

AMENDMENT NO. 1
TO
AIS - 062
Performance Requirements of Lighting and Light-Signalling
Devices for Agricultural Tractors

1.0 Page No. 2/50;

Insert new clause 5.1.1 after clause 5.1 as follows:

5.1.1	Specific requirements for headlamps using H4 lamps, shall be as per the relevant paragraphs of EEC directive 2003/37 or ECE regulations R-20, which is equivalent standards.	
-------	--	--

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 SHIPPING, ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

July 2005

AIS-062

AUTOMOTIVE INDUSTRY STANDARD

**Performance Requirements of
Lighting and Light-Signalling Devices
for Agricultural Tractors**

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 VEHICLES RULES – TECHNICAL STANDING COMMITTEE

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

December 2004

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

Sr. No.	Corrige nda.	Amend- ment	Revision	Date	Remark	Misc.

General Remarks :

INTRODUCTION

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 Ministry of Surface Transport (MOST) vide order No. RT-11028/11/97-MVL dated September 15,1997.The standard 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.

Performance of lighting and light-signalling devices is a safety requirement. This standard prescribes the requirements of such devices installed on Agricultural Tractor

Performance requirements of lighting and light-signalling devices for two and three wheeler are covered in AIS-010 and those for motor vehicle having more than three wheels, trailer and semi-trailer are covered in AIS-012.

Performance requirements for retro-reflectors to be installed on motor vehicles are covered in AIS-057

Performance requirements for Rear Warning Triangle (Slow Moving Emblem) to be installed on Agricultural Tractors is covered under AIS-088 (under formulation).

Considerable assistance has been taken from the following ECE Regulations / Automotive Industry Standards (AIS) in preparing this standard:

ECE R 1 & 2 Rev. 4 –Amd.5 (02 series of Amd.)	Uniform Provisions concerning the Approval of Motor Vehicle Headlamps Emitting an Asymmetrical Passing Beam and /or a Driving Beam and equipped with Filament Lamps of Categories R2 and / or HS1
ECE R 6 Rev. 3-Amd.1 (Supp.10 to 01 Series of Amd.)	Uniform Provisions concerning the Approval of Direction Indicators for Motor Vehicles and their Trailers
ECE R 7 Rev. 3-Amd.1 (Supp.6 to 02 Series of Amd.)	Uniform Provisions concerning the Approval of Front and Rear Position (Side) Lamps, Stop-Lamps and End-outline Marker Lamps for Motor Vehicles (Except Motor Cycles) and their Trailers

ECE R 19 Rev. 3-Amd. 4 (Supp.9 to 02 Series of Amd.)	Uniform Provisions concerning the Approval of Motor Vehicles Fog Lamps.
ECE R 23 Rev. 1-Amd. 4 (Supp.8 to Org.Ver.)	Uniform Provisions concerning the Approval of Reversing Lamps for Power-Driven Vehicles and their Trailers
ECE R 38 Rev. 1-Amd. 2 (Supp.7 to Org.Ver.)	Uniform Provisions concerning the Approval of Rear Fog Lamps for Power-Driven Vehicles and their Trailers
ECE R 77 Rev. 1-Amd. 1 (Supp.6 to Org.Ver.)	Uniform Provisions concerning the Approval of Parking Lamps for Power-Driven Vehicles.
ECE R 50 Rev.1-Amd.4 Supplement 5	Uniform Provisions Concerning the Approval of Front Position Lamps, Rear Position Lamps, Stop Lamps, Direction Indicators and Rear-Registration-Plate Illuminating Devices for Mopeds, Motor Cycles and Vehicles treated as such
ECE R 57 Rev.1-Amend.2 (02 series of Amd.)	Uniform Provisions Concerning the Approval of Headlamps for Motor Cycles and Vehicles treated as such
AIS-012	Performance Requirements of Lighting and Light- Signalling Devices for Motor Vehicle having more than Three Wheels, Trailer and Semi-Trailer.
AIS-010	Performance Requirements of Lighting and Light- Signalling Devices for 2 And 3 Wheeled Motor Vehicles, their Trailers and Semi-Trailers and Vehicles treated as such

While preparing this standard, as per decisions of CMVR-TSC, following was considered:

- Additional environmental and vibration tests ;
- The new and old colour coordinates of ECE regulations have been retained as alternatives;
- The size of number plate for checking the registration plate (mark) illuminating lamp has been changed to the size prescribed in CMVR ;
- Performance requirements of headlamps equipped with S2 category of filament lamp included.
- Environmental and vibration tests for work lamp (plough lamp) are included.

The Automotive Industry Standards Committee responsible for this standard is given in Annex : L

Performance Requirements of Lighting and Light-Signalling Devices for Agricultural Tractors

1.0 SCOPE

This standard lays down performance requirements of lighting and light-signalling devices for agricultural tractors.

2.0 REFERENCE

The following standards are necessary adjuncts to this standard.

AIS-008/2001	Installation requirements of lighting and light - signalling devices for motor vehicle having more than three wheels, trailer and semi-trailer excluding agricultural tractor and special purpose vehicle
AIS-030/2001	Installation requirements of lighting and light - signalling devices for agricultural tractors
AIS-034	Automobile lamps
AIS-012	Performance requirements of lighting and light-signalling devices for motor vehicle having more than three wheels, trailer and semi-trailer.
AIS-010	Performance requirements of lighting and light-signalling devices for 2 and 3 wheeled motor vehicles, their trailers and semi-trailers and vehicles treated as such

3.0 Lighting and light-signalling devices fitted on agricultural tractors as specified in para. 1.0 shall meet the requirements specified in para. 5.0 and 6.0.

4.0 DEFINITIONS

4.1 In addition to following, definitions refereed in paragraph 4.0 of AIS- 030/2001, paragraph 4.0 of AIS- 008/2001 and paragraph 4.0 of AIS- 012 shall be applicable;

4.1.1. **“Work Lamp (Plough lamp) of Different Type”** means work lamp (plough lamp) which differ in such essential respects as :

- 4.1.1.1. The trade name or mark;
- 4.1.1.2. The characteristics of the optical system;
- 4.1.1.3. The inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and / or deformation during operation.
- 4.1.1.4. The kind of beam produced
- 4.1.1.5. The material constituting the lenses and coating if any;
- 4.1.1.6. The category of filament lamp used.

5.0 LIGHTING AND LIGHT-SIGNALLING DEVICES SHALL MEET THE PHOTOMETRIC AND COLORIMETRIC REQUIREMENTS AS GIVEN IN FOLLOWING ANNEXES

5.1	Main-beam headlamp and dipped-beam headlamp equipped with R2 or HS1 category of filament lamps	Annexes: A1, A2, A3 of this standard.
5.2	Main-beam headlamp and dipped-beam headlamp equipped with S2 category of filament lamp	Annexes: B1, B2, B3 of this standard
5.3	Front fog lamp	Annex: C1, C2, C3 of AIS-012
5.4	Front and rear position lamp, stop lamp, end-outline marker lamp	Annex: D1, D2, D3 of AIS-012
5.5	Direction indicator lamp and hazard warning lamp	Annex: E1, E2, E3 of AIS-012
5.6	Reversing lamp	Annex: F1, F2, F3 of AIS-012
5.7	Parking lamp	Annex: G1, G2, G3 of AIS-012
5.8	Rear fog lamp	Annex: J1, J2, J3 of AIS-012
5.9	Rear registration plate (mark) illuminating lamp	Annex: B of AIS-010

5.10 In the case of devices designed for use with replaceable filament lamp, they shall be of category listed in AIS-034 or corresponding standard applicable at the time of Type Approval of device or those permitted in standard considered to be alternate as per rule 92(3) of CMVR. The lamp holders of such devices shall be suitable for cap of such filament lamps.

6.0 APPLICABLE TESTS TO THE LIGHTING AND LIGHT-SIGNALLING DEVICES

6.1 The applicable tests to the lighting and light-signalling devices are shown in the **Table-1**

6.2 Lighting and light-signalling devices shall meet the requirements of environmental tests as specified in **Annex: L of AIS-012**, when tested with prescribed test procedures given in the same **Annex**

7.0 SAMPLES TO BE SUBMITTED FOR TESTING

7.1 For photometric and colorimetric tests two samples – one L/H and one R/H- shall meet the specified requirements. The samples tested for photometric tests may be further used for colorimetric tests

- 7.2 For all other environmental tests a separate sample shall be tested. However tests can be combined as per manufacturers' option.
- 7.3 For the test of plastic material of which the lenses of headlamp are made the following samples shall also be submitted:
 - 7.3.1 thirteen lenses
 - 7.3.2 Six of these lenses may be replaced by six 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;
 - 7.3.3 Every such lens or sample of material shall be produced by the method to be used in mass production;
 - 7.3.4 A reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.
 - 7.3.5 The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.

8.0 REQUIREMENTS OF CONFORMITY OF PRODUCTION ⁽¹⁾

- 8.1. Devices approved under this standard shall be so manufactured as to conform to the type approved by meeting the requirements set forth in the relevant annexes.
- 8.2 The test agency may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be once every two years.
- 8.3. Penalties for non-compliance of conformity of production shall be as detailed in AIS-037

9.0 FOR TYPE-APPROVAL

- 9.1 **Technical Specifications to be submitted:**
At the time of application, the manufacturer shall declare to the test agency the information given in **Table-2**.

(1) This provision will come into force after AIS-037 is notified for implementation

10.0 CHANGES IN TECHNICAL SPECIFICATION

10.1 Every modification pertaining to the information, even if the changes are not technical in nature declared in accordance with para 9.1 shall be intimated by the manufacturer to the certifying 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, may then consider, whether,

10.1.1 the model with the changed specifications still complies with provisions;
or,

10.1.2 any further verification is required to establish compliance.

10.2 For considering whether testing is required or not, guidelines given in para 11.0 (Criteria for Extension of Approval) shall be used.

10.3. In case of 10.1.2, tests for only those parameters which are affected by the modifications need be carried out

10.4. In case of fulfilment of criterion of Para 10.1.1 or after results of further verification as per Para of 10.1.2 are satisfactory, the approval of compliance shall be extended for the changes carried out.

11.0 CRITERIA FOR EXTENSION OF APPROVAL

Till the details are finalized, the Criteria shall be as agreed between the test agency and manufacturer.

12.0 MARKING

12.1 The devices shall have, in a legible and indelible way, the following markings:

12.2 Trade name or mark of the manufacturer

12.3 Indication of category of filament lamp provided.

12.4 Headlamp shall be marked with the letter M in downward-pointing triangle

12.5 On the prototype for type approval the marking may be provided by suitable temporary methods and need not necessary be obtained from the tools used for series production.

12.6 In case of front and rear position lamp, stop lamp operating at other than the nominal rated voltages of 6V, 12V or 24 V respectively, by the application of an additional supply system or having secondary mode, must bear a marking denoting the rated secondary design voltage, if the additional supply is not part of the device.

Table:1
(See para 6.1)
LIST OF APPLICABLE TESTS

Sr . No.	Name of the Test	Lighting * Device with -out Plastic Lens	Lighting * Device with Plastic Lens	Light – Signalling Devices **
1	Photometry	√	√	√
2	Colorimetry	√	√	√
3	Vibration Test	√	√	√
4	Resistance to Oil Test	---	---	√
5	Corrosion Resistance Test	√	√	√
6	Dust Test	√	√	√
7	Moisture Test	√	√	√
8	Thermal Shock Resistance Test	√	---	---
9	High Voltage (flash) Test	√	√	---
10	Warpage Test for Devices with Plastic Lenses	---	√	√
11.	Fuel Resistance Test	---	---	√
12	Tests for Stability of Photometric Performance of Headlamps in operation	√	√	---

* Lighting devices include main-beam headlamp, dipped-beam headlamp, front fog lamp, and work lamp (plough lamp) . In case of work lamp photometry and colorimetry tests are not applicable.

** All other devices are considered as light-signalling devices

Table: 2

(See para 9.1)

**TECHNICAL INFORMATION TO BE SUBMITTED BY THE
MANUFACTURER FOR TYPE- APPROVAL**

1. Manufacturer's name & address
2. Telephone No
3. FAX. No.
4. E mail address
5. Contact person
6. Plant/(s) of manufacture.
7. The intended function(s) of the device.
8. Drawings, in triplicate ,in sufficient detail to permit identification of the type and setting out the geometrical conditions under which it is fitted to the vehicle, together with the direction of observation which must be taken into account as the reference axis during the tests (horizontal angle $H = 0^\circ$, vertical angle $V = 0^\circ$) and the point which must be taken as the center of reference during these tests; in the case of a headlamp the drawings must show a vertical (axial) section and a head-on view with, where appropriate, details of the lens fluting; the drawings must also illustrate the position intended for the mandatory component type-approval mark and, where appropriate, additional symbols in relation to the rectangle for that mark.
9. A brief technical description of device giving details, the category or categories of filament lamps prescribed as listed in AIS-034
10. Colour of the light emitted from the device :
- 11 **Following specific information regarding lighting and light-signalling devices**
 - 11.1 **Headlamp**
 - 11.1.1 Whether the headlamp is intended to provide both a dipped-beam and a main-beam or only one of these beams;
 - 11.1.2 if the headlamp is equipped with an adjustable reflector, the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle;
 - 11.1.3 Drawings representing a frontal view of the headlamp, with details of lens ribbing if any, and the cross-section;
 - 11.1.3.1 If the headlamp is equipped with an adjustable reflector, an indication of the mounting position(s) of the headlamp in relation to the ground and the longitudinal median plane of the vehicle, if the headlamp is for use in that (those) position(s) only;

11.2 Front fog lamp

11.2.1 drawings representing a frontal view of the front fog lamp, with details of lens ribbing if any, and the cross-section;

11.3 Front and rear position lamp, Stop lamp , End-outline marker lamp

11.3.1 The purpose or purposes for which the device submitted for approval is intended and whether it may also be used in an assembly of two lamps of the same kind/type;

11.3.2 Category of stop lamp : S1,S2

11.3.3 At the choice of the manufacturer, it will specify that the device may be installed on the vehicle with different inclinations of the reference axis in respect to the vehicle reference planes and to the ground or rotate around its reference axis; these different conditions of installation shall be indicated in the information.

11.3.4 In case of stop lamp with two levels of intensity, an arrangement diagram and specification of the characteristics of the system ensuring the two levels of intensity. Manufacturer shall provide two samples of parts constituting the system which ensures two level of intensity.

11.4 Direction Indicator lamp

11.4.1 Category or to which of the Categories 1, 2a, 5 and whether the direction indicator may also be used in an assembly of two lamps of the same category.

11.5 Reversing lamp

11.5.1 See para 11.3.3

11.6 Parking lamp

11.6.1 See para 11.3.3

11.7 Rear fog lamp

11.7.1 See para 11.3.3

11.8 Rear registration plate (mark) illuminating lamp :

11.8.1 Drawings showing geometrically the position in which the illuminating device is to be fitted in relation to the space to be occupied by the registration plate, and the outlines of the area adequately illuminated.

ANNEX : A1

(See para 5.1)

**REQUIREMENTS FOR MAIN-BEAM HEADLAMP AND
DIPPED-BEAM HEADLAMP EQUIPPED WITH
R2 OR HS1 CATEGORY FILAMENT LAMP**

A1.1 GENERAL REQUIREMENTS FOR HEADLAMPS

A1.1.1 Each sample shall conform to the specifications set forth in Annex: A1, A2, A3 of this standard and Annex: L of AIS-012

A1.1.2 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.

A1.1.2.1 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 components in which the reflector and the diffusing lens cannot be separated, provided the use of such units is confined to vehicles on which the headlamp setting can be adjusted by other means.

Where a headlamp providing a dipped-beam and a headlamp providing a main-beam, each equipped with its own filament lamp, are assembled to form a composite unit, the adjusting device shall enable each optical system individually to be duly adjusted.

A1.1.2.2 However, these provisions shall not apply to headlamp assemblies whose reflectors are indivisible. For this type of assembly the requirements of Annex :A2 shall apply.

A1.1.3 The headlamp shall be equipped with filament lamp(s) of category R2, HS1 as listed in AIS 034.

A1.1.4 The components by which a filament lamp is fixed to the reflector shall be so made that, even in darkness, the filament lamp can be fixed in no position but the correct one. ⁽¹⁾

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

A1.1.5 The filament lamp holder shall conform to the characteristics given in AIS 034. Table:A1 gives nomenclature of filament lamp holder for R2 and HS1 category of filament lamps. The holder data sheet relevant to the category of filament lamp used applies.

Table:A1

Filament Lamp	Holder
R 2	P45t-41
HS 1	PX43t

A1.1.6 Headlamp designed shall satisfy the requirements of left-hand traffic.

A1.1.7 Conformity with the requirements of paragraphs A1.1.2 to A1.1.6 shall be verified visually and where necessary by test fitting.

A1.1.8 Complementary test shall be done according to Annex :A4 to ensure that in use there is no excessive change in photometric performance.

A1.1.9 If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of Annex : A5.

A1.1.10 On headlamps designed to provide alternately a main-beam and a dipped-beam, any mechanical, electromechanical or other device incorporated in the headlamp for switching from one beam to the other shall be so constructed that:

A1.1.10.1 The device is strong enough to withstand 50,000 operations without suffering damage despite the vibrations to which it may be subjected in normal use.

A1.1.10.2 In the case of failure it shall automatically obtain the dipped-beam position.

A1.1.10.3 Either the dipped-beam or the main-beam shall always be obtained without any possibility of the mechanism stopping in between two positions

A1.1.10.4 The user cannot, with ordinary tools, change the shape or position of the moving parts.

ANNEX : A2

(See para 5.1 and A1.1.1.)

PHOTOMETRIC TEST PROCEDURE AND ILLUMINATION REQUIREMENTS FOR MAIN-BEAM HEADLAMP AND DIPPED-BEAM HEADLAMP EQUIPPED WITH R2 OR HS1 CATEGORY FILAMENT LAMP

A2.1 GENERAL PROVISIONS

A2.1.1 Headlamps shall be so made that with suitable R2 and / or HS1 filament lamp they provide adequate illumination without dazzle in the case of dipped-beam and good illumination in the main-beam.

A2.1.2 The illumination produced by the headlamp shall be determined by means of a vertical screen set up 25 m forward of the headlamp and at right angles to its axis as shown in Figure-A1.

A2.1.3 The headlamps shall be checked by means of a standard (reference or etalon) filament lamp(s) designed for a rated voltage of 12V⁽¹⁾. During the checking of the headlamp, the voltage at the terminals of the filament lamp shall be regulated so as to obtain the following characteristics.

Filament Lamp category	Approximate supply voltage (v) for measurement	Light Flux (in lumens)	
		Main-beam filament	Dipped-beam filament
R2	12	700	450
HS1	12	700	450

A2.1.4 The bulb of the standard filament lamp shall be of such optical shape and quality that it does not cause any reflection or refraction adversely affecting the light distribution. Compliance with this requirement shall be checked by measuring the light distribution obtained when standard headlamp is fitted with standard (etalon) filament lamp

(1) 24V rated voltage lamps also can be approved to this standard

A2.2 PROVISION CONCERNING DIPPED-BEAM

A2.2.1 Aiming of dipped-beam headlamp

A2.2.1.1 The dipped-beam must produce a sufficiently sharp "cut-off" to permit a satisfactory adjustment with its aid. The "cut-off" must be a horizontal straight line on the right hand side. On the other side it shall be horizontal or within an angle of 15° above the horizontal.

A2.2.1.2. The headlamp shall be so aimed that:

A2.2.1.2.1 The "cut-off" on the right-half of the screen⁽¹⁾ is horizontal;

A2.2.1.2.2 This horizontal part of the "cut-off" is situated on the screen 25 cm below the horizontal plane passing through the focus of the headlamp (See Figure-A1);

A2.2.1.2.3 The screen is in the position indicated in Figure-A1⁽²⁾

When so adjusted, the headlamp shall, if it is intended to provide a dipped-beam and a main-beam, comply with the requirements referred to in paragraphs A2.2.2, A2.2.3 and A2.3 below. If it is intended primarily to provide a dipped-beam, it need comply only with the requirements refer to in paragraph A2.2.2 and A2.2.3.⁽³⁾

Where a headlamp so adjusted does not meet the requirements referred in paragraphs A2.2.2, A2.2.3 and A2.3 its adjustments may be changed, provided that the axis of beam or the point of the intersection HV specified in Figure A1 to this standard is not laterally displaced by more than 1° (more than 1° = 44 cm) to the right or left⁽⁴⁾. To facilitate adjustment by means of the cut-off, the headlamp may be partially occulted in order to sharpen the cut-off.

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

(2) If in the case of a headlamp designed to satisfy the requirements of this standard with respect to the dipped - beam only, The focal axis diverges appreciably from the general direction of the beam lateral adjustment shall be effected to the manner which best satisfies the requirements for illumination at Points 75 L and 50 L.

(3) A dipped-beam headlamp of this kind may incorporate a main-beam for which no specifications are laid down.

(4) The limit of non-adjustment of 1° to the right or left is not incompatible with vertical non-adjustment. The later is limited only by the requirements of paragraph A2.2.4.

If the headlamp is designed solely to provide a main- beam, it shall be so adjusted that the area of maximum illumination is centered on the point of intersection of the line hh and vv. Such a headlamp need meet only the requirements referred to in paragraph A2.2.4. and A2.3

A2.2.2 The illumination produced on the screen by dipped-beam headlamp having a diameter ‘D’ less than 160 mm ⁽¹⁾ shall meet the requirements as laid down in Table- A2 below, with the minimum requirements for illumination reduced in the ratio:

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

Subject to the following absolute to the lower limits:
 3 Lux at point 75 L :
 5 Lux at point 50 L :
 1.5 Lux in Zone IV :

**Table:A2
 Illumination produced by Dipped-Beam**

Point on measuring screen		Required Illumination in lux
Headlamps for Left-Hand Traffic		
Point B	50 R	≤ 0.4
Point	75 L	≥ 6
Point	50 L	≥ 6
Point	25 R	≥ 1.5
Point	25 L	≥ 1.5
Any point in zone III		≤ 0.7
Any point in zone IV		≥ 2
Any point in zone I		≤ 20

In the technical information to be submitted by the manufacturer concerning approval, para 9 (para 11.1 in Table : 1) in this standard shall read: “Head Lamp for slow-moving vehicles only”.

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

- A2.2.2.1 It is understood that, where the flux of the standard filament lamp used for measurement is other than 450 lumens, the measurement as taken will be corrected proportionally to the rates of the fluxes. There shall be no lateral variations detrimental to good visibility in any of the zones I, II, III, and IV.
- A2.2.3 The illumination values ⁽¹⁾ in zones "A" and "B" as shown in Figure-A2 shall be checked by the measurement of the photometric values of points 1 to 8 on this Figure; these values shall lie within the following limits:
 $1+2+3 \geq 0.3 \text{ lux,}$ and
 $4+5+6 \geq 0.6 \text{ lux,}$ and
 $0.7 \text{ lux} \geq 7 \geq 0.1 \text{ lux}$ and
 $0.7 \text{ lux} \geq 8 \geq 0.2 \text{ lux}$
- A2.2.4 In the case of headlamps with an adjustable reflector, the requirements of paragraphs A2.2.1 to A2.2.3 are applicable for each mounting position indicated in relevant para. 11.1 of Table : 2 of this standard. For verification, the following procedure shall be used:
- A2.2.4.1 Each applied position is realized on the test goniometer with respect to a line joining the center of the light source and point HV on the aiming screen. The adjustable reflector is then moved into such a position that the light pattern on the screen corresponds to the aiming prescriptions of paragraphs A2.1. A2.2.1 and/or A2.2.3;
- A2.2.4.2. With the reflector initially fixed according to paragraph A2.2.4.1, the headlamp must meet the relevant photometric requirements of paragraphs A2.2.1, A2.2.2 and A2.2.3;
- A2.2.4.3 Additional tests are made after the reflector has been moved vertically ± 2 degrees or at least into the maximum position, if less than 2 degrees, from its initial position by means of the headlamps adjusting device. Having re-aimed the headlamp as a whole (by means of the goniometer for example) in the corresponding opposite direction, the light output in the following directions shall be controlled and lie within the required limits:

Dipped-beam: Points HV and 75L respectively;
 Main-beam: E_M and Point HV (percentage of E_M)

(1) Illumination values in any point of Zones A & B, which also lies with Zone III, shall not exceed 0.7 lux

A2.2.4.4 If the applicant has indicated more than one mounting position, the procedure of paragraphs A2.2.4.1 to A2.2.4.3 shall be repeated for all the other positions;

A2.2.4.5 If the applicant has not asked for special mounting positions, the headlamp shall be aimed for measurements of paragraphs A2.2.1 to A2.2.3 with the headlamps adjusting device in its mean position. The additional tests of paragraph A2.2.4.3 shall be made with the reflector moved into its extreme positions (instead of $\pm 2^\circ$) by means of the headlamps adjusting device.

A2.3 PROVISIONS CONCERNING MAIN-BEAM

Measurement of the illumination produced on the screen by the main-beam shall be taken with the same head lamp adjustment as for measurements under paragraph A2.2.2 above, or, in the case of a head lamp providing a main-beam only, in accordance with the final paragraph of para A2.2.1.2.3. In the case where more than one light source is used to provide the main beam, the combined function shall be used to determine the maximum value of the illumination. (E_{max})

A2.3.1 The illumination produced on the screen by the main-beam shall meet the following requirements:

A2.3.1.1 The point of intersection (HV) of the lines hh and vv shall be situated within the isolux representing 90% of maximum illumination.

This maximum value shall be not less than 32 lux.

A2.3.1.2 Starting from point HV, horizontally to the right and left the illumination shall be not less than 16 lux up to a distance of 1.125 m. and not less than 4 Lux up to a distance of 2.25 m.

(where the flux of the standard filament lamp used for the measurement is other than 700 lumens, the measurement as taken must be corrected proportionally to the ratio of the fluxes)

A2.4 The screen illumination values referred to in paragraphs A2.2.2 and A2.3 above shall be measured by means of a photo-electric cell, the useful area of which shall be contained within a square of 65mm side.

A2.5 STANDARD (Reference) HEADLAMP

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

- A2.5.1 Satisfies the above-mentioned requirements for approval;
- A2.5.2 Has an effective diameter of not less than 160mm;
- A2.5.3 Provides with a standard filament lamp, at the various point and in the various zones referred to in paragraph A2.2.2. above, illumination equal to:
 - A2.5.3.1 Not more than 90% of the maximum limits and
 - A2.5.3.2 Not less than 120% of the minimum limits prescribed in the table in paragraph A2.2.2.

ANNEX : A3

(See para 5.1 and A1.1.1.)

COLORIMETRIC REQUIREMENTS FOR HEADLAMP

The colour of light emitted shall be white. Expressed in CIE trichromatic coordinates, the light of beam shall be in following boundaries:

Limit towards blue	:	$x \geq 0.310$
Limit towards yellow	:	$x \leq 0.500$
Limit towards green	:	$y \leq 0.150 + 0.640 x$
Limit towards green	:	$y \leq 0.440$
Limit towards purple	:	$y \geq 0.050 + 0.750 x$
Limit towards red	:	$y \geq 0.382$

ANNEX : A4

(See para A1.1.8)

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

TESTS ON COMPLETE HEADLAMPS

Once the photometric values have been measured according to the prescriptions of this standard, in the point for Emax for main-beam and in points HV, 50 L, B 50 R for dipped-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 those surrounding body parts and lamps, which could influence its thermal dissipation.

A4.1 TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

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

A4.1.1 Clean headlamp

The headlamp shall be operated for 12 hours as described in paragraph A4.1.1.1. and checked as prescribed in paragraph A4.1.1.2.

A4.1.1.1 Test procedure

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

- A4.1.1.1.1 (a) In the case where only one lighting function (driving or dipped-beam) is to be approved, the corresponding filament is lit for the prescribed time, ⁽¹⁾
- (b) In the case of reciprocally incorporated Dipped-Beam Lamp and Main-Beam Lamp (Dual Filament Lamp or Two Filament Lamp) :

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

if the applicant declares that the headlamp is to be used with a single filament lit ⁽¹⁾ at a time, the test shall be carried out in accordance with this condition, activating⁽²⁾ each specified function successively for half the time specified in paragraph A4.1.1. above.

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

15 minutes, dedeed – beam filament lit.

5 minutes, all filaments lit.

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

A4.1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply wattage 15% higher than the rated wattage specified in AIS-034 for filaments lamp at a rated voltage of 6 V or 12 V, and 26 percent higher than rated wattage for 24 V filaments lamp.

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

A4.1.1.2. Test results

A4.1.1.2.1. 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.

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

(2) See footnote (1) on Page no.17/50

A4.1.1.2.2. **Photometric test**

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

Dipped-beam: 50 L - B 50 R - HV.

Main-beam: Point of E_{\max}

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in paragraph A4.2 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.

A4.1.2. **Dirty headlamp**

After being tested as specified in paragraph A4.1.1. above, the headlamp shall be operated for one hour as described in paragraph A4.1.1.1., after being prepared as prescribed in paragraph A4.1.2.1., and checked as prescribed in paragraph A4.1.1.2.

A4.1.2.1. **Preparations of the headlamp**A4.1.2.1.1. **Test mixture**A4.1.2.1.1.1. **For headlamp with the outside lens in glass:**

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

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

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

0.2 parts by weight of NaCMC ⁽¹⁾, and

An appropriate quantity of distilled water, with a conductivity of < 1 mS/m.

The mixture must not be more than 14 days old.

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

A4.1.2.1.1.2. For headlamp with outside lens in plastic material:

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

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

1 part by weight of vegetal carbon dust (beech wood) with a particle size of 0-100 micrometers,

0.2 part by weight of NaCMC ⁽¹⁾

13 parts by weight of distilled water with a conductivity of < 1 mS/m, and 2 +/- 1 parts by weight of surface-actant ⁽²⁾

The mixture must not be more than 14 days old.

A4.1.2.1.2. **Application of the test mixture to the headlamp**

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

Point of Emax in dipped-beam/main-beam and in main-beam only, 50 L and 50 V ⁽³⁾ for a passing lamp only

A4.1.2.1.3. **Measuring equipment**

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

A4.2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp. The headlamp tested in accordance with paragraph A4.1, shall be subjected to the test described in paragraph A4.2.1., without being removed from or readjusted in relation to its test fixture.

(1) See footnote (1) on page no.19/50

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

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

A4.2.1. Test

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

Using a mass production filament lamp, which has been aged for at least one hour the headlamp shall be operated on dipped-beam without being dismantled from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph A4.1.1.1.2.). The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B 50 R) shall be verified 3 minutes (r3) and 60 minutes (r60) 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.

A4.2.2. Test results

A4.2.2.1 The result in milliradians (mrad) shall be considered as acceptable for a passing lamp, only when the absolute value $\Delta rI = | r3 - r60 |$ recorded on the headlamp is not more than 1.0 mrad ($\Delta rI < 1.0 \text{ mrad}$).

A4.2.2.2 However, if this value is more than 1.0 mrad but not more than 1.5 mrad ($1.0 \text{ mrad} < \Delta rI < 1.5 \text{ mrad}$) a second headlamp shall be tested as described in paragraph A4.2.1 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 dipped-beam for one hour, (the voltage shall be adjusted as specified in paragraph A4.1.1.1.2.),

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values ΔrI measured on the first sample and ΔrII measured on the second sample is not more than 1.0 mrad.

$$\left(\frac{\Delta r_1 + \Delta r_{11}}{2} \leq 1.0 \text{ mrad} \right)$$

ANNEX : A5

(See para A1.1.9)

**REQUIREMENTS FOR LAMPS INCORPORATING
LENSES OF PLASTIC MATERIAL - TESTING OF LENS
OR MATERIAL SAMPLES AND OF COMPLETE LAMPS****A5.1. GENERAL SPECIFICATIONS**

A5.1.1 The samples supplied pursuant to paragraph 7.3 of this standard shall satisfy the specifications indicated in paragraphs A5.2.1. to A5.2.5. below.

A5.1.2 The two samples of complete lamps supplied pursuant to paragraph 7.1 of this standard and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph A5.2.6 below.

A5.1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in Table A reproduced in Appendix-1 to this Annex: A5

A5.1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs A5.2.1. to A5.2.5. below, or the equivalent tests pursuant to another standard those tests need not be repeated; only the tests prescribed in Appendix 1, Table B, shall be mandatory.

A5.2. TESTS**A5.2.1. Resistance to Temperature Changes****A5.2.1.1 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 $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 85-95 % RH;

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

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

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

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

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

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

Note:

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

A5.2.1.2. Photometric Measurements

A5.2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test. These measurements shall be made using a standard lamp, at the following points:

B 50 R and 50 L for the dipped-beam of a passing lamp or a passing/driving lamp

E max route for the main-beam of a main-beam lamp or a dipped-beam/main-beam lamp

A5.2.1.2.2. Results

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

A5.2.2. Resistance to Atmospheric and Chemical Agents

A5.2.2.1. 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 5,500K and 6,000K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wavelengths smaller than 295 nm and greater than 2,500 nm.

The samples shall be exposed to an energetic illumination of $1,200 \text{ W/m}^2 \pm 200 \text{ W/m}^2$ for a period such that the luminous energy that they receive is equal to $4,500 \text{ MJ/m}^2 \pm 200 \text{ MJ/m}^2$. Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50^{\circ} \text{ C} \pm 5^{\circ} \text{ C}$. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 l/min.

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

spraying: 5 minutes;

drying: 25 minutes.

A5.2.2.2. Resistance to Chemical Agents

After the test described in paragraph A5.2.2.1. above and the measurement described in paragraph A5.2.2.3.1. below have been carried out, the outer face of the said three samples shall be treated as described in paragraph A5.2.2.2.2. with the mixture defined in paragraph A5.2.2.2.1 below.

A5.2.2.2.1 Test mixture

The test mixture shall be composed of 61.5 % n-heptane, 12.5 % toluene, 7.5 % ethyl tetrachloride, 12.5 % trichlorethylene and 6 % xylene (volume %).

A5.2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph A5.2.2.2.1 above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm², corresponding to an effort of 100 N applied on a test surface of 14 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.

A5.2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph A5.2.3. (Resistance to detergents) at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.

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

A5.2.2.3. **Results**

A5.2.2.3.1 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

$$\Delta t = \frac{T2 - T3}{T2}$$

measured on the three samples according to the procedure described in Appendix 2 to this Annex shall not exceed 0.020 (Delta tm < 0.020).

A5.2.2.3.2 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

$$\Delta d = \frac{T5 - T4}{T2}$$

measured on the three samples according to the procedure described in Appendix 2 to this Annex shall not exceed 0.020 (Delta tm < 0.020).

A5.2.3. **Resistance to Detergents and Hydrocarbons**A5.2.3.1. **Resistance to Detergents**

The outer face of three samples (lenses or samples of material) shall be heated to 50 degrees C \pm 5°C and then immersed for five minutes in a mixture maintained at 23°C \pm 5°C and composed of 99 parts distilled water containing not more than 0.02 % impurities and one part alkylaryl sulphonate. At the end of the test, the samples shall be dried at 50°C \pm 5°C . The surface of the samples shall be cleaned with a moist cloth.

A5.2.3.2. **Resistance to Hydrocarbons**

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

A5.2.3.3. **Results**

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

$$\Delta t = \frac{T2 - T3}{T2}$$

measured on the three samples according to the procedure described in Appendix 2 to this Annex shall not exceed 0.010 ($\Delta t_m < 0.010$).

A5.2.4 **Resistance to Mechanical Deterioration**

A5.2.4.1. **Mechanical Deterioration Method**

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

A5.2.4.2. **Results**

After this test, the variations:
in transmission:

$$\Delta t = \frac{T2 - T3}{T2}$$

and in diffusion:

$$\Delta d = \frac{T5 - T4}{T2}$$

shall be measured according to the procedure described in Appendix 2 in the area specified in paragraph A5.2.2.4.1.1 above. The mean value of the three samples shall be such that: $\Delta t_m < 0.100$; $\Delta d_m < 0.050$.

A5.2.5 **Test of Adherence of Coatings, if any**

A5.2.5.1. **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.

A5.2.5.2. Description of the Test

Use an adhesive tape with a force of adhesion of 2 N/(cm of width) ± 20 % measured under the standardized conditions specified in Appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph A5.2.5.1.

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.

A5.2.5.3. Results

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

A5.2.6 Tests of the Complete Lamp Incorporating a Lens of Plastic Material**A5.2.6.1. Resistance to Mechanical Deterioration of the Lens Surface****A5.2.6.1.1. Tests**

The lens of lamp sample No. 1 shall be subjected to the test described in paragraph A5.2.4.1.above.

A5.2.6.1.2. Results

After the test, the results of photometric measurements carried out on the lamp in accordance with this standard shall not exceed by more than 30 % the maximum values prescribed at points B 50 R and HV and not be more than 10 per cent below the minimum values prescribed at point 75 L.

A5.2.6.2. Test of adherence of coatings, if any
The lens of lamp sample No. 2 shall be subjected to the test described in paragraph A5.2.5. above.

A5.3 VERIFICATION OF THE CONFORMITY OF PRODUCTION

- A5.3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognized as complying with this Standard if:
 - A5.3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see para. A5.2.2.2, A5.2.3.1. and A5.2.3.2.);
 - A5.3.1.2. After the test described in paragraph A5.2.6.1.1 the photometric values at the points of measurement considered in paragraph A5.2.6.1.2. are within the limits prescribed for conformity of production by this standard.
- A5.3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

ANNEX:A5 – APPENDIX:1

(See para A5.1.3)

CHRONOLOGICAL ORDER OF APPROVAL TESTS

Table A: Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 7.3 of this standard).

Samples → Test ↓		Lenses or samples of material						Lenses						
		1	2	3	4	5	6	7	8	9	10	11	12	13
A5:App1.1.1	Limited Photometry (Para.A5.2.1.2)										x	x	x	
A5:App1.1.1.1	Temperature change (para. A5.2.1.1.)										x	x	x	
A5:App1.1.1.2.	Limited photometry (para. A5.2.1.2.)										x	x	x	
A5:App1.1.2.1	Transmission Measurement	x	x	x	x	x	x	x	x	x				
A5:App1.1.2.2.	Diffusion measurement	x	x	x				x	x	x				
A5:App1.1.3.	Atmospheric agents (para. A5.2.2.1.)	x	x	x										
A5:App1.1.3.1.	Transmission Measurement	x	x	x										
A5:App1.1.4.	Chemical agents (para.A5.2.2.2.)	x	x	x										
A5:App1.1.4.1.	Diffusion Measurement	x	x	x										
A5:App1.1.5.	Detergents (para. A5.2.3.1.)				x	x	x							
A5:App1.1.6.	Hydrocarbons (para. A5.2.3.2.)				x	x	x							
A5:App1.1.6.1.	Transmission measurement				x	x	x							
A5:App1.1.7.	Deterioration (para. A5.2.4.1.)							x	x	x				
A5:App1.1.7.1.	Transmission Measurement							x	x	x				
A5:App1.1.7.2.	Diffusion Measurement							x	x	x				
A5:App1.1.8.	Adherence (para.A5.2.5.)													x

Table B: Tests on complete headlamps supplied pursuant to paragraph 7.1. of this standard).

Tests		Complete headlamp	
		Sample No.	
		1	2
A5:App1.2.1.	Deterioration (para. A5.2.6.1.1.)	x	
A5:App1.2.2.	Photometry (para. A5.2.6.1.2.)	x	
A5:App1.2.3.	Adherence (para. A5.2.6.2.)		X

-

ANNEX:A5 – APPENDIX:2

(See para A5.2.2.3.1)

METHOD OF MEASUREMENT OF THE DIFFUSION AND TRANSMISSION OF LIGHT

A5:App2.1. Equipment (see figure in this Appendix)

The beam of a collimator K with a half divergence $\beta/2 = 17.4 \times 10^4$ rd is limited by a diaphragm D_τ with an opening of 6 mm against which the sample stand is placed.

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

An annular diaphragm D_D , with angles “ $\alpha_o/2 = 1^\circ$ and $\alpha_{max}/2 = 12^\circ$ ” is placed in an image focal plane of the lens L_2 .

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

The distance $L_2 D_\tau$ and the focal length $F_2^{(1)}$ of the lens L_2 shall be so chosen that the image of D_τ completely covers the receiver R. When the initial incident flux is referred to 1,000 units, the absolute precision of each reading shall be better than 1 unit.

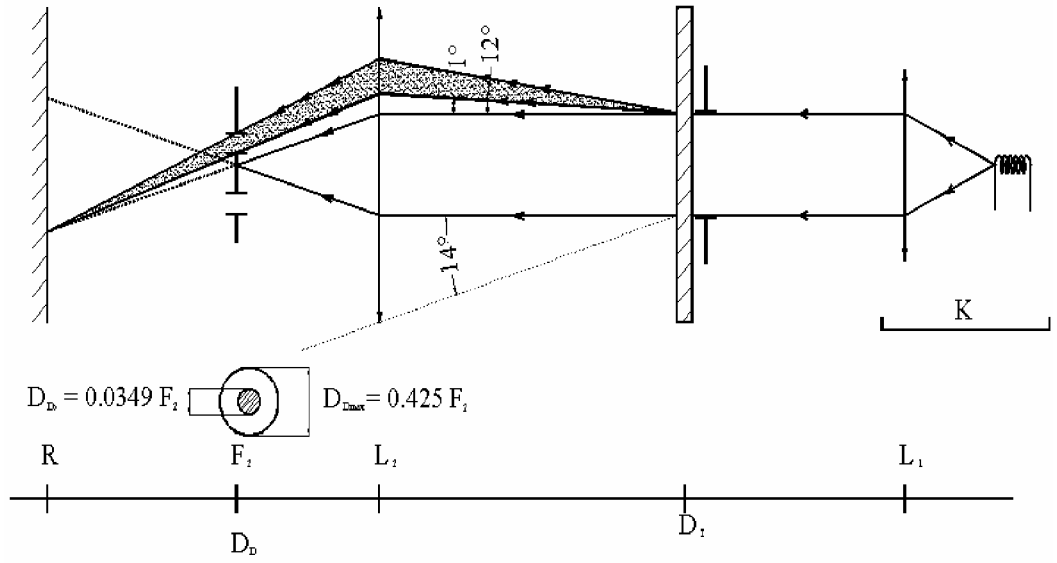
A5: App2.2. Measurements

The following readings shall be taken:

Reading	With sample	With central part of D_D	Quantity represented
T ₁	No	No	Incident flux in initial reading
T ₂	yes (before test)	no	Flux transmitted by the new material in a field of 24°
T ₃	yes (after test)	no	Flux transmitted by the tested material in a field of 24°
T ₄	yes (before test)	Yes	Flux diffused by the new material
T ₅	Yes (after test)	Yes	Flux diffused by the tested material

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

FIGURE



ANNEX:A5 – APPENDIX:3

(See para A5.2.4.1.)

SPRAY TESTING METHOD**A5:App3.1. TEST EQUIPMENT****A5:App3.1.1. 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 $170 \text{ mm} \pm 50 \text{ mm}$ in diameter on the surface exposed to deterioration, at a distance of $380 \text{ mm} \pm 10 \text{ mm}$ from the nozzle.

A5:App3.1.2. 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.

A5:App3.2. TEST

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

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

$$\Delta d = \frac{T_5 - T_4}{T_2} = 0.0250 \pm 0.0025$$

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

ANNEX: A5 – APPENDIX:4

(See para A5.2.5.2)

ADHESIVE TAPE ADHERENCE TEST

A5:App4.1. PURPOSE

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

A5:App4.2. PRINCIPLE

Measurement of the force necessary to unstuck an adhesive tape from a glass plate at an angle of 90⁰.

A5:App4.3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at 23⁰ C ± 5⁰ C and 65 ± 15 % RH.

A5:App4.4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see para. A5:App.4.3 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.

A5:App4.5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph A5:App.4.3.

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.

AIS-062

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 90⁰. 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 unstuck at a speed of 300 mm/s \pm 30 mm/s and record the force required.

A5:App4.6.

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 Newtons per centimetre of width of the tape.

ANNEX: A6

(See para 8.0)

**MINIMUM REQUIREMENTS FOR CONFORMITY OF
PRODUCTION CONTROL PROCEDURES**

A6.1. GENERAL

A6.1.1 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.

A6.1.2. With respect to photometric performances, the conformity of mass-produced headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard (étalon) filament lamp:

A6.1.2.1. No measured value deviates unfavourably by more than 20 per cent from the value prescribed in this standard. For values B 50 R and zone III, the maximum unfavourable deviation may be respectively:

B 50 R	0.2 lx equivalent 20%
	0.3 lx equivalent 30 %
Zone III	0.3 lx equivalent 20 %
	0.45 lx equivalent 30 %

A6.1.2.2. or if

A6.1.2.2.1. For the dipped-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 R, 25 L, and in the entire area of zone IV which is not more than 22.5 cm above line 25 R and 25 L;

A6.1.2.2.2. And if, for the main-beam, HV being situated within the isolux $0.75 E_{\max}$, a tolerance of + 20 per cent for maximum values and -20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph A2.3. of Annex: A2.

A6.1.2.3. 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 1° to the right or left⁽¹⁾

(1) The limit of realignment of 1° towards the right or left is not incompatible with upward or down ward vertical realignment. The latter is limited only by the requirements of paragraph A2.2.4.

A6.1.2.4. If the results of the tests described above do not meet the requirements, tests shall be repeated using another standard (étalon) filament lamp.

A6.1.3. With respect to the verification of the change in vertical position of the cut-off line under the influence of heat, the following procedure shall be applied:

One of the sampled headlamps shall be tested according to the procedure described in paragraph A4.2.1. of Annex A4 after being subjected three consecutive times to the cycle described in paragraph A4.2.2.2. of Annex : A4

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

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

A6.2. 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.

A6.2.1. 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 the influence of heat.

A6.2.2. Methods used in tests

A6.2.2.1. Tests shall generally be carried out in accordance with the methods set out in this standard

A6.2.2.2. In any test of conformity carried out by the manufacturer, equivalent methods may be used with the consent of the test agency responsible for approval tests. The manufacturer is responsible for proving that the applied methods are equivalent to those laid down in this Standard.

A6.2.2.3. The application of paragraphs A6.2.2.1. and A6.2.2.2. requires regular calibration of test apparatus and its correlation with measurement made by a test agency.

A6.2.2.4. In all cases the reference methods shall be those of this Standard, particular for the purpose of administrative verification and sampling.

A6.2.3. 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.

A.6.2.4. 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⁽¹⁾ HL, HR⁽²⁾ in the case of a main-beam, and to points B 50 R, HV, 50 V, 75 L and 25 R in the case of the dipped-beam (see Figure A1).

A6.2.5. Criteria Governing Acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the test agency, criteria governing acceptability of his products in order to meet the specification laid down for verification of conformity of products in paragraph 8.1 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: A7 (first sampling) would be 0.95.

(1) When the main-beam is reciprocally incorporated with the dipped-beam, HV in the case of the main-beam shall be the same measuring point as in the case of the dipped-beam
 (2) HL and HR: points "hh" located at 1.125 m to the left and to the right of point HV respectively)

ANNEX: A7

(See para 8.0 and para A6.2.5)

**MINIMUM REQUIREMENTS FOR
SAMPLING BY AN INSPECTOR****A7.1. GENERAL**

A7.1.1. 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. This condition also applies to colour.

A7.1.2. With respect to photometric performances, the conformity of mass-produced headlamps shall not be contested if, when testing photometric performances of any headlamp chosen at random and equipped with a standard filament lamp:

A7.1.2.1. No measured value deviates unfavourably by more than 20 per cent from the value prescribed in this Standard. For values B 50 R and zone III, the maximum unfavourable deviation may be respectively:

B 50 R	:	0.2 lx equivalent 20 %
		0.3 lx equivalent 30 %
Zone III	:	0.3 lx equivalent 20 %
		0.45 lx equivalent 30 %

A7.1.2.2. or if

A7.1.2.2.1. for the dipped-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 R, 25 L, and in the entire area of zone IV which is not more than 22.5 cm above line 25 R and 25 L;

A7.1.2.2.2. and if, for the main-beam, HV being situated within the isolux $0.75 E_{\max}$, a tolerance of + 20 per cent for maximum values and - 20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph A 2.3. of Annex: A2. The reference mark is disregarded.

- A7.1.2.3. 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 1° to the right or left⁽¹⁾.
- A7.1.2.4. If the results of the tests described above do not meet the requirements, tests shall be repeated using another standard filament lamp.
- A7.1.2.5. Headlamps with apparent defects are disregarded.
- A7.1.2.6. The reference mark is disregarded.
- A7.1.2.7. The chromaticity coordinates shall be complied with. The photometric performance of the head lamp emitting selective yellow light shall be the values contained in this standard multiplied by 0.84.

A7.2. 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.

A7.2.1. The Conformity is Not Contested

A7.2.1.1. Following the sampling procedure shown in Figure A3 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:

A7.2.1.1.1. Sample A

A1:	one headlamp		0 %
	one headlamp	not more than	20%
A2:	Both headlamps	more than	0 %
	But	not more than	20%
	go to sample B		

A7.2.1.1.2. Sample B

B1:	Both headlamps		0 %
-----	----------------	--	-----

A7.2.1.2. or if the conditions of paragraph A7.1.2.2. for sample A are fulfilled.

(1) The limit of realignment of 1° towards the right or left is not incompatible with upward or down ward vertical realignment. The latter is limited only by the requirements of paragraph A2.2.4.

A7.2.2. The Conformity is Contested

A7.2.2.1. Following the sampling procedure shown in Figure A3 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:

A7.2.2.1.1. **Sample A**

A3:	one headlamp	not more than	20%
	one headlamp	more than	20%
	but	not more than	30%

A7.2.2.1.2. **Sample B**

B2:	in the case of A2		
	one headlamp	more than	0%
	But	not more than	20%
	one headlamp	not more than	20%
B3:	in the case of A2		
	one headlamp		0%
	one headlamp	more than	20%
	but	not more than	30%

A7.2.2.2. or if the conditions of paragraph A7.1.2.2. for sample A are not fulfilled.

A7.2.3. **Approval Withdrawn**

Conformity shall be contested and paragraph 8.3 of this standard applied if, following the sampling procedure shown in Figure 1 of this annex, the deviations of the measured values of the headlamps are:

A7.2.3.1. **Sample A**

A4:	one headlamp	not more than	20%
	one headlamp	more than	30%
A5:	Both headlamps	more than	20%

A7.2.3.2. **Sample B**

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

A7.2.3.3. or if the conditions of paragraph A7.1.2.2. for samples A and B are not fulfilled.

A7.3. REPEATED SAMPLING

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

A7.3.1. **The Conformity is Not Contested**

A7.3.1.1. Following the sampling procedure shown in FigureA3, the conformity of mass-produced headlamps shall not be contested if the deviations of the measured values of the headlamps are:

A7.3.1.1.1. **Sample C**

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

A7.3.1.1.2. **Sample D**

D1:	In the case of C2		
	both headlamps		0%

A7.3.1.2. or if the conditions of paragraph A7.1.2.2. for sample C are fulfilled.

A7.3.2. The Conformity is Contested

A7.3.2.1. Following the sampling procedure shown in Figure A3, 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:

A7.3.2.1.1. Sample D

D2:	In the case of C2		
	one headlamp	more than	0%
	but one headlamp	not more than	20%

A7.3.2.1.2. or if the conditions of paragraph A7.1.2.2 for sample C are not fulfilled.

A7.3.3. Approval Withdrawn

Conformity shall be contested and paragraph 8.3 of this standard applied if, following the sampling procedure shown in Figure A3, the deviations of the measured values of the headlamps are:

A7.3.3.1. Sample C

C3:	one headlamp	not more than	20%
	one headlamp	more than	20%
C4:	both headlamps	more than	20%

A7.3.3.2. Sample D

D3:	in the case of C2		
	one headlamp	0 or more than	0%
	one headlamp	More than	20%

A7.3.3.3. or if the conditions of paragraph A7.1.2.2. for samples C and D are not fulfilled.

A7.4. 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:

AIS-062

One of the headlamps of sample A after sampling procedure in Figure A3 shall be tested according to the procedure described in paragraph A4.2.1. of Annex : A4 after being subjected three consecutive times to the cycle described in paragraph A4.2.2.2. of Annex A4.

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.

ANNEX : B1

(See para 5.2)

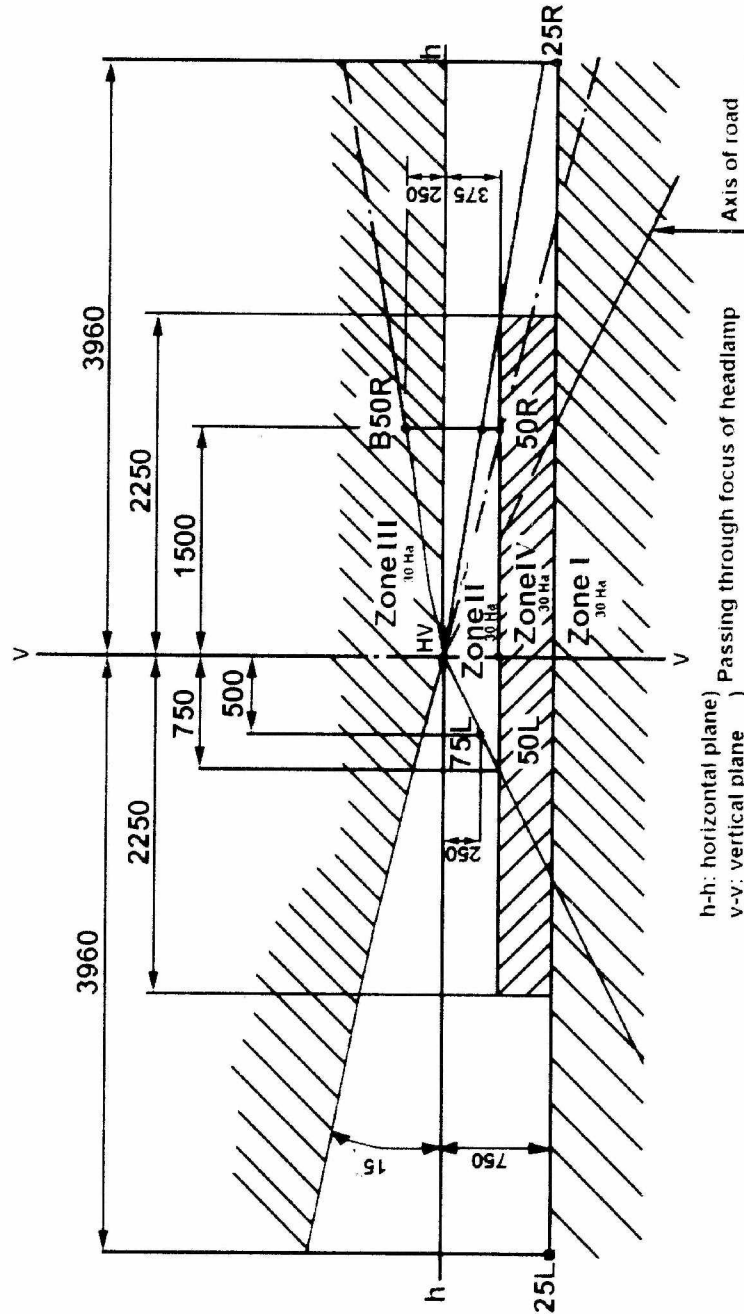
**REQUIREMENTS FOR MAIN-BEAM HEADLAMP AND
DIPPED-BEAM HEADLAMP EQUIPPED WITH
S2 CATEGORY FILAMENT LAMP**

Annex	Description	Reference
Annex : B1	Requirements for main-beam headlamp and dipped-beam headlamp equipped with S2 category filament lamp	
B1.1	General requirements for headlamps	Refer Annex : C of AIS-010
Annex : B2 (See para 5.2)	Photometric test procedure and illumination requirements for main-beam headlamp and dipped-beam headlamp equipped with S2 category filament lamp	Refer Annex : E of AIS-010
Annex : B3 (See para 5.2)	Colorimetric requirements for headlamp	Refer paragraph C2.6 of Annex : C of AIS-010
Annex : B4	Tests for stability of photometric performance of headlamps in operation	Refer paragraph C5.0 of Annex: C of AIS-010
Annex : B5	Requirements for lamps incorporating lenses of plastic material-testing of lens or material samples and of complete lamps	Refer paragraph C 6.0 of Annex: C of AIS-010
Annex : B6	Requirements of conformity of production	Refer paragraph 7.0 of AIS-010

Table : 3
(See para 5.0)
**REQUIREMENTS FOR FRONT FOG LAMP,
WORK LAMP(PLOUGH LAMP) AND OTHER
LIGHT-SIGNALLING DEVICES**

Annex	Description	Reference
Annex: C (See para 5.3)	Requirement for Front Fog Lamp	Refer Annexes :C1 to C7 of AIS-012
Annex: D (See para 5.4)	Requirement for Front and Rear Position Lamp, Stop Lamp and End-outline Marker Lamp	Refer Annexes : D1 to D5 of AIS-012
Annex: E (See para 5.5)	Requirement for Direction Indicator Lamp	Refer Annexes : E1 to E5 of AIS-012
Annex: F (See para 5.6)	Requirement for Reversing Lamp	Refer Annexes :F1 to F5 of AIS-012
Annex: G (See para 5.7)	Requirement for Parking Lamp	Refer Annexes : G1 to G5 of AIS- 012
Annex: H (See para 5.8)	Requirement for Rear Fog Lamp	Refer Annexes : J1 to J5 of AIS-012
Annex: J (See para 5.9)	Requirement for Rear Registration Plate (mark) Illuminating Lamp	Refer paragraph 4.0, 5.0 and Annex: B of AIS-010
Annex : K	Requirement for Work (Plough) Lamp	For applicable tests and requirements , refer Table : 1 and foot note to Table: 1 of this standard and Annex :L of AIS-012.

FIGURE: A1
 (See para A2.1.2)
STANDARD EUROPEAN BEAM



(Dimensions in mm)

FIGURE : A2
(See para A2.2.3)

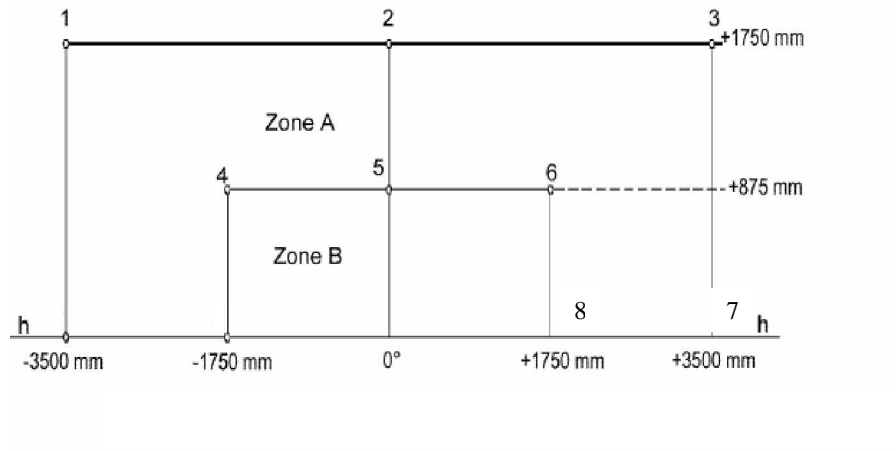
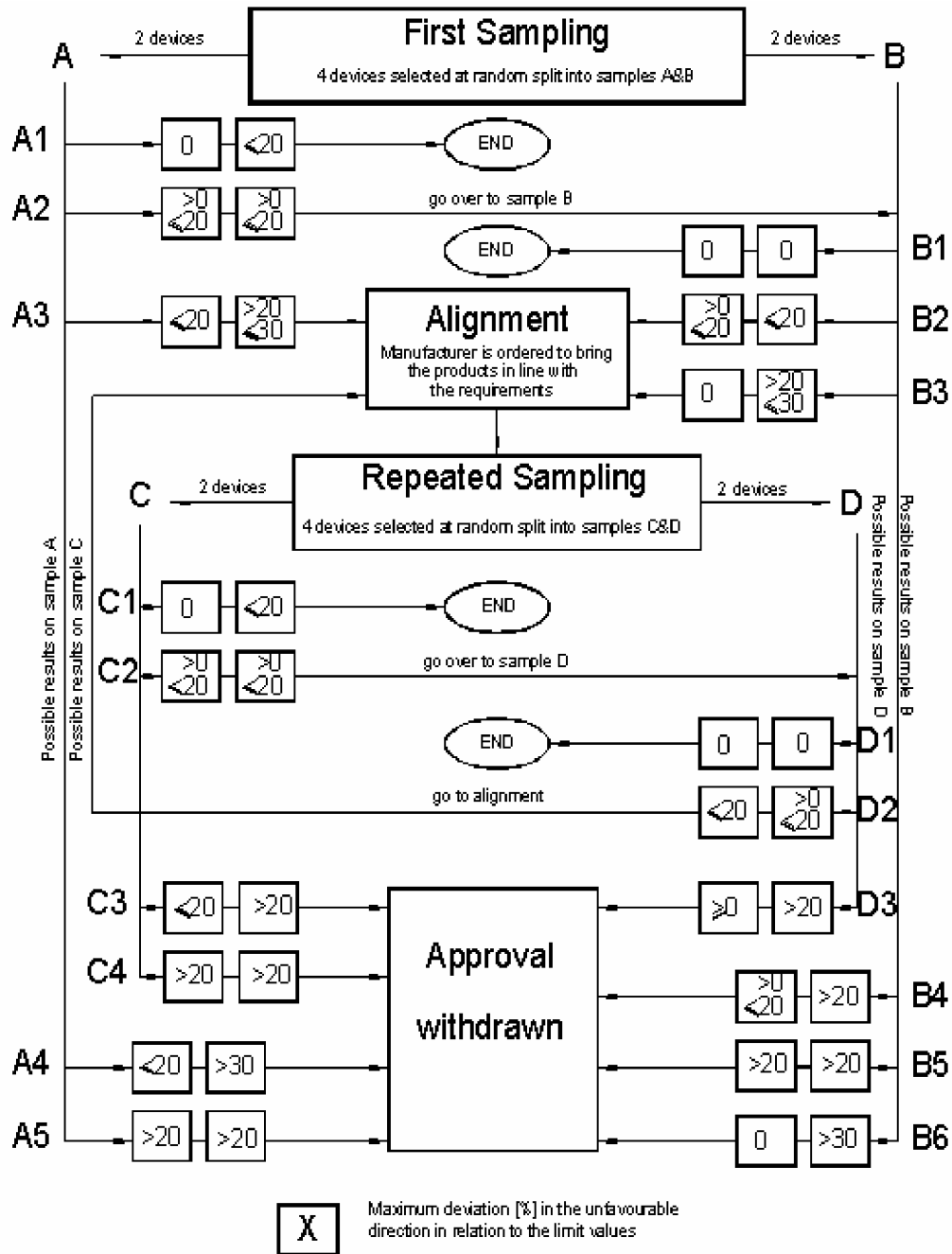


FIGURE: A3
(See para A7.2.1.1)



ANNEX:L
(See Introduction)
COMMITTEE COMPOSITION
Automotive Industry Standards Committee

Chairman	
Shri B. Bhanot	Director The Automotive Research Association of India, Pune
Members	Representing
Shri Alok Rawat	Ministry of Road Transport & Highways, New Delhi
Shri Sushil Kumar	Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, New Delhi
Shri. Chandan Saha	Office of the Development Commissioner Small Scale Industries, Ministry of Small Scale Industries, New Delhi
Shri. L . R. Singh	Bureau of Indian Standards, New Delhi
Shri A. S. Lakra Shri D. P. Saste (Alternate)	Central Institute of Road Transport, Pune
Director	Indian Institute of Petroleum, Dehra 'Dun
Shri R.C. Sethi Shri N. Karuppaiah (Alternate)	Vehicles Research & Development Establishment, Ahmednagar
Shri Rajat Nandi	Society of Indian Automobile Manufacturers
Shri T.C. Gopalan Shri Ramakant Garg (Alternate)	Tractor Manufacturers Association, New Delhi
Shri K.N.D. Nambudiripad	Automotive Components Manufacturers Association
Shri G. P. Banerji	Automotive Components Manufacturers Association

Member Secretary
Mrs. Rashmi Urdhwareshe
Sr. Assistant Director
The Automotive Research Association of India, Pune