AUTOMOTIVE INDUSTRY STANDARD

Provisions concerning the Approval of Headlamps equipped with Gas Discharge Light Sources

(Revision 1)

PRINTED BY
THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA
P.B. NO. 832, PUNE 411 004

ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

December 2010

Status chart of the standard to be used by the purchaser for updating the record

Sr. No.	Corrigenda.	Amendment	Revision	Date	Remark	Misc.
General remarks :						

INTRODUCTION

0 The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No.RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the Secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

0.1 Accordingly AIS-010 covering mandatory requirements regarding performance of lighting and light signalling devices for use in two and three wheelers has been published in 2004 and has been implemented thereafter in 2005.

0.2 With technological developments in lighting and light signaling devices, AIS-010 was taken up for revision and now is prepared in five parts.

This part covers the approval of headlamps equipped with gas discharge light sources as applicable to all categories of vehicles. The permission to use headlamps covered by this standard for a vehicle category is governed by requirements specified by the standard for installation of requirements of that category of vehicles.

0.3 This part is based on the following ECE regulation:

ECE R 98, Revision 1, Amendment No. 5, (Supplement 10 to the original version of the Regulation - Date of entry into force: 15 October 2008)

0.4 While preparing this standard attempts have been made to align with the above ECE regulation. However, certain changes were necessary in the Indian context.

0.5 The following standards contain provisions, which through reference in this text constitute provisions of the standard.

AIS-008 (Rev.1):2010	Installation Requirements of Lighting and Light-Signaling Devices for Motor Vehicle having more than Three Wheels, Trailer and Semi-Trailer excluding Agricultural Tractor and Special Purpose Vehicle

AIS-009	Automotive Vehicles - Installation Requirements of Lighting and Light - Signalling Devices for 2 and 3 Wheelers, their Trailers and Semi-Trailers
AIS-012	Performance Requirements of Lighting and Light Signalling Devices for Motor Vehicle having more than Three wheels, Trailer and Semi-Trailer
AIS-010 (Part 5) (Rev. 1):2010	Requirements of Chromaticity Co-ordinates of Colour of Light emitted from Lighting and Light-Signalling Devices
AIS-034 (Part 1) (Rev. 1):2010	Provisions concerning the Approval of Filament Lamps for use in Approved Lamp Units on Power Driven Vehicles and their Trailers
AIS-034 (Part 2) (Rev. 1):2010	Provisions concerning the Approval of Gas Discharge Light Sources for use in Approved Gas Discharge Lamp Units of Power Driven Vehicles
AIS-037	Procedure for Type Approval and Establishing Conformity of Production for Safety Critical Components
AIS-053	Automotive Vehicles – Types – Terminology
ISO 105	Textiles -- Tests for Colour Fastness -- Part E03: Colour Fastness to Chlorinated Water (Swimming-pool Water)
AIS-010 (Part 1) (Rev. 1):2010	Provisions concerning the Approval of Headlamps emitting an Asymmetrical Passing Beam or a Driving Beam or Both and equipped with Filament Lamps and/or LED Modules
AIS-010 (Part 2) (Rev. 1):2010	Provisions concerning the Approval of Headlamps emitting an Symmetrical Passing Beam or a Driving Beam or both and equipped with Filament lamps or Gas-Discharge Light Sources
AIS-010 (Part 3) (Rev. 1):2010	Provisions concerning the Approval of Front Position Lamps, Rear Position Lamps, Stop Lamps, Direction Indicators Rear-Registration-Plate Illuminating Devices and Reversing Lamp for Vehicles of Category L and their Trailers and Semi-trailers
CIE -Publication 84-1989	The Measurement of Luminous Flux
IEC Publication 60061,	Lamp Caps and Holders together with Gauges for the Control of Interchangeability and Safety.

0.6 The AISC panel and Automotive Industry Standards Committee (AISC) responsible for preparation of this standard are given in Annex M and Annex N respectively

Provisions concerning the Approval of Headlamps equipped with Gas Discharge Light Sources

Provisions concerning the Approval of Headlamps equipped with Gas Discharge Light Sources

0 SCOPE

This standard applies to

(a) headlamps, and

(b) distributed lighting systems,

utilizing gas-discharge light sources, for vehicles of categories M and N, and L2 as defined in AIS-053.

Note 1 : The permission to use headlamps covered by this standard are governed by requirements specified by the standard for installation of requirements of that category of vehicles.

Note 2 : Type of headlamps suitable for both left and right hand traffic conditions covered by ECE R98 are not permitted and hence not covered in this standard. However, this does not exclude approval and use of such headlamp where the change depending on the traffic can only be done at the factory setting. Such headlamp need to comply with the requirements of "left hand" traffic specified in this standard.

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1 DEFINITIONS

1.1 In addition to the following definition, the definitions given in AIS-008, AIS-009, AIS-010 (Part 1), (Part 2), (Part 3) and (Part 5) and their amendments in force at the time of application for type approval shall apply to this standard.

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;

1.6.3. the inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation;

1.6.4. Reserved

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 standard to standard (étalon) filament lamp(s) and gas-discharge light source(s) shall refer to standard AIS-34 (Part 1) (Rev. 1) and AIS-34 (Part 2) (Rev. 1) respectively.

2. APPLICATION FOR APPROVAL OF HEADLAMP (*)

(*) For gas discharge light sources, See AIS-034(Part 2) (Rev. 1).

2.1 Information to be submitted at the time of applying for type approval of the headlamp shall be as given in Annex A.

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 or vehicle manufacturer.

2.1.1 to 2.1.7 Reserved

2.2. Every application for approval shall be accompanied by:

2.2.1. Reserved

2.2.1.1. Reserved

2.2.2. Reserved

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 standard AIS-034 (Part 2)(Rev. 1), 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 x 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 x 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, standard AIS-034 (Part 2)(Rev. 1), 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 headlamp manufacturer.

3.2 They shall comprise, on the lens and on the main body, spaces of sufficient size for the approval mark and the additional symbols referred to in 4; these spaces shall be indicated on the drawings referred to in . A-7

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

3.3. Reserved

3.4 All beams may bear on their light-emitting surface a centre of reference as shown in Annex F.

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 AIS-034 (Part 2)(Rev. 1), the light-generator shall bear the trade name or mark of its manufacturer and the part number referred to in A.9 of Annex A.

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 the lamp:

3.7.1. shall bear the trade name or mark of the headlamp manufacturer. 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 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 A.7 of Annex A. 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 headlamp manufacture.

4 APPROVAL

4.1. General

4.1.1 If all the samples of a type of headlamp submitted pursuant to 2.0, satisfy the provisions of this standard, approval shall be granted.

4.1.2 Headlamps conforming to this standard 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 parts of this standard or other AIS a single 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, as prescribed in AIS-037

4.1.5 Reserved

4.1.6 Reserved

4.2 Composition of the approval mark

The approval mark shall consist of

4.2.1 Approval mark as per AIS-037

4.2.1.1 Reserved

4.2.1.2 Reserved

4.2.2. the following additional symbol (or symbols):

4.2.2.1. An optional marking, 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. Reserved

4.2.2.3. on headlamps meeting the requirements of this standard in respect of the passing beam only, the letter "DC";

4.2.2.4. on headlamps meeting the requirements of this standard in respect of the driving beam only, the letter "DR";

4.2.2.5. on headlamps meeting the requirements of this standard 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 group of letters "PL" to be affixed near the symbols prescribed in 4.2.2.3 to 4.2.2.5 above;

4.2.2.7. on headlamps meeting the requirements of this standard in respect of the driving beam, an indication of the maximum luminous intensity expressed by a reference mark, as defined in 6.3.2.2 below, placed near to approval mark.

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 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 D-1.1.1.1 of Annex D and the permitted voltage(s) according to D-1.1.1.2 of Annex D shall be included in the test report.

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

4.2.3.1. On headlamps meeting the requirements of this standard 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 4.2.3.1. above shall not apply to headlamps meeting the requirements of this standard which are so designed that the passing beam and the driving beam are provided by the same gas-discharge light source

4.2.4. Reserved

4.2.5. The marks and symbols referred to in 4.2.1.and 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 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

Fig 1 to 9 of Annex 2 of the ECE R 98, Revision 1, Amendment No.5, (Supplement 10 to the original version of the Regulation) may be used for the relative location of approval marking and other markings.

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 standards, a single approval mark may be affixed, 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 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 standard under which approval has been granted, 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 as a guidance in Annex 2, Figure10 of ECE R 98, Revision 1, Amendment No. 5, (Supplement 10 to the original version of the Regulation).

4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the standard under which approval has been granted.

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

4.3.2.4 Reserved

4.3.2.5 Figure 10 of Annex 2 of the ECE R 98, Revision 1, Amendment No. 5, (Supplement 10 to the original version of the Regulation) may be used as guidance for the arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the abovementioned additional symbols.

4.3.3 Lamps, the lens of which are used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps:

The provisions laid down in 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 it cannot be separated from the lens, also comprises the space described in 3.2 above and bears the approval marks of the actual functions.

4.3.3.2 Figure 11 of Annex 2 of the ECE R 98, Revision 1, Amendment No. 5, (Supplement 10 to the original version of the Regulation) may be used as guidance for the arrangements of approval marks relating to the above case.

4.3.4 **Distributed lighting systems**

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

5 TECHNICAL REQUIRMENTS OF HEADLAMPS (*)

(*) Technical requirements for gas discharge light sources, See AIS-034 (Part 2)(Rev. 1).

GENERAL SPECIFICATION

5.1 Each sample shall conform to the specifications set forth in 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.

Note : This is a general requirement and no verification is needed for this paragraph to approve the headlamp for compliance to this standard.

5.2.1 Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicles as to comply with the rules applicable to them. Such a device need not be fitted on units in which the reflector and the diffusing lens cannot be separated, provided the use of such units is confined to vehicles on which the headlamp setting can be adjusted by other means.

Where a headlamp providing a passing beam and a headlamp providing a driving beam, each equipped with its own 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 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 6.3.of this standard shall apply.

5.3 Reserved

5.4 Reserved

5.4.1 Reserved

5.4.2 Reserved

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 bend lighting, any mechanical, electromechanical or other device incorporated in the headlamp for these purposes (These provisions shall not apply to the control switch.) shall 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 testing agency 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 testing agency 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 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 testing agency responsible for approval tests shall refer to the instructions supplied by the applicant.

5.5.3. either the passing beam or the driving beam shall always be obtained without any possibility of the mechanism stopping in between two positions;

5.5.4 the user cannot, with ordinary tools, change the shape or position of the moving parts

5.6 Complementary tests shall be done according to the requirements of Annex D 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 E

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 approved according to standard AIS-034 (Part 2) (Rev. 1), and its amendments in force at the time of application for type approval. Gas-discharge light source(s) not approved according, standard AIS-034 (Part 2) (Rev. 1), 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 standard AIS-034 (Part 1)(Rev. 1), and its amendments in force at the time of application for type approval, provided that no restriction on the use is made in standard AIS-034 (Part 1)(Rev. 1),and its 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 standard AIS-034 (Part 2) (Rev. 1), used in distributed lighting systems shall moreover comply with the following requirements (corresponding to those specified in standard AIS-034 (Part 2) (Rev. 1), for approval of gas-discharge light sources):

5.9.1. starting, run-up and hot-restrike as prescribed in 3.6. standard AIS-034 (Part 2) (Rev. 1).

5.9.2. colour as prescribed in 3.9. of standard AIS-034 (Part 2) (Rev. 1),. The colour shall be white.

5.9.3. UV-radiation as prescribed in 3.10. of standard AIS-034 (Part 2)(Rev. 1), if so indicated in the application for approval (See A.9 of Annex A).

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.

Note : Compliance with the requirements for electromagnetic compatibility is relevant to the individual vehicle type

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.

5.13. The headlamp (if equipped with LED modules) and the LED module(s) themselves shall comply with the relevant requirements specified in Annex L of this standard. 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 that they give adequate illumination without dazzle when emitting the passing beam, and good illumination when emitting the driving beam..

Note: Compliance to the requirement of the first sentence of 6.1.1, is deemed to be established if the photometric requirements in this standard are complied with.

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 C to this standard, 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 6. are met with one light source, which has been aged during at least 15 cycles, in accordance with D-4 of AIS-034 (Part 2) (Rev. 1).

Where the gas-discharge light source is approved according to, AIS-034(Part 2) (Rev. 1), it shall be a standard (étalon) light-source and its luminous flux may differ from the objective luminous flux specified in standard AIS-034 (Part 2) (Rev. 1), 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 standard AIS-034 (Part 2) (Rev. 1), 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 standard AIS-034 (Part 2) (Rev. 1).

6.1.5. Photometric compliance must be checked in accordance with 6.2.6. or 6.3. of this standard. 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. (Refer AIS-010 (Part 5) (Rev. 1) for Requirement of chromaticity co-ordinates)

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 50V for headlamps producing passing beam only or alternately passing and driving beam functions as described in 5.4. of this standard.

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), 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) Reserved.

(b) For “left hand” traffic beams:

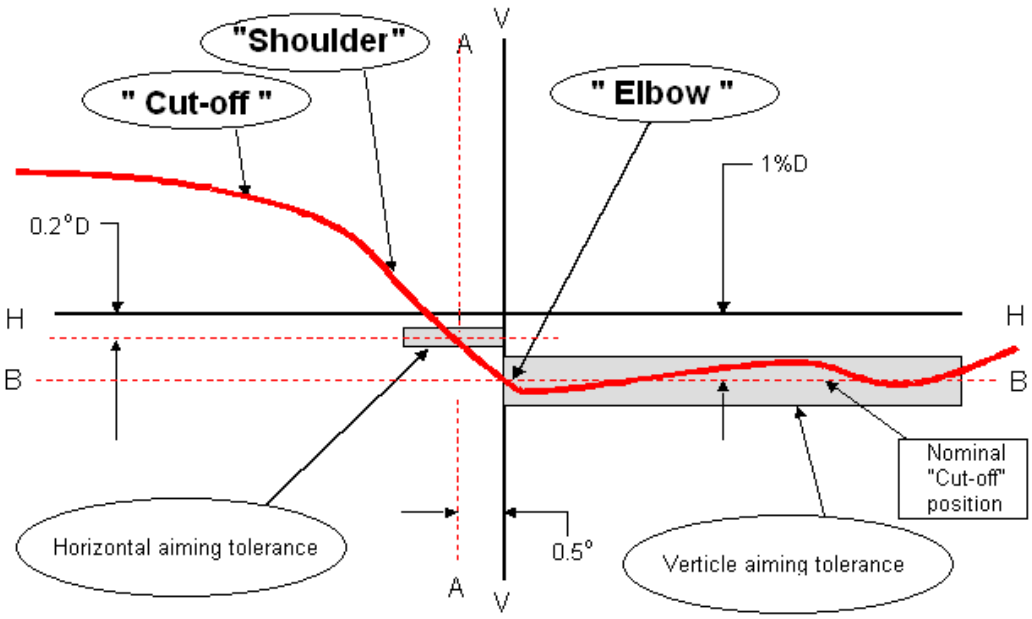
(i) a straight "horizontal part" towards the right;

(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) 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 H-H line;



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

Figure 1

(See 6.2.2.)

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

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

(a) above the line 0.2°D its "shoulder" shall not exceed the line A to the right;

(b) on the line 0.2°D or below its "shoulder" cross the line A; and

(c) the kink of the "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 6.2.5 to 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) Reserved.

(b) 0.5° to the right or 0.75° to the left, for “left hand”; and

vertically not more than 0.25° 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 6.2.2.3 above, the instrumental method prescribed in K-2 and K-3 of Annex K, 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, if its approval is sought solely for provision of a passing beam, (See 6.2.3.1) need comply only with the requirements set out in 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 6.2.4 to 6.2.6. The values specified for Segment II in 6.2.5. do not apply to Annex C, Screen 2

6.2.3.1 Such a special "passing beam" headlamp shall not incorporate a driving beam not subject to requirements.

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 AIS-034 (Part 1)(Rev. 1) 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 AIS-034 (Part 1)(Rev. 1), 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 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 ± 0.1	for 12 V systems
or:	otherwise specified	(See Annex G)

6.2.5. After more than 10 minutes after ignition the illuminances produced on Screen 1 or 2 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 R	0.5 max	R 150	U 25
3	75-L	20 min	L 50	D 25
4	50 R	20 max	R 150	D 37.5
5	25 R 1	30 max	R 150	D 75
6	50 V	12 min	0	D 37.5
7	50 L	20 min	L 75	D 37.5
8	25 R 2	4 min	R 396	D 75
9	25 L 1	4 min	L 396	D 75
10	25 R 3	2 min	R 670	D 75
11	25 L 2	2 min	L 670	D 75
12	15 R	1 min	R 910	D 125
13	15 L	1 min	L 910	D 125
14		*/	R 350	U 175
15		*/	0	U 175
16		*/	L 350	U 175
17		*/	R 175	U 87.5
18		*/	0	U 87.5

19		*/	L 175	U 87.5
20		0.1 min	R 350	0
21		0.2 min	R 175	0
A to B	Segment I	6 min	R 225 to L 225	D 37.5
C to D	Segment II	6 max	L 140 to L 396	U 45
E to F	Segment III and under	20 max	R 417 to L 375	D 187.5
	E max L	70 max	Left of VV line	Above D 75
	E max R	50 max	Right of VV line	

*/ The illumination values at points 14 through 19 shall be such that:
$14 + 15 + 16 \geq 0.3$ lux and
$17 + 18 + 19 \geq 0.6$ lux.
(see Annex C, Figure 3)

6.2.6. The requirements in 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 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 reaimed 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 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 need meet only the requirements referred to in 6.3. Test voltages are the same as in 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 AIS-034 (Part 1)(Rev. 1)(in the case of filament lamps shall be operated at their reference luminous flux) or AIS-034 (Part 2)(Rev. 1).

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 180 lux.

6.3.3.2. The reference mark (I'_M) of this maximum intensity, referred to in 4.2.2.7 above, shall be obtained by the ratio means of the formula

Reference mark = 0.208 E_{max}
This value shall be rounded off to the value 17.5 - 20 - 25 - 27.5 - 30 - 37.5.

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 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 A.10 of Annex A, the headlamp must meet the photometric requirements of 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 A.10 of Annex A. 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 shall be met at the following points:

Passing beam:	HV and (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 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 A.10 of Annex A 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 6.5.2. are checked.

7 Reserved

8. EXTENSION OF TYPE APPROVAL

8.1 Every modification pertaining to the information, including the ballast even if the changes are not technical in nature declared in accordance with 2.1 shall be intimated by the manufacturer to the testing agency. If the changes are in parameters not related to the provisions, no further action need be taken.

If the changes are in parameters related to the provisions, the Testing Agency, which has issued the certificate of compliance, shall then consider, whether,

8.1.1 the device with the changed specifications still complies with provisions, or

8.1.2 Any further verification is required to establish compliance.

8.2 For considering whether testing is required or not, guidelines given in 8.5 (Criteria for Extension of Type Approval) shall be used.

8.3 In case of 8.1.2, tests for only those parameters which are affected by the modifications need be carried out

8.4 In case of fulfillment of criterion of 8.1.1 or after results of further verification as per 8.1.2 are satisfactory, the approval of compliance shall be extended for the changes carried out.

8.5 **Criteria for extension of Type approval**

The Criteria shall be as agreed between the testing agency and applicant.

9. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the AIS-037 with the following requirements:

9.1. Headlamps approved under this standard shall be so manufactured as to conform to the type approved by meeting the requirements set forth in 6.

9.2. the minimum requirements for conformity of production control procedures set fourth in Annex H to this standard shall be complied with.

9.3. The minimum requirements for sampling by the testing agency set forth in Annex J to this standard shall be complied with.

9.4. The normal frequency of these verifications shall be once every two years.

9.5. Headlamps with apparent defects are disregarded.

9.6. The reference mark is disregarded.

9.7. The measuring points 14 to 21 from 6.2.5 of this standard are disregarded.

10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

The provisions shall be as prescribed in AIS-037.

11. Reserved.

12. Reserved.

13. TRANSITIONAL PROVISION

13.1 At the request of the applicant, type approvals for compliance to AIS-010(Part 4) (Rev.1): 2010, shall be granted by testing agencies from 27th October 2010 (date of adoption in CMVR-TSC). Such type approvals shall be deemed to be compliance to AIS-012:2004.

13.2 At the request of applicant, type approval to the compliance to AIS-012:2004 shall be granted up to the notified date of implementation of AIS-010 (Part 4) (Rev.1):2010.

13.3 Type approvals issued for compliance to AIS-012:2004 shall be extended to approval of AIS-010 (Part 4) (Rev.1):2010, subject to satisfactory compliance of the following:

13.3.1 Marking as per 3.0 and sub-clauses for 4.0 applicable for marking.

13.3.2. In case of "E/e" approved devices, requirements specified in 14.

Note : Additional verification for the above need not be carried out, if compliance to the above requirements has already been established during the type approval as per AIS-012:2004.

13.4 Extension of Approvals for engineering and administrative changes:

13.4.1 In the case of 13.1, extensions shall be granted subject to the conditions of AIS-010 (Part 4) (Rev.1):2010. Such extensions shall be deemed to be compliance to AIS-012: 2004.

13.4.2 In the case of 13.2, extensions shall be granted subject to conditions of AIS-012**:** 2004 till the notified date of implementation of AIS-010 (Rev.1) (Part 4):2010.

13.5 Type approvals for compliance to AIS-037**,** already been granted, shall continue to be valid for AIS-010 (Part 4) (Rev.1):2010.

Note : Necessary corrections to the reference of verification reports as per this standard shall be incorporated while issuing the next COP certificate. In the meantime for issuing of vehicle certificate, test/verification report as per this standard shall deemed to be the proof of compliance of AIS-037.

14 ESTABLISHING COMPLIANCE OF "E"/"e" APPROVED HEADLAMPS TO THIS STANDARDS:

14.1 As an exception to 7.4 of AIS-037, (or related administrative decisions) for certifying compliance of "E"/"e" approved headlamps to this standard, the test for the following shall be carried out by testing agency

14.1.1 Provision concerning passing beam. (6.2 of this standard)

14.1.2 Provision concerning driving beam. (6.3 of this standard)

14.1.3 In the case of 14.1.1 and 14.1.2 above, no measured value shall deviate unfavourably by more than 20 per cent from the value prescribed in this standard. For values B 50 R and H/H2(or H/H2/H4) , the maximum unfavourable deviation shall be:

B 50 R	0.2 lx equivalent 20 per cent
	0.3 lx equivalent 30 per cent
On line H/H2 (or H/H2/H4)and above	0.3 lx equivalent 20 per cent
	0.45 lx equivalent 30 per cent

14.1.4 Tests for stability of photometric performance of headlamps in operation (5.5 and Annex D of this standard)

15 AMENDMENTS TO ECE REGULATIONS AFTER THE LEVEL DESCRIBED IN 0.3 OF FOREWORD

15.1 Supplements

In case of changes in ECE regulation, which are issued as supplements (Supplements do not affect the earlier type approvals) at the request of applicant, approval of compliance to this standard shall be issued taking into account the changes arising out of such supplement(s) to ECE regulation with approval from Chairman AISC.
This shall be incorporated in the test report.

Note : Such changes will be considered for inclusion in this standard at the time of its next amendment /revision.

15.2 Series of amendments

Changes in ECE regulation, which are issued as series of amendments (series of amendments may affect the earlier type approvals) will not be considered for issuing approval to this standard.

However, Chairman, AISC may, on a case to case basis, permit to accept latest series of amendments.

This shall be incorporated in the test report.

Note : Such changes will be considered for inclusion in this standard at the time of its next revision.

ANNEX A

(See 2.1)

INFORMATION AND SAMPLES TO BE SUBMITTED AT THE TIME OF APPLICATION FOR TYPE APPROVAL

A-1. Trade name or mark of the device:

A-2. Manufacturer's name for the type of device:

A-3. Manufacturer's name and address:

A-3.1 Telephone No

A-3.2 FAX. No.

A-3.3 E mail address

A-3.4 Contact person

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

A-5 whether the headlamp is intended to provide both a passing beam and a driving beam or only one of these beams;

A-6 the category of the gas discharge lamp used, as listed in AIS-034 (Part 2)(Rev. 1) and/or the light source module specific identification code(s) for LED modules, as applicable,

A-7 Drawings in triplicate in sufficient detail to permit identification of the type and showing the position intended for the approval number and the additional symbols in relation to 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.

A-8 if the headlamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle,

A-9 a brief technical description including the make and type of the ballast(s) and, in the case where headlamps are used to produce bend lighting, the extreme positions according to 6.2.6 of this standard. 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;

If distributed lighting system is used, 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 5.8 of this standard.

A-10 the maximum vertical angles above and below the nominal position(s) which the aiming device can achieve;

A-11 which light sources are energized when the various beam combinations are used;

A-12 whether a distributed lighting system is used and which type(s) of beam(s) is (are) intended to be provided by this system;

For a distributed lighting system using a non-replaceable gas-discharge light source not approved under AIS-034(Part 2)(Rev. 1), the part number assigned by the light-generator manufacturer to the light generator.

ANNEX B

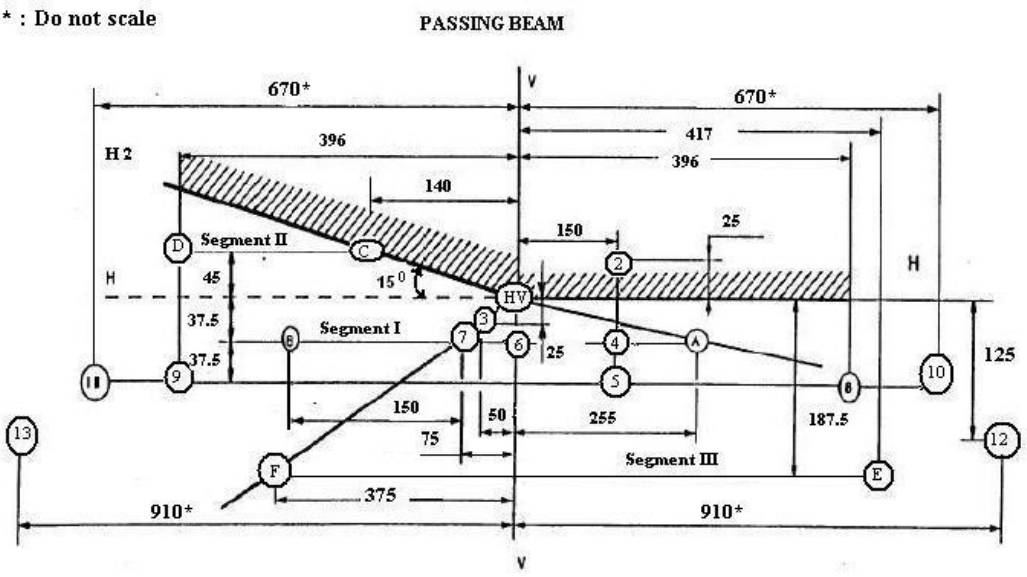
(Reserved)

ANNEX C

(See 6.1.2)

MEASURING SCREEN

Figure A
Measuring screen 1

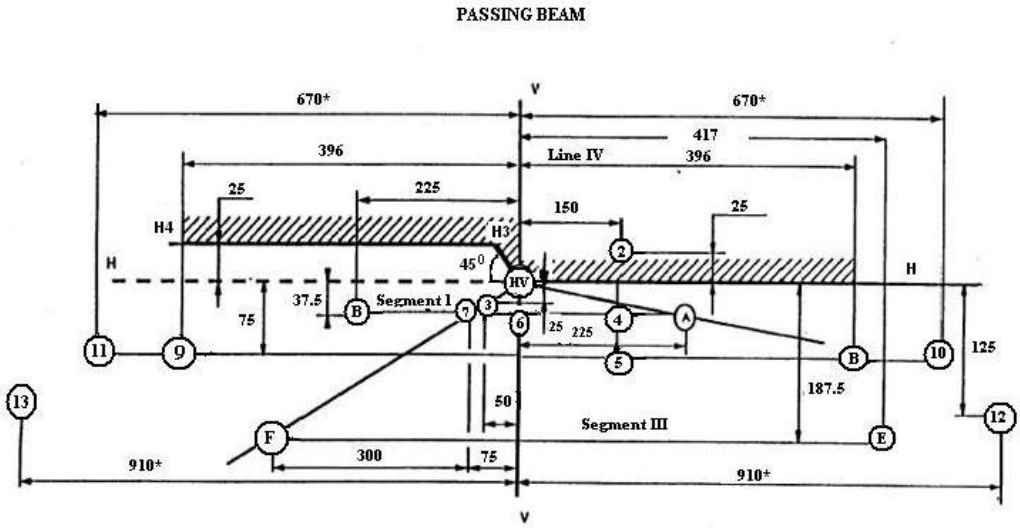


Dimensions are in cm on a flat vertical screen at 25m. The HH and VV lines are the intersections with this screen of the horizontal and vertical plans passing through the axis of reference of the passing beam as declared by the applicant. Angle HVH2-HH is 15^0.

Figure B:

Measuring screen 2

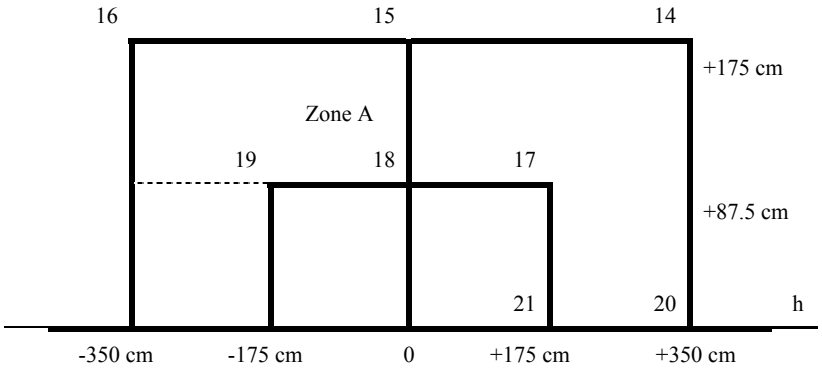
* : Do not scale



Dimensions are in cm on a flat vertical screen at 25m. The HH and VV lines are the intersections with this screen of the horizontal and vertical plans passing through the axis of reference of the passing beam as declared by the applicant. Angle HVH3-HH- 45^0.

Figure C

Measuring points for illumination values



ANNEX D

(See 5.6)

TESTS FOR STABILITY OF PHOTOMETRIC PERFORMANCE IN OPERATION OF HEADLAMPS IN OPERATION

D-0 Test on complete headlamps

Once the photometric values have been measured according to the prescriptions of this standard, in the point for Emax for driving beam and in points HV, 50 L, B 50 R for passing beam 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.

D-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°C $\pm$ 5°C, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

D-1.1 **Clean headlamp**

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

D-1.1.1. **Test Procedure:**

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

D-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 lit for the prescribed time. (See note below)

Note : When tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the later shall be lit for the duration of the test, except for daytime running lamp. In case of direction indicator lamp, it shall be lit in flashing operation mode with an on/off time of approximately one to one.

(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 (See note below) at a time, the test shall be carried out in accordance with this condition, activating {See note under D-1.1.1.1 (a)} each specified condition successively for half the time specified in D-1.1 above.

Note : 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.

In all other cases {See note under D-1.1.1.1 (a) and note under D-1.1.1.1 (b)} shall be subjected to the following cycle until the time specified is reached:

- 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 D-3).

D-1.1.1.2. **Test voltage**

The test voltage for the ballast and for LED module(s), if applicable, is 13.5 ± 0.1 volts for 12 V network system, or otherwise specified in the application for approval. If there are reciprocally incorporated filament lamps, the voltage producing the reference flux shall be used.

D-1.1.2. **Test results**

D-1.1.2.1. **Visual inspection**

Once the headlamp has been stabilized 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.

D-1.1.2.2. **Photometric test**

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

Passing beam: 50 L - B 50 R - HV
Driving beam: Point of Emax

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 D-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.

D-1.2. **Dirty headlamp**

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

D-1.2.1. **Preparations of the headlamp**

D-1.2.1.1. **Test mixture**

D-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:

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

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

(c) 0.2 parts by weight of NaCMC (See D-1.2.1.1.3) , and

(d) an appropriate quantity of distilled water, with a conductivity of $\leq$ 1 mS/m.

The mixture shall not be more than 14 days old.

D-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:

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

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

(c) 0.2 part by weight of NaCMC (See D-1.2.1.1.3)

(d) 13 parts by weight of distilled water with a conductivity of $\leq$ 1 mS/m, and

(e) 2 ± 1 parts by weight of surface-actant (See D-1.2.1.1.4)

The mixture shall not be more than 14 days old.

D-1.2.1.1.3 NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0.6-0.7 and a viscosity of 200-300 cP for a 2 per cent solution at 20^{O}C.

D-1.2.1.1.4 The tolerance on quantity is due to the necessity of obtaining a dirt that correctly spreads out on all the plastic lens.

D-1.2.1.2. Application of the test mixture to the headlamp

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

Point Emax in passing beam/driving beam and in driving beam only,

50 L and 50 V for a passing lamp only,

Note : Point 50 V is situated 375 mm below HV on the vertical line v-v on the screen at 25 m distance.

D-1.2.1.3 **Measuring equipment**

The measuring equipment shall be equivalent to that used during headlamp approval tests. Gas discharge light source as supplied by the applicant shall be used for the photometric verification.

D-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 D-1, shall be subjected to the test described in D-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.

D-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°C ± 5°C.

Using a mass production gas discharge light source, which has been aged for at least 15 hour the headlamp shall be operated on passing beam function without being dismounted from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in D-1.1.1.2.).

The position of the cut-off line in its horizontal part (between vv and the vertical line passing through points) B 50R 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.

D-2.2. **Test results**

D-2.2.1. The result in milliradians (mrad) shall be considered as acceptable for a passing lamp, only when the absolute value $\Delta r_I = \left| r_3 - r_{60} \right|$ recorded on the headlamp is not more than 1.0 mrad ($\Delta r_I \leq 1.0$ mrad).

D-2.2.2. However, if this value is more than 1.0 mrad but not more than 1.5 mrad (1.0 mrad < $\Delta r_I \leq 1.5$ mrad) a second headlamp shall be tested as described in D-2.1 after being subjected three consecutive times to the cycle as described below, in order to stabilize 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 D-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

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

D-3 Overview of operational periods concerning tests for stability of photometric performance

Abbreviations:

P: passing beam lamp

D: driving beam lamp (D_1 + D_2 means two driving beams)

F: front fog lamp

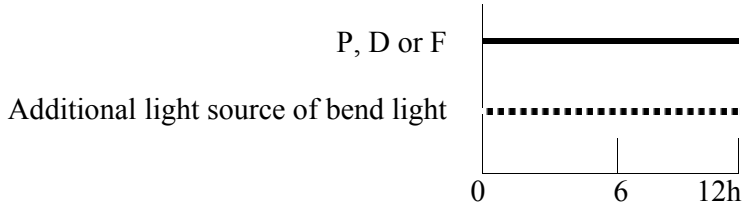
– – – – means a cycle of 15 minutes off and 5 minutes lit

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

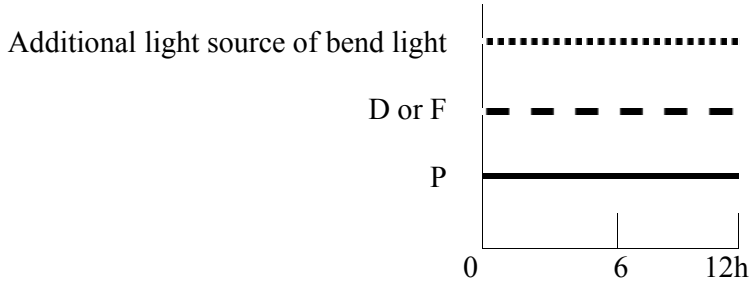
– · – · – means a cycle of 15 minutes lit and 5 minutes off

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

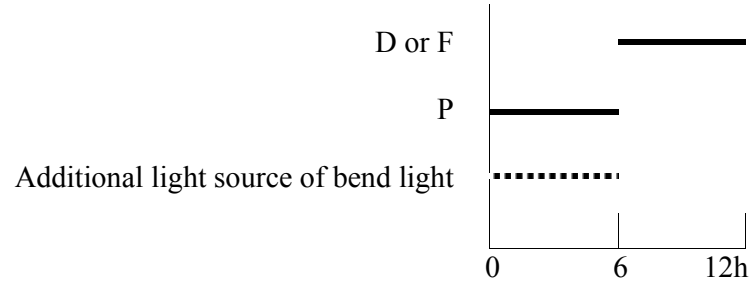
1. P or D or F (HC or HR or B)



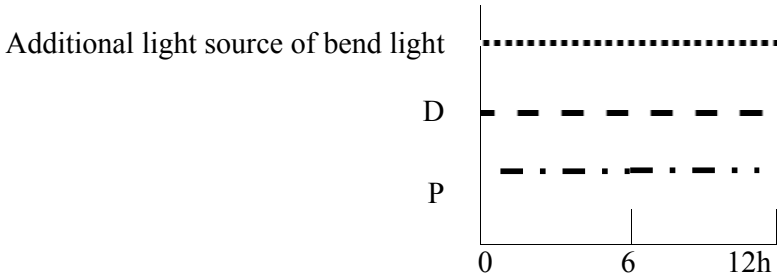
2. P+F (HC B) or P+D (HCR)



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



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



ANNEX E

(See 5.7)

REQUIREMENTS FOR HEADLAMPS INCORPORATING LENSES OF PLASTIC MATERIAL- TESTING OF LENS OR MATERIAL SAMPLES AND OF COMPLETE HEADLAMPS

E-1 General specifications

E-1.1 The samples supplied pursuant to 2.2.5. and 2.3. of this standard shall satisfy the specifications indicated in E-2.1 to E-2.5 below.

E-1.2 The two samples of complete headlamps supplied pursuant to 2.2.4 of this standard and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications below.

E-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 A of Table E1 of this Annex.

E-1.4 However, if the headlamp manufacturer can prove that the product has already passed the tests prescribed in E-2.1 to E-2.5 below, or the equivalent tests pursuant to another standard, those tests need not be repeated; only the tests prescribed in B of Table E-1, shall be mandatory.

E-1.5 Reserved

E-2 Tests

E-2.1 Resistance to temperature changes

E-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 $40^{O}C \pm 2^{O}C$ and 85-95 per cent RH;

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

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

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

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

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

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

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

E-2.1.2 **Photometric measurements**

E-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 50R and 50L for passing beam of a passing headlamp or a passing/driving headlamp

Emax for the driving beam of a driving headlamp or a passing/driving headlamp.

E-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.

E-2.2 **Resistance to atmospheric and chemical agents**

E-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 $1,200\ W/m^2 \pm 200\ W/m^2$ for a period such that the luminous energy that they receive is equal to $4,500\ MJ/m^2 \pm 200\ MJ/m^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50^{O}C \pm 5^{O}C$. 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 $23^{O}C \pm 5^{O}C$, in accordance with the following cycle:

spraying: 5 minutes;

drying: 25 minutes.

E-2.2.2 **Resistance to chemical agents:**

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

E-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).

E-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 E-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 x 14 mm.

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

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

E-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 E-2.3 (Resistance to detergents) $23^{O}C \pm 5^{O}C$.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0.2 per cent impurities at $23^{O}C \pm 5^{O}C$ and then wiped off with a soft cloth.

E-2.2.3. **Results**

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

$$\Delta t = \frac{T_2 - T_3}{T_2}$$

measured on the three samples according to the procedure described in E-4 shall not exceed 0.020 ($\Delta tm \leq 0.020$).

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

$$\Delta d = \frac{T_5 - T_4}{T_2}$$

measured on the three samples according to the procedure described in E-4 shall not exceed 0.020 ($\Delta dm \leq 0.020$).

E-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 1500 hours of continuous exposure, the colorimetric specifications of the transmitted light shall 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

E-2.3 **Resistance to detergents and hydrocarbons**

E-2.3.1 **Resistance to detergents**

The outer face of three samples (lenses or samples of material) shall be heated to $50^{O}C \pm 5^{O}C$ and then immersed for five minutes in a mixture maintained at $23^{O}C \pm 5^{O}C$ 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 $50^{O}C \pm 5^{O}C$. The surface of the samples shall be cleaned with a moist cloth.

E-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.

E-2.3.3 **Results**

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

$$\Delta t = \frac{T_2 - T_3}{T_2}$$

measured on the three samples according to the procedure described in E- 4.0 to this annex shall not exceed 0.010 ($\Delta tm \leq 0.010$).

E-2.4 **Resistance to mechanical deterioration**

E-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 E-5.

E-2.4.2 **Results**

After this test, the variations:

in transmission

$$\Delta t = \frac{T_2 - T_3}{T_2}$$

and in diffusion:

$$\Delta d = \frac{T_5 - T_4}{T_2}$$

shall be measured according to the procedure described in E-4 in the area specified in E-2.2.4. The mean value of the three samples shall be such that:

$\Delta tm \leq 0.100$;

$\Delta dm \leq 0.050$

E-2.5 **Test of adherence of coatings, if any**

E-2.5.1 **Preparation of the sample**

A surface of 20 mm x 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 x 2 mm. The pressure on the blade or needle shall be sufficient to cut at least the coating.

E-2.5.2 **Description of the test**

Use an adhesive tape with a force adhesion of 2 N/(cm of width) ± 20% measured under the standardized conditions specified in E-6 of 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 E-2.5.1

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1.5 m/s ± 0.2 m/s.

E-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.

E-2.6 **Tests of the complete headlamp incorporating a lens of plastic material**

E-2.6.1 **Resistance to mechanical deterioration of the lens surface**

E-2.6.1.1 **Tests**

The lens of headlamp sample No. 1 shall be subjected to the test described in E-2.4.1 above.

E-2.6.1.2 **Results**

After the test, the results of photometric measurements carried out on the headlamp in accordance with this standard shall not exceed by more than:

30 per cent the maximum values prescribed at points B50R and HV and not be more than 10% below the minimum values prescribed at Point B 50 R, HV and 75L.

E-2.6.2 **Test of adherence of coatings, if any**

The lens of headlamp sample No. 2 shall be subjected to the test described in E-2.5 above.

E-4 Method of Measurement of the Diffusion and Transmission of Light

E-4.1 **Equipment** (see **Figure E-1**)

The beam of a collimator K with a half divergence

$$\beta/2 = 17.4 \text{ X } 10^{-4} \text{ rd}$$

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

A convergent achromatic lens L2 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

$$\beta/2 = 14^{O}$$

An annular diaphragm D_D with angles

$$\frac{\alpha_O}{2} = 1^{O} \text{ and } \frac{\alpha_{max}}{2} = 12^{O}$$

is placed in an image focal plane of the lens L_2.

The non-transparent central art 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 (see note below) of the lens L_2 shall be so chosen that the image of D_2 completely covers the receiver R.

Note : For L_2 the use of a focal distance of about 80mm is recommended.

When the initial incident flux is referred to 1000 units, the absolute precision of each reading shall be better than 1 unit.

E-4.2 **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^O
T_3	Yes (after test)	no	Flux transmitted by the tested material in a field of 24^O
T_4	Yes (before test)	yes	Flux diffused by the new material
T_5	Yes (after test)	yes	Flux diffused by the tested material

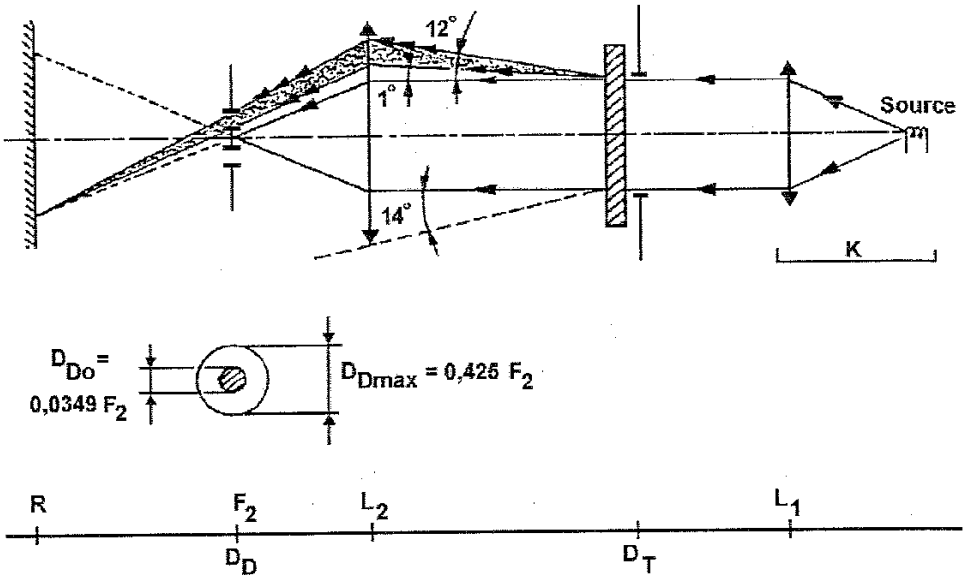


Figure E-1

Optical Setup for Measurement of Variations in Diffusion and Transmission

E-5 Spray testing method

E-5.1. Test equipment

E-5.1.1. 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 ± 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 ± 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm ± 10 mm from the nozzle.

E-5.1.2. 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/m^3 for a mixture comprising 25 g of sand per litre of water.

E-5.2. Test

The outer surface of the headlamp 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 **E-4,** 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.

E-6 Adhesive tape adherence test

E-6.1. Purpose

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

E-6.2. Principle

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

E-6.3. **Specified atmospheric conditions**

The ambient conditions shall be at $23^{O}C \pm 5^{O}C$ and 65 ± 15 per cent RH.

E-6.4. **test pieces**

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see E-6.3 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.

E-6.5. **Procedure**

The test shall be under the ambient conditions specified in E-6.3.

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

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

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

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

Fix the plate and fold back the free end of the tape at 90^{O}. 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 mm/s ± 30 mm/s and record the force required.

E-6.6. **Results**

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

Table E-1
(See E-1.3 & E-1.4)

CHRONOLOGICAL ORDER OF APPROVAL TESTS

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

Samples	Lenses or samples of material										Lenses			
Tests	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1 Limited photometry (para. E-2.1.2)											X	X	X	
1.1.1 Temperature change (para. E-2.1.1)											X	X	X	
1.2 Limited photometry (para E- 2.1.2)											X	X	X	
1.2.1 Transmission measurement	X	X	X	X	X	X	X	X	X					
1.2.2 Diffusion measurement	X	X	X				X	X	X					
1.3 Atmospheric agents (para. E- 2.2.1)	X	X	X											
1.3.1 Transmission measurement	X	X	X											
1.4 Chemical agents (para E-2.2.2)	X	X	X											
1.4.1 Diffusion measurements	X	X	X											
1.5 Detergents (para E-2.3.1)				X	X	X								
1.6 Hydrocarbons para. E-2.3.2)				X	X	X								
1.6.1 Transmission measurement				X	X	X								
1.7 Deterioration (para. E-2.4.1)							X	X	X					
1.7.1 Transmission measurement							X	X	X					
1.7.2 Diffusion measurement							X	X	X					
1.8 Adherence (para.E-2.5)														X
1.9 Resistance to light source radiations (para. E-2.2.4.)										X				

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

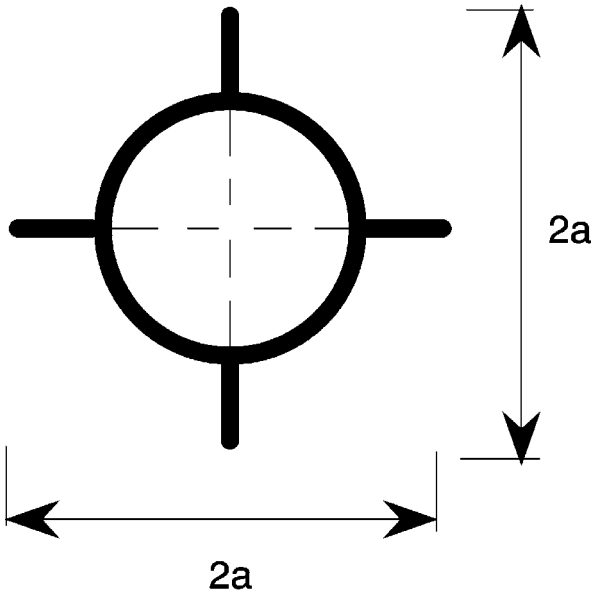
Tests	Complete headlamp	
	Sample No.	
	1	2
2.1 Deterioration (para E-2.6.1.1)	x	
2.2 Photometry (para E-2.6.1.2.)	x	
2.3 Adherence (para E-2.6.2.)		x

ANNEX F

(See 3.4)

CENTRE OF REFERENCE

Diameter = a



a = 2 mm min.

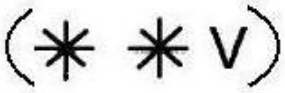
This optional mark of the centre of reference shall be positioned on the lens at its intersection with the reference axis of the passing beam, and also on the lenses of the driving beams when they are neither grouped nor combined nor reciprocally incorporated with a passing beam.

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 G

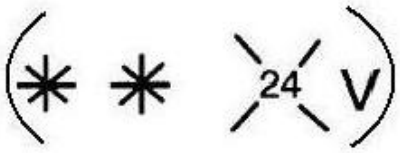
(See 6.2.4.4)

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 H

(See 9.2)

MINIMUM REQUIREMENTS FOR CONFORMITY OF PRODUCTION CONTROL PROCEDURES

H-1. General

H-1.1. The conformity requirements shall be considered satisfied from a mechanical and a geometrical standpoint, if the differences do not exceed inevitable manufacturing deviations within the requirements of this standard..

H-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 V ± 0.1 V or as otherwise specified and:

either

equipped with a removable standard gas-discharge light source according to 6.1.3. The luminous flux of this gas-discharge light source may differ from the reference luminous flux specified in AIS-034 (Part 2)(Rev. 1). 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 AIS-034(Part 2)(Rev. 1) accordingly the measured illuminances may be corrected by 20 per cent in the favourable direction.

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

B 50 R:	0.2 lx equivalent 20 per cent
	0.3 lx equivalent 30 per cent
On line H/H2 or Line H/H3/H4 and above	0.3 lx equivalent 20 per cent
	0.45 lx equivalent 30 per cent

H-1.2.2 or if

H-1.2.2.1 for the passing beam, the values prescribed in this standard are met at HV (with a tolerance of + 0.2 lx) and related to that aiming at least one point of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius around points B 50 R (with a tolerance of + 0.1 lx), 75 L, 50 V, 25 R1, 25 L2, and on segment I

H-1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0.75 Emax, a tolerance of + 20 per cent for maximum values and -20 per cent for minimum values is observed for the photometric values at any measuring point specified in 6.3. of this standard.

H-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° to the right or left and not by more than 0.2° up or down.

H-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 1.2. above.

H-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 D-2.1 of Annex D after being subjected three consecutive times to the cycle described in D-2.2.2 of Annex D.

The headlamp shall be considered as acceptable if Δr (as defined in D-2.1 and D-2.2 of Annex D 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.

H-1.4. The chromaticity coordinates shall be complied with

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

H-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 provision of this standard.

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.

H-2.1. **Nature of tests**

Tests of conformity in this standard shall cover the photometric characteristics and the verification of the change in vertical position of the cut-off line under influence of heat.

H-2.2. **Methods used in tests**

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

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

H-2.2.3. The application of H-2.2.1 and H-2.2.2 requires regular calibration of test apparatus and its correlation with measurement made by a testing agency.

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

H-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.

H-2.4. Measured and recorded photometric characteristics

The sampled headlamps shall be subjected to photometric measurements at the points provided for in the standard, the reading being limited at the points E_{max}, HV (See H-2.4.1) , HL, HR (See H-2.4.2) in the case of a driving beam, and to points B 50 R, HV, 50 V, 75 L and 25R2 in the case of the passing beam (see Figure in Annex C).

H-2.4.1 When the driving beam is reciprocally incorporated with the passing beam, HV in the case of driving beam shall be same measuring point as in the case of passing beam

H-2.4.2 HL and HR : points “hh” located at 1.125 m to the left and to the right of point HV respectively.

H-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 testing agency, criteria governing acceptability of his products in order to meet the specification laid down for verification of conformity of products in 9.1 of this standard.

The criteria governing 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 J (first sampling) would be 0.95.

ANNEX J

See (9.3)

MINIMUM REQUIREMENTS FOR SAMPLING BY TESTING AGENCY

J-1. General

J-1.1. The conformity requirements shall be considered satisfied from a mechanical and a geometrical standpoint in accordance with the requirements of this standard, if any, if the differences do not exceed inevitable manufacturing deviations.

J-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 V ± 0.1 V or as otherwise specified and:

either
equipped with a removable standard gas-discharge light source according to 6.1.3. The luminous flux of this gas-discharge light source may differ from the reference luminous flux specified in AIS-034 (Part 2)(Rev. 1). 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 AIS-034 (Part 2)(Rev. 1), accordingly the measured illuminances may be corrected by 20 per cent in the favourable direction.

J-1.2.1. no measured value deviates unfavourably by more than 20 per cent frothe values prescribed in this standard.

In the glare zone the maximum deviation may be respectively:

B50R	0.2 lx equivalent 20 per cent
	0.3 lx equivalent 30 per cent
On line H/H2	0.3 lx equivalent 20 per cent
Or line H/H3/H4)and above:	0.45 lx equivalent 30 per cent

J-1.2.2. or if

J-1.2.2.1. for the passing beam, the values prescribed in this standard 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 of 15 cm in radius around points B 50 L R (with a tolerance of 0.1 lx), 75L, 50 V, 25 R1, 25 L2, and on segment I;

J-1.2.2.2. and if, for the driving beam, HV being situated within the isolux 0.75 E_{max}, a tolerance of + 20 per cent for maximum values and - 20 per cent for minimum values is observed for the photometric values at any measuring point specified in 6.3. of this standard. The reference mark is disregarded.

J-1.2.3. if the results of the test 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° to the right or left and not by more than 0.2° up or down.

J-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 J-1.2. above.

J-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 D-2.1. of Annex D after being subjected three consecutive times to the cycle described in D-2.2.2. of Annex D.

The headlamp shall be considered acceptable if Δr (as defined in D-2.1. and D-2.2. of Annex D) 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.

J-1.4 The chromaticity coordinates shall be complied with.

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

J-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.

J-2.1. The conformity is not contested

J-2.1.1. Following the sampling procedure shown in Figure J-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:

J-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

J-2.1.1.2. sample B

B1:	Both the headlamps	0 per cent

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

J-2.2. **The conformity is contested**

J-2.2.1. Following the sampling procedure shown in Figure J-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:

J-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

J-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	not more than	20 per cent
	but	not more than	30 per cent

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

J-2.3. **Non conformity established**

Conformity shall be contested and 10 of this standard applied if, following the sampling procedure shown in Figure J-1 of this annex, the deviations of the measured values of the headlamps are:

J-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

J-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

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

J-3. Repeated sampling

In the case of A3, B2, B3 a repeated sampling, third sample C of two headlamps, selected from stock manufactured after alignment, is necessary within two months' time after the notification.

J-3.1. **The conformity is not contested**

J-3.1.1. Following the sampling procedure shown in Figure J-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:

J-3.1.1.1. sample C

	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		

J-3.1.1.2. sample D

D1	in the case of C2		
	both headlamps		0 per cent

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

J-3.2. **The conformity is contested**

J-3.2.1. Following the sampling procedure shown in Figure J-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:

J-3.2.1.1. sample D

D2	in the case of C2		
	One headlamps	more than	0 per cent
	but	Not more than	20 per cent
	one headlamp	Not more than	20 per cent

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

J-3.3. **Non Conformity Established.**

Conformity shall be contested and 10 of this standard applied if, following the sampling procedure shown in Figure J-1 of this annex, the deviations of the measured values of the headlamps are

J-3.3.1. **sample C**

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

J-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

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

J-4. Change of the vertical position of the cut-off line

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:

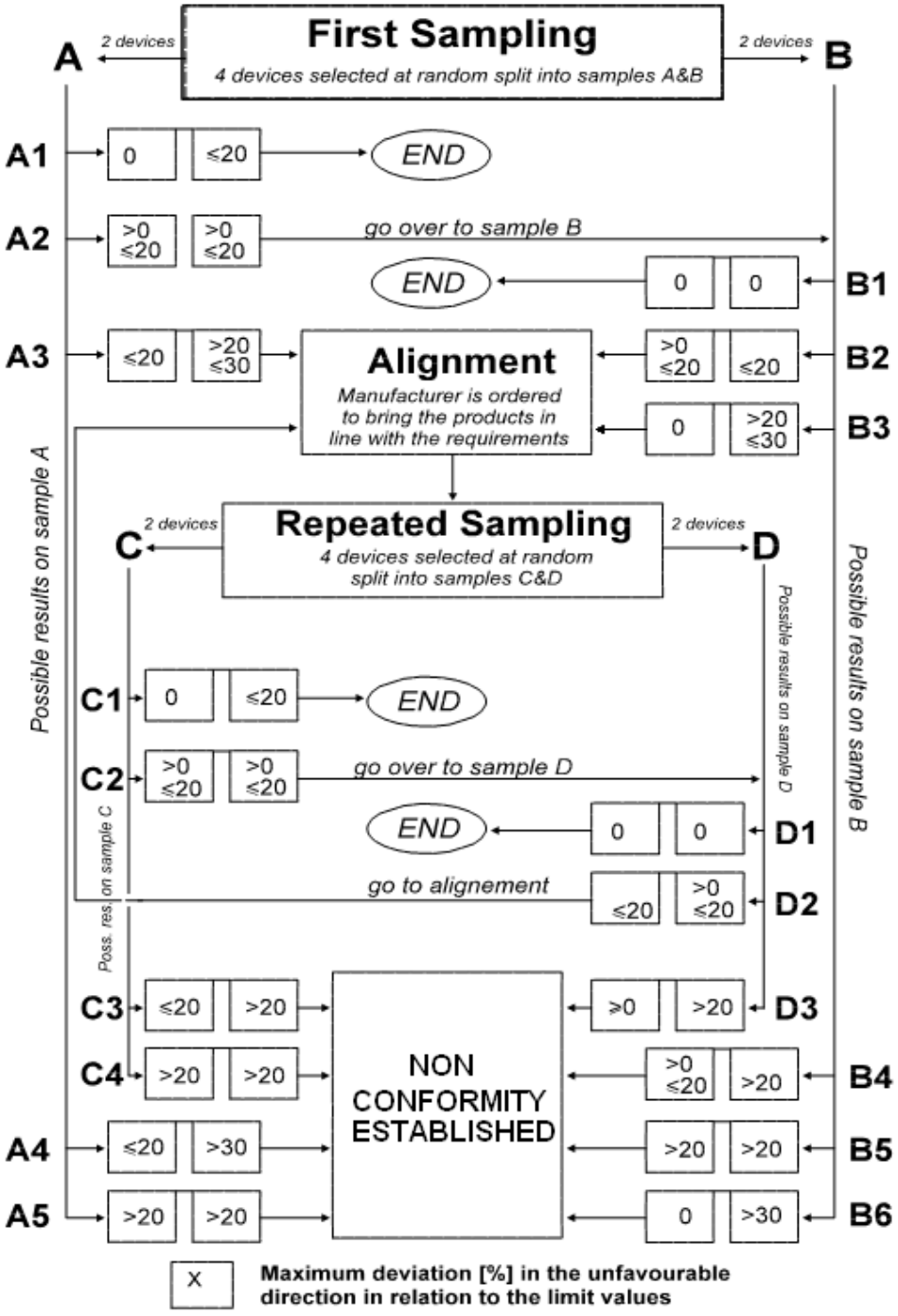
One of the headlamps of sample A after sampling procedure in Figure J-1 of this annex shall be tested according to the procedure described in D-2.1 of Annex D after being subjected three consecutive times to the cycle described in D-2.2.2 of Annex D.

The headlamp shall be considered as acceptable if Δr does not exceed 1.5 mrad.

If this value exceeds 1.5 mrad but is not more than 2.0 mrad, the second headlamp of sample A shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 1.5 mrad.

However, if this value of 1.5 mrad on sample A is not complied with, the two headlamps of sample B shall be subjected to the same procedure and the value of Δr for each of them shall not exceed 1.5 mrad.

Figure J-1


First Sampling
4 devices selected at random split into samples A&B
2 devices
2 devices
A
B
A1
0
≤20
END
A2
>0 ≤20
>0 ≤20
go over to sample B
END
0
0
B1
A3
≤20
>20 ≤30
Alignment
Manufacturer is ordered to bring the products in line with the requirements
>0 ≤20
≤20
B2
0
>20 ≤30
B3
Repeated Sampling
4 devices selected at random split into samples C&D
2 devices
2 devices
C
D
Possible results on sample A
Possible results on sample B
Possible results on sample D
C1
0
≤20
END
C2
>0 ≤20
>0 ≤20
go over to sample D
END
0
0
D1
go to alignement
≤20
>0 ≤20
D2
Poss. res. on sample C
C3
≤20
>20
≥0
>20
D3
C4
>20
>20
NON CONFORMITY ESTABLISHED
>0 ≤20
>20
B4
A4
≤20
>30
>20
>20
B5
A5
>20
>20
0
>30
B6
X
Maximum deviation [%] in the unfavourable direction in relation to the limit values

ANNEX K
(See 6.2.2.4.)

INSTRUMENTAL VERIFICATION OF THE "CUT-OFF" FOR PASSING BEAM HEADLAMPS

K-1. GENERAL

In the case where 6.2.2.4 of this standard applies, the quality of the "cut-off" shall be tested according to the requirements set out in K-2 below and the instrumental vertical and horizontal adjustment of the beam shall be performed according to the requirements set out in K-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 6.2.2.1 and 6.2.2.2 of this standard is required.

K-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° 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 the test report.

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° 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 K-2.1 to K-2.3 below comply with at least one set of measurements.

K-2.1. Not more than one "cut-off" shall be visible.

K-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° from the V-V where:

$G = (\log E_{\beta} - \log E_{(\beta + 0.1°)})$ where β = 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).

K-2.3. **Linearity**

The part of the horizontal "cut-off" that serves for vertical adjustment shall be horizontal between 1.5° and 3.5° from the V-V line (see Figure K-1).

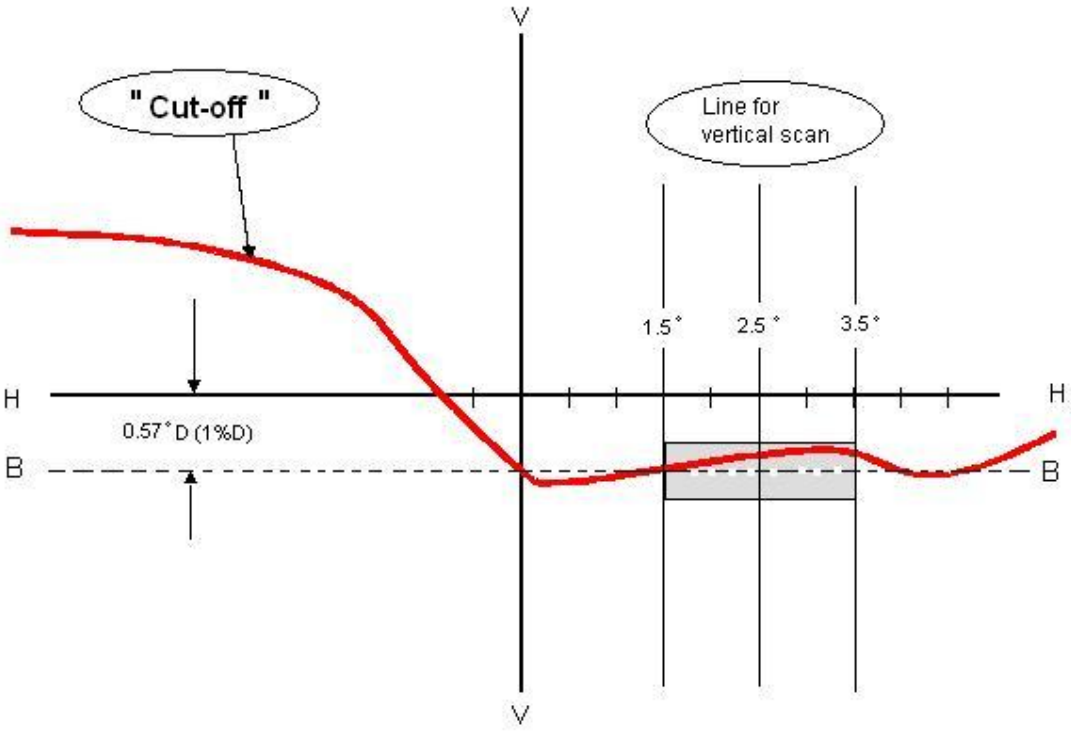
(a) The inflection points of the "cut-off" gradient at the vertical lines at 1.5°, 2.5° and 3.5° shall be determined by the equation:

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

(b) The maximum vertical distance between the inflection points determined shall not exceed 0.2 °.

K-3. Vertical and horizontal adjustment

If the "cut-off" complies with the quality requirements of K-2 of this annex, the beam adjustment may be performed instrumentally



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

Figure K-1
Measurement of "cut-off" quality

K-3.1. **Vertical adjustment**

Moving upward from below the line B (see Figure K-2 below), a vertical scan is carried out through the horizontal part of the "cut-off" at 2.5° 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.

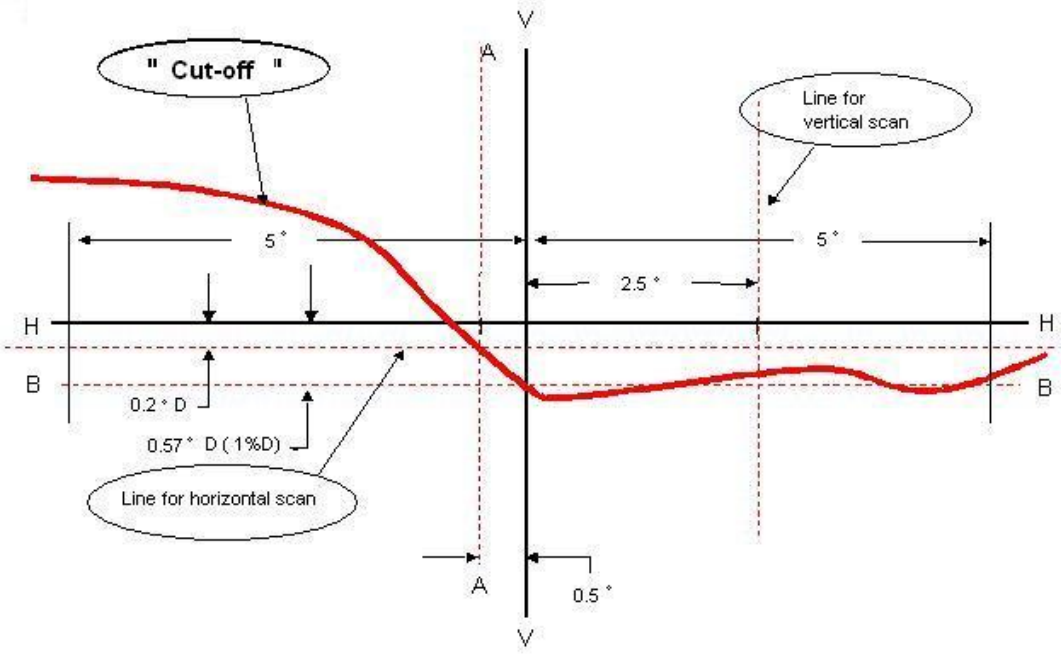
K-3.2. **Horizontal adjustment**

The applicant shall specify one of the following horizontal aim methods

(a) The "0.2 D line" method (see Figure K-2 below).

A single horizontal line at 0.2° 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 $G = (\log E_{\beta} - \log E_{(\beta + 0.1°)})$ 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.



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

Figure K-2

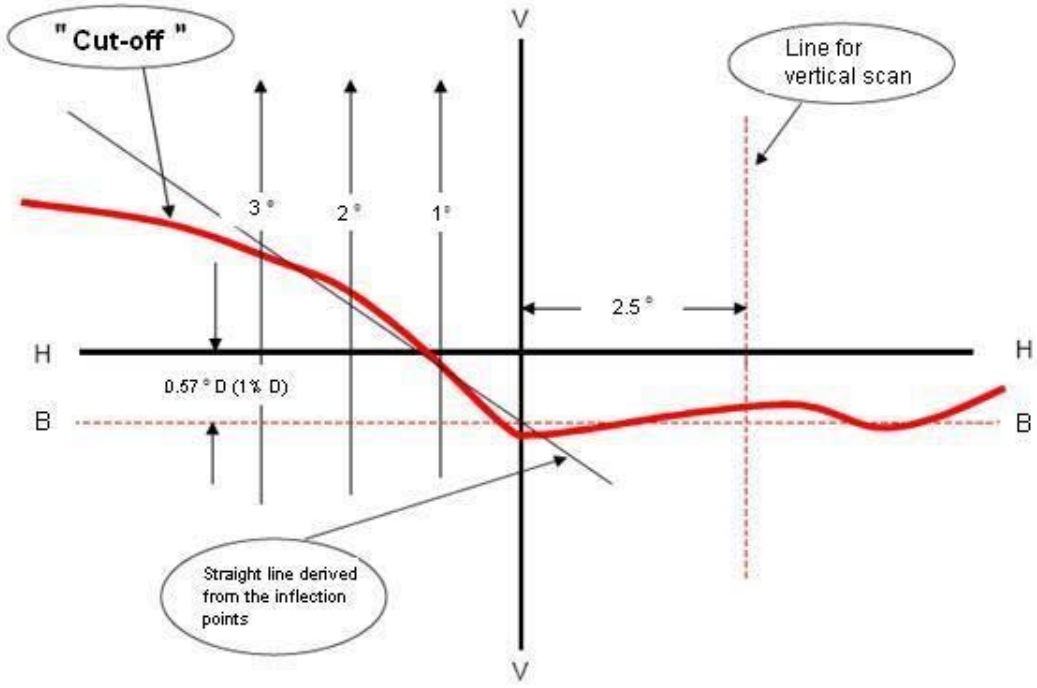
Instrumental vertical and horizontal adjustment- horizontal line scan method

(b) The "3 line" method (see Figure K-3)

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

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

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.



Note: The scales are different for vertical and horizontal lines

Figure K-3 :

Instrumental vertical and horizontal adjustment-three line scan method

ANNEX L

(See 5.13)

REQUIREMENTS FOR LED MODULES AND HEADLAMPS INCLUDING LED MODULES

L-1. General specifications

L-1.1. Each LED module sample submitted shall conform to the relevant specifications of this standard when tested with the supplied electronic light source control-gear(s), if any.

L-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.

L-1.3. LED module(s) shall be tamperproof.

L-1.4. The design of removable LED module(s) shall be such that:

L-1.4.1 when the LED module is removed and replaced by another module provided by the applicant and bearing the same light source module identification code, the photometric specifications of the headlamp shall be met;

L-1.4.2. LED modules with different light source module identification codes within the same lamp housing, shall not be interchangeable.

L-1.5 Electronic light source control gear(s) may be part of the LED module(s).

L-2. Manufacture

L-2.1. The LED(s) on the LED module shall be equipped with suitable fixation elements.

L-2.2. The fixation elements shall be strong and firmly secured to the LED(s) and the LED module.

L-3. Test conditions

L-3.1. Application

L-3.1.1. All samples shall be tested as specified in L-4 below.

L-3.1.2. The kind of light sources on a LED module shall be light-emitting diodes (LED) as defined in 2.7.1.1.6 of AIS-008, in particular with regard to the element of visible radiation. Other kinds of light sources are not permitted.

L-3.2. Operating conditions

L-3.2.1 LED module operating conditions

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

L-3.2.2. Ambient temperature

For the measurement of electrical and photometric characteristics, the headlamp shall be operated in a dry and still atmosphere at an ambient temperature of 23 °C ± 5 °C.

L-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 standard

L-4. Specific requirements and tests

L-4.1. Colour rendering

L-4.1.1. Red content

In addition to measurements as described in 6.1.6 of this standard.

The minimum red content of the light of a LED module or headlamp incorporating LED module(s) tested at 50 V shall be such that:

$$k_{red} = \frac{\int_{\lambda=610\,nm}^{780\,nm} E_e(\lambda)\, V(\lambda)\, d\lambda}{\int_{\lambda=380\,nm}^{780\,nm} E_e(\lambda)\, V(\lambda)\, d\lambda} \geq 0.05$$

where:

$E_e(\lambda)$	(unit: W)	is the spectral distribution of the irradiance;
$V(\lambda)$	(unit: 1)	is the spectral luminous efficiency;
(λ)	(unit: nm)	is the wavelength

This value shall be calculated using intervals of one nanometer.

L-4.2. UV-radiation

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

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

$S(\lambda)$(unit: 1) is the spectral weighting function;

k_m = 683 lm/W is the maximum value of the luminous efficacy of radiation.

(For definitions of the other symbols see L-4.1.1 above).

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

λ	S(λ)	λ	S(λ)	λ	S(λ)
250	0.430	305	0.060	355	0.000 16
255	0.520	310	0.015	360	0.000 13
260	0.650	315	0.003	365	0.000 11
265	0.810	320	0.001	370	0.000 09
270	1.000	325	0.000 50	375	0.000 077
275	0.960	330	0.000 41	380	0.000 064
280	0.880	335	0.000 34	385	0.000 530
285	0.770	340	0.000 28	390	0.000 044
290	0.640	345	0.000 24	395	0.000 036
295	0.540	350	0.000 20	400	0.000 030
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.

ANNEX M

(See Introduction)

COMPOSITION OF AISC PANEL ON LIGHTING AND LIGHT SIGNALLING DEVICES*

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* At the time of approval of this Automotive Industry Standard (AIS)

ANNEX N
(See Introduction)

COMMITTEE COMPOSITION *

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