with any driver of the vehicle during normal road use shall be measured with a contact thermometer. No such part or parts shall exceed a temperature of 70 °C for uncoated metal or 80 °C for other materials.
 - 2.1. In the case of part or parts of the heating system behind the driver's seat, and in the case of overheating, the temperature shall not exceed 110 °C.
 - 2.2. In the case of vehicles of categories M₁ and N, no part of the system likely to come into contact with seated passengers during normal road use of the vehicle, with the exception of the outlet grille, shall exceed a temperature of 110 °C.
 - 2.3. In the case of vehicles of categories M₂ and M₃, no part of the system likely to come into contact with passengers during normal road use of the vehicle shall exceed a temperature of 70 °C for uncoated metal or 80 °C for other materials.
3. In the case of exposed parts of the heating system outside the passenger compartment, and in the case of overheating, the temperature shall not exceed 110 °C.

The temperature of the heated air entering the passenger compartment shall not exceed 150 °C to be measured at the centre of the outlet.

ANNEX 6

TEST PROCEDURE FOR EXHAUST EMISSION OF COMBUSTION HEATERS

1. Operate heater for one hour at maximum output in conditions of still air (wind speed ≤ 2 m/s) and an ambient temperature of 20 ± 10 °C. If, however, having selected the maximum output the heater switches off automatically in less than an hour, the measurements may be made before switch-off.
2. The dry and undiluted exhaust emissions, measured using an appropriate meter, shall not exceed the values indicated in the following table:

Parameter	Heaters using gaseous fuels	Heaters using liquid fuel
CO	0,1 % vol.	0,1 % vol.
NO _x	200 ppm	200 ppm
HC	100 ppm	100 ppm
Bacharach reference unit ⁽¹⁾	1	4

⁽¹⁾ Reference unit 'Bacharach' ASTM D 2156 is used.

3. The test shall be repeated in conditions equivalent to a vehicle speed of 100 km/h (or maximum design speed of the vehicle in cases where the maximum speed is less than 100 km/h). Under these conditions the CO value must not exceed 0,2 % vol. If the test has been carried out on the heater as a component, then it need not be repeated in the case of the vehicle type in which the heater is installed.

ANNEX 7

ADDITIONAL REQUIREMENTS FOR COMBUSTION HEATERS

1. Operating and maintenance instructions shall be supplied with every heater and, in the case of heaters intended for the after-market, installation instructions shall also be supplied.
 2. Safety equipment shall be installed (either as part of the combustion heater or as part of the vehicle) to control the operation of every combustion heater in an emergency. It shall be designed such that, if no flame is obtained at start-up or if the flame goes out during operation, the ignition and switching times for the supply of fuel are not exceeded by four minutes in the case of liquid fuel heaters or, in the case of gaseous fuel heaters, one minute if the flame supervision device is thermoelectric or 10 seconds if it is automatic.
 3. The combustion chamber and the heat exchanger of heaters using water as a transfer medium shall be capable of withstanding a pressure of twice the normal operating pressure or 2 bar (gauge), whichever is greater. The test pressure shall be noted in the information document.
 4. The heater must have a manufacturer's label showing the manufacturer's name, the model number and type together with its rated output in kilowatts. The fuel type must also be stated and, where relevant, the operating voltage and gas pressure.
 5. Delayed shut-off of combustion air blowers
 - 5.1. If a combustion air blower is fitted a delayed shut-off must be provided even in the event of overheating and in the event of interruption of the fuel supply.
 - 5.2. Other measures to prevent damage due to deflagration and exhaust corrosion can be applied if the manufacturer provides evidence to the satisfaction of the approval authority of their equivalent effect.
 6. Requirements for electrical supply
 - 6.1. All technical requirements affected by the voltage must be within the voltage range of ± 16 per cent of the rated figure. However, if under voltage and/or over voltage protection is provided, the requirements shall be met at rated voltage and in the immediate vicinity of the cut-off points.
 7. Warning light
 - 7.1. A clearly visible tell-tale in the operator's field of view shall inform when the combustion heater is switched on or off.
-

ANNEX 8

Safety requirements for LPG combustion heaters and LPG heating systems

1. LPG HEATING SYSTEMS FOR ROAD USE IN MOTOR VEHICLES
 - 1.1. If an LPG heating system in a motor vehicle can also be used when the vehicle is in motion, the LPG combustion heater and its supply system shall comply with the following requirements:
 - 1.1.1. The LPG combustion heater shall comply with the requirements of the harmonized standard EN 624:2000 (Specifications for dedicated LPG appliances. Room sealed LPG space heating equipment for installation in vehicles and boats).
 - 1.1.2. In cases of a permanently installed LPG container all components of the system that are in contact with LPG in the liquid phase (all components from the filling unit to the vaporiser/pressure regulator) and the associated liquid phase installation shall comply with the technical requirements of Regulation No 67, Parts I and II and Annexes 3 to 10, 13 and 15 to 17.
 - 1.1.3. The gaseous phase installation of the LPG heating system in a vehicle shall comply with the requirements of the harmonized standard EN 1949:2002.⁽¹⁾ (Specifications for the installation of LPG systems for habitation purposes in leisure accommodation vehicles and in other road vehicles).
 - 1.1.4. The LPG supply system shall be so designed that the LPG is supplied with the required pressure and in the correct phase for the installed LPG combustion heater. It is permitted to withdraw LPG from the permanently installed LPG container in either gaseous or liquid phase.
 - 1.1.5. The liquid outlet of the permanently installed LPG container to supply LPG to the heater shall be provided with a remotely controlled service valve with excess flow valve as required in paragraph 17.6.1.1 of Regulation No 67. The remotely controlled service valve with excess flow valve shall be controlled such that it is automatically closed within five seconds of the vehicle engine stopping, irrespective of the position of the ignition switch. If within these five seconds the on-switch of the heater or LPG supply system is activated, the heating system may stay in operation. The heating can always be restarted.
 - 1.1.6. If the LPG is supplied in the gaseous phase from the permanently installed LPG container or separate portable LPG cylinder(s), appropriate provisions shall be taken to ensure that:
 - 1.1.6.1. no liquid LPG can enter the pressure regulator or LPG combustion heater. A separator may be used, and
 - 1.1.6.2. no uncontrolled release due to an accidental disconnection can occur. Means shall be provided to stop the flow of LPG by installing a device directly after or in a cylinder or container mounted regulator or if the regulator is mounted remote from the cylinder or container, a device shall be installed directly before the hose or pipe from the cylinder or container and an additional device shall be installed in, or after the regulator.
 - 1.1.7. If the LPG is supplied in liquid phase, the vaporiser and pressure-regulator unit shall be heated as appropriate by a suitable heat source.
 - 1.1.8. In motor vehicles that use LPG in their propulsion system, the LPG combustion heater may be connected to the same permanently installed LPG container that supplies LPG to the engine, provided that the safety requirements of the propulsion system are met. If a separate LPG container is used for heating, this container shall be provided with its own filling unit.
 - 1.2. The LPG combustion heater and its supply system shall comply with the following requirements:
 - 1.2.1. The LPG combustion heater shall comply with the requirements of the harmonized standard EN 624:2000 (Specifications for dedicated LPG appliances. Room sealed LPG space heating equipment for installation in vehicles and boats).
 - 1.2.2. In cases of a permanently installed LPG container all components of the system that are in contact with LPG in the liquid phase (all components from the filling unit to the vaporiser/pressure regulator) and the associated liquid phase installation shall comply with the technical requirements of Regulation No 67, Parts I and II and Annexes 3 to 10, 13 and 15 to 17.
 - 1.2.3. The gaseous phase installation of the LPG heating system in a vehicle shall comply with the requirements of the harmonized standard EN 1949:2002.⁽¹⁾ (Specifications for the installation of LPG systems for habitation purposes in leisure accommodation vehicles and in other road vehicles).
 - 1.2.4. The LPG supply system shall be so designed that the LPG is supplied with the required pressure and in the correct phase for the installed LPG combustion heater. It is permitted to withdraw LPG from the permanently installed LPG container in either gaseous or liquid phase.
 - 1.2.5. The liquid outlet of the permanently installed LPG container to supply LPG to the heater shall be provided with a remotely controlled service valve with excess flow valve as required in paragraph 17.6.1.1 of Regulation No 67. The remotely controlled service valve with excess flow valve shall be controlled such that it is automatically closed within five seconds of the vehicle engine stopping, irrespective of the position of the ignition switch. If within these five seconds the on-switch of the heater or LPG supply system is activated, the heating system may stay in operation. The heating can always be restarted.
 - 1.2.6. If the LPG is supplied in the gaseous phase from the permanently installed LPG container or separate portable LPG cylinder(s), appropriate provisions shall be taken to ensure that:
 - 1.2.6.1. no liquid LPG can enter the pressure regulator or LPG combustion heater. A separator may be used, and
 - 1.2.6.2. no uncontrolled release due to an accidental disconnection can occur. Means shall be provided to stop the flow of LPG by installing a device directly after or in a cylinder or container mounted regulator or if the regulator is mounted remote from the cylinder or container, a device shall be installed directly before the hose or pipe from the cylinder or container and an additional device shall be installed in, or after the regulator.
 - 1.2.7. If the LPG is supplied in liquid phase, the vaporiser and pressure-regulator unit shall be heated as appropriate by a suitable heat source.
 - 1.2.8. In motor vehicles that use LPG in their propulsion system, the LPG combustion heater may be connected to the same permanently installed LPG container that supplies LPG to the engine, provided that the safety requirements of the propulsion system are met. If a separate LPG container is used for heating, this container shall be provided with its own filling unit.
2. LPG HEATING SYSTEMS FOR STATIONARY USE ONLY IN MOTOR VEHICLES AND THEIR TRAILERS
 - 2.1. The LPG-combustion heater and its supply system of an LPG heating system that is intended to be used only when the vehicle is not in motion, shall comply with the following requirements:
 - 2.1.1. The LPG combustion heater shall comply with the requirements of the harmonized standard EN 624:2000 (Specifications for dedicated LPG appliances. Room sealed LPG space heating equipment for installation in vehicles and boats).
 - 2.1.2. In cases of a permanently installed LPG container all components of the system that are in contact with LPG in the liquid phase (all components from the filling unit to the vaporiser/pressure regulator) and the associated liquid phase installation shall comply with the technical requirements of Regulation No 67, Parts I and II and Annexes 3 to 10, 13 and 15 to 17.
 - 2.1.3. The gaseous phase installation of the LPG heating system in a vehicle shall comply with the requirements of the harmonized standard EN 1949:2002.⁽¹⁾ (Specifications for the installation of LPG systems for habitation purposes in leisure accommodation vehicles and in other road vehicles).
 - 2.1.4. The LPG supply system shall be so designed that the LPG is supplied with the required pressure and in the correct phase for the installed LPG combustion heater. It is permitted to withdraw LPG from the permanently installed LPG container in either gaseous or liquid phase.
 - 2.1.5. The liquid outlet of the permanently installed LPG container to supply LPG to the heater shall be provided with a remotely controlled service valve with excess flow valve as required in paragraph 17.6.1.1 of Regulation No 67. The remotely controlled service valve with excess flow valve shall be controlled such that it is automatically closed within five seconds of the vehicle engine stopping, irrespective of the position of the ignition switch. If within these five seconds the on-switch of the heater or LPG supply system is activated, the heating system may stay in operation. The heating can always be restarted.
 - 2.1.6. If the LPG is supplied in the gaseous phase from the permanently installed LPG container or separate portable LPG cylinder(s), appropriate provisions shall be taken to ensure that:
 - 2.1.6.1. no liquid LPG can enter the pressure regulator or LPG combustion heater. A separator may be used, and
 - 2.1.6.2. no uncontrolled release due to an accidental disconnection can occur. Means shall be provided to stop the flow of LPG by installing a device directly after or in a cylinder or container mounted regulator or if the regulator is mounted remote from the cylinder or container, a device shall be installed directly before the hose or pipe from the cylinder or container and an additional device shall be installed in, or after the regulator.
 - 2.1.7. If the LPG is supplied in liquid phase, the vaporiser and pressure-regulator unit shall be heated as appropriate by a suitable heat source.
 - 2.1.8. In motor vehicles that use LPG in their propulsion system, the LPG combustion heater may be connected to the same permanently installed LPG container that supplies LPG to the engine, provided that the safety requirements of the propulsion system are met. If a separate LPG container is used for heating, this container shall be provided with its own filling unit.

⁽¹⁾ Prepared by the European Committee for Standardisation (CEN). (<http://www.cenorm.be/CENORM/index.htm>).

- 2.1.1. Permanent labels shall be attached on the compartment where the portable LPG cylinders are stored and in close proximity to the control device for the heating system, giving instructions that the LPG heater shall not be in operation and that the valve of the portable LPG cylinder shall be closed when the vehicle is in motion.
 - 2.1.2. The LPG combustion heater shall comply with the requirements of paragraph 1.1.1 above.
 - 2.1.3. The gaseous phase installation of the LPG heating system shall comply with the requirements of paragraph 1.1.3 above.
-

ANNEX 9

Additional provisions applicable to certain vehicles as specified in the ADR

1. Scope

This annex applies to certain vehicles for which the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) contains specific requirements concerning combustion heaters and their installation.

2. Definitions

For the purpose of this Annex, the vehicle designations EX/II, EX/III, AT, FL, OX and MEMU are as defined in Chapter 9.1 of the ADR.

Vehicles approved as being in compliance with the requirements applicable to EX/III vehicles under this Annex shall be deemed to comply with the requirements applicable to MEMU vehicles.

3. Technical Provisions

3.1. General (EX/II, EX/III, AT, FL, OX and MEMU vehicles)

3.1.1. ⁽¹⁾ The combustion heaters and their exhaust gas routing shall be designed, located, protected or covered so as to prevent any unacceptable risk of heating or ignition of the load. This requirement shall be considered as fulfilled if the fuel tank and the exhaust system of the appliance conform to the following provisions:

— Any fuel tanks for supplying the appliance shall meet the following requirements:

(a) In the event of any leakage, the fuel shall drain to the ground without coming into contact with hot parts of the vehicle or the load;

(b) Fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed.

— The exhaust system as well as the exhaust pipes shall be so directed or protected to avoid any danger to the load through heating or ignition. Parts of the exhaust system situated directly below the fuel tank (diesel) shall have a clearance of at least 100 mm or be protected by a thermal shield.

3.1.2. The combustion heater shall be switched on manually. Programming devices shall be prohibited.

3.2. EX/II, EX/III and MEMU vehicles

Combustion heaters using gaseous fuels are not permitted.

3.3. FL vehicles

3.3.1. The combustion heaters shall be put out of operation by at least the following methods:

(a) Intentional manual switching off from the driver's cab;

(b) Stopping of the vehicle engine; in this case the heating device may be restarted manually by the driver;

(c) Start up of a feed pump on the motor vehicle for the dangerous goods carried.

3.3.2. After running is permitted after the combustion heaters have been put out of operation. For the methods of paragraph 3.3.1 (b) and (c) the supply of combustion air shall be interrupted by suitable measures after an after-running cycle of not more than 40 seconds. Only heaters for which proof has been furnished that the heat exchanger is resistant to the reduced after-running cycle of 40 seconds for the time of their normal use shall be used.

⁽¹⁾ Compliance with this paragraph shall be verified on the completed vehicle.

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