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EAST AFRICAN STANDARD

Lights for motor vehicles — Specification — Part 2: Headlights

EAST AFRICAN COMMUNITY

Draft for comments only — Not to be cited as East African Standard

Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in East Africa. It is envisaged that through harmonized standardization, trade barriers which are encountered when goods and services are exchanged within the Community will be removed.

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

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Lights for motor vehicles — Specification — Part 2: Headlights

1 Scope

This part of the specification covers the requirements for the photometric properties of headlights emitting an asymmetrical dipped beam or a main beam, or both, and used in headlight systems meeting left-hand rule-of-road requirements.

As the requirements of this part of the specification are based on those given in UNECE Regulations Nos 1, 5, 8, 20 and 31, reciprocity of compliance of headlights with the relevant requirements can be assumed.

2 Normative references

The following referenced documents are indispensable for the application of this East African Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 381, *Sampling procedures for inspection by attributes*

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety—Part 1: Lamp caps*

IEC 60061-2, *Lamp caps and holders together with gauges for the control of interchangeability and safety—Part 2: Lampholders*

CD/K/029-1:2008, *Lights for motor vehicles — Specification — Part 1: Incandescent lamps*

ISO 9001, *Quality management systems—Requirements*

UNECE R 1, *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*

UNECE R 5, *Uniform provisions concerning the approval of motor vehicle "sealed beam" headlamps (SB) emitting a European asymmetrical passing beam or a driving beam or both*

UNECE R 8, *Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H₁, H₂, H₃, HB₃, HB₄, H₇, H₈, H₉, HIR1, HIR2 and/or H₁₁)*

UNECE R 20, *Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with halogen filament lamps (H₄ lamps)*

UNECE R 31, *Uniform provisions concerning the approval of halogen sealed-beam unit (MSB unit) motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both*

3 Definitions

For the purposes of this East African Standard the definitions (other than those of "Lot" and "Defective") given in CD/K/029-1:2008 and the following definitions shall apply:

3.1

halogen headlight

a headlight designed for use with a lamp of category H1, H2, H3 or H4 (see CD/K/029-1:2008), or a sealed headlight equipped with one or more filaments operating in a halogen atmosphere

3.2

headlight

a device that is capable of emitting a main beam or a dipped beam, or both, and used to illuminate the road ahead of a vehicle

3.3

ordinary headlight

a headlight other than a halogen headlight

3.4

sealed headlight

a headlight, the component parts of which (including the optical system and the light source(s)) form an integral whole which cannot be dismantled without rendering the headlight unusable

4 Requirements

4.1 General construction

A headlight shall be so designed and constructed that it will retain its photometric properties and remain in good working order despite the vibration to which it may be subjected in normal use.

4.2 Securing of lens

A headlight equipped with a lens that is not permanently secured shall be so designed that the lens cannot be fitted in any position other than the correct one.

4.3 Lamps

A headlight (other than a sealed headlight) shall be designed for use with a lamp of category R2, H1, H2, H3 or H4 complying with CD/K/029-1:2008.

4.4 Securing of lamp

The means by which a lamp is secured to the reflector of a headlight (other than a sealed headlight) shall be such that, even in darkness, the lamp cannot be fitted in any position other than the correct one.¹⁾

4.5 Lampholders

The dimensions of a lampholder (other than for an R2 lamp ²⁾) of a headlight shall conform to those given in the relevant data sheet in IEC 60061-2 (see Table 1).

Table 1 — Lampholder data sheets

1	2	3
Lamp	Lamp cap	Data sheet in IEC 60061-2
H1	p14.5s	7005-46
H2	X511	7005-99
H3	PK22s	7005-47
H4	p43t-38	7005-39

4.6 Securing of filter

A yellow filter fitted in a headlight shall be so secured that it cannot be removed either inadvertently or, with ordinary tools, intentionally.

¹⁾ Special care should be taken when fitting an R2 lamp, to align the positioning lug on the lamp cap with a complementary slot in the lampholder.

²⁾ There is no lampholder data sheet applicable to R2 lamps in IEC 60061-2. The dimensions of an R2 lamp cap (Part-41) are given in IEC 60061-1 (sheet 7004-95), and manufacturers producing lampholders for R2 lamps should ensure that the dimensions of the lampholder are such that, when an R2 lamp is fitted, the lamp is securely located and correctly oriented.

4.7 Terminals (sealed headlights)

The terminals of a sealed headlight shall be in electrical contact with the appropriate filament(s) only and shall be robust and firmly fixed to the headlight. The arrangement and dimensions of the terminals shall conform to those given in IEC 60061-1 (sheet 7004-100).

4.8 Initial power (sealed headlights)

When determined in accordance with 6.3, the initial power of an ordinary sealed headlight shall not exceed the rated power, and the initial power of a 12 V sealed halogen headlight shall not exceed 75 W on the main-beam filament and 68 W on the dipped-beam filament.

4.9 Colour

The light beam emitted by a headlight shall be either uncoloured or yellow. When determined in accordance with 6.4, the chromaticity co-ordinates of a yellow light beam emitted by a headlight shall, on the CIE chromaticity diagram (see Figure 2), be within the area defined by the straight lines connecting the points having the following (x y) co-ordinates:

(0.541; 0.451); (0.524; 0.442); (0.466; 0.500) and (0.477; 0.515)³⁾

4.10 Photometric properties

4.10.1 Cut-off

The dipped beam of a headlight shall have a cut-off sharp enough to be used as a reference in the adjustment of that headlight. With the headlight in its normal position, the shape of the cut-off shall be such that on the right-hand side it is horizontal and below line OH, and on the left-hand side it is below either line ADO or line BCO (see Figure 1). The cut-off shall not be above both line BD and line DO.

4.10.2 Luminous intensities⁴⁾ of a dipped beam

When determined in accordance with 6.5, the luminous intensities, in the specified directions, of a dipped beam of a headlight shall conform to the appropriate values given in Table 2, and the luminous intensity in a direction such that it will reach a point anywhere in one of the zones I, III or IV (see Figure 1), shall conform to the appropriate values given in Table 3.

Table 2 — luminous intensities in specified directions

1 Point	2 Direction		3 Angle, °		4 Luminous intensity, cd	
					Ordinary Headlight	Halogen headlight
	Horizontal	Vertical				
B50R	3.4 right	0.6 up			190 max.	250 max.
75 L	1.2 left	0.6 down			3 750 min.	7 500 min.
75 R	3.4 right	0.6 down			—	7 540 max.
SOL	1.7 left	0.9 down			3 760 min.	7 520 min.
50 R	3.4 right	0.9 down			—	9 420 max.
50V	0	0.9 down			—	3 750 min.
25 L	9.0 left	1.7 down			970 min.	1 300 min.
25 R	9.0 right	1.7 down			970 min.	1 300 min.

³⁾ Another method of specifying the same colour is as follows:

$$y \geq 0.580x + 0.138; y \leq 1.290x - 0.100; y \geq -x + 0.966 \text{ and } y \leq -x + 0.992$$

⁴⁾ The intensity values can be converted to illuminance values on a vertical screen by using the formula

$$E = \frac{I \cos \theta}{d^2}$$

where E = illuminance,
 I = intensity, cd
 θ = angle of incidence on the screen
 d = distance from the headlight to the screen, m

Table 3 — Luminous intensities in zones

1	2	3
Zone	Luminous intensity, cd	
	Ordinary headlight	Halogen headlight
I	12780 max.	Twice the intensity measured at point 50 L, max.
III	450 max.	450 max.
IV	1 260 min.	1 890 min.

4.10.3 Luminous intensities of a main beam

When determined in accordance with 6.5, the luminous intensity of the main beam of a headlight

- shall, in any direction, not exceed 150 000 cd and in the case of a dual-beam headlight, not exceed 16 times the intensity measured in direction 75 L of the dipped beam;
- in the direction 0° horizontal, 0° vertical shall be at least 80 % of the maximum intensity in the case of a halogen headlight and at least 90 % of the maximum intensity in the case of an ordinary headlight; and
- in the specified directions shall be at least the appropriate of the values given in Table 4.

Table 4 — Luminous intensities of main beam

1	2	3
Direction	Luminous intensity, cd, min.	
	Ordinary headlight	Halogen headlight
Of maximum intensity	20000	30000
Horizontally within an angle of 2.6° of 0° direction	10000	15000
Horizontally within an angle of 5.1° of 0° direction	2520	3780

4.10.4 Compliance with photometric requirements

A headlight of normal production shall be deemed to comply with the photometric requirements of the specification if:

- none of the intensity values measured deviate unfavourably by more than 20 % from the values in 4.10.2 and 4.10.3; and
- the unfavourable deviation at point B50R and in Zone III does not exceed 125 cd and 190 cd respectively.

or

- for the dipped beam, the intensity values measured comply (with a tolerance of 65 cd) with the requirements of 4.10.2 within 0.4° of the directions of B50R, 75 L, 75 R, 50 L, 50 R, 25 L and 25 R and the top of Zone IV is situated not higher than a horizontal line 0.6° above the line joining 25 L and 25 R; and
- for the main beam, the intensity values measured do not deviate unfavourably by more than 20 % from the values described in 4.10.3 and, in the direction 0° horizontal, 0° vertical, the luminous intensity is at least 75 % of the maximum intensity.

4.11 Life of sealed headlights

When determined in accordance with 6.6, the average life of a sample of sealed headlights shall be at least 75 h for the main beam filament and at least 150 h for the dipped-beam filament.

5 Marking

5.1 The following information shall be legibly and durably marked on each headlight:

- a) the manufacturer's name or registered trade name or registered trade mark or any combination of these;
- b) the manufacturer's model number or type reference or catalogue number;
- c) the lamp category for which the headlight is designed or, in the case of sealed headlights, the rated voltage and the rated power of each filament in the sequence: Main beam filament, dipped-beam filament.

5.2 The following additional marking (grouped together and of characters at least 4 mm in height), shall appear on the headlight:

- a) one or more of the following letters, as relevant:

S, if it is a sealed headlight;

H, if it is a halogen headlight;

C, if the headlight emits a dipped beam; and

R, if the headlight emits a main beam;

- b) a horizontal arrow pointing to the right of an observer facing the headlight;
- c) when relevant, a figure indicating the maximum luminous intensity of the main beam. (To arrive at this figure, divide the maximum luminous intensity by 3 000 and round off to the nearest of 7.5; 10; 12.5; 17.5; 20; 25; 27.5; 30; 37.5; 40; 45 or 50.)

6 Inspection and methods of test

NOTE The definitions, sampling procedure and criteria of compliance given in A.2 shall apply.

6.1 Inspection

Visually examine and, using suitable measuring instruments, check each headlight in the sample for compliance with the requirements of 4.1 – 4.7 inclusive and of Clause 5.

6.2 General conditions of testing

6.2.1 Supply voltage stabilization

Maintain the test voltage to within 0.2 %.

6.2.2 Accuracy of measuring instruments

Carry out measurements with instruments of an accuracy appropriate to the requirements (at least class 0.2, i.e. 0.2 % of full scale deflection).

6.2.3 Aging

Age each filament of a sealed headlight in its normal operating position at rated voltage for a period of 2 h before conducting the tests.

6.3 Measurement of initial power

Operate an ordinary sealed headlight at its rated supply voltage and a 12 V sealed halogen headlight at 13.2 V in their normal operating positions until they have stabilized. Measure by means of suitable instruments the initial power of each filament of the headlights and check for compliance with the requirements of 4.8.

6.4 Colour test

Fit the headlight (other than a sealed headlight) with the appropriate standard lamp, and operate it at the test voltage given on the relevant data sheet in CD/K/029-1:2008. Operate an ordinary sealed headlight at rated voltage and a 12 V sealed halogen headlight at 13.2 V. Use a spectrophotometer or other equally suitable colour-measuring device to determine the chromaticity co-ordinates of the light beam emitted by the headlight and check for compliance with the requirements of 4.9.

6.5 Photometric properties test

6.5.1 Apparatus

- a) **Goniometer.** A rigid structure capable of making angular adjustments correctly to within 0.1° , and with mounting arrangements such that the headlight can be mounted in its normal operating position with the filament at the optical centre of the goniometer.
- b) **Detector.** A vision-corrected photo-electric detector of suitable sensitivity for measuring luminous intensity accurately to within 2 %, at a distance such that the effective area of the detector subtends an angle of not more than 0.15° at the filament of the headlight. The detector is such that the angle of incidence (of a light beam from the headlight) at the detector surface is constant.
- c) **Screening.** Suitable screening that prevents any stray light from reaching the detector.
- d) **Overlay.** A transparent overlay (see Figure 1) on which the specified measuring directions and zones and the shapes of the cut-off are indicated.

6.5.2 Test voltage

Test sealed headlights at rated voltage. Test other headlights at a voltage such that the standard lamp emits the reference luminous flux given in the appropriate table in CD/K/029-1:2008.

6.5.3 Procedure

- a) Except in the case of a sealed headlight, fit an appropriate standard lamp.
- b) Mount the headlight in its normal operating position with the filament at the optical centre of the goniometer, and operate the headlight at the appropriate test voltage for at least 2 h.
- c) At the end of this period measure the luminous intensity distribution of the dipped beam (when relevant) and draw an intensity distribution diagram (iso-candela diagram), using the same scale as that of the transparent overlay.
- d) Put the overlay on the distribution diagram and try to so adjust it that all the requirements for shape of cut-off and luminous intensity are met, to check for compliance with the requirements of 4.10.1 and 4.10.2.
- e) Measure the luminous intensity distribution of the main beam (when relevant) without changing the position of the headlight in the goniometer and draw an intensity distribution diagram (iso-candela diagram), using the same scale as that of the overlay.
- f) For a headlight emitting a main beam only, regard the direction of maximum intensity as 0° horizontal, 0° vertical. For a dual beam headlight the direction 0° horizontal, 0° vertical must be the same for both beams and it shall be determined from the dipped beam distribution diagram.
- g) Check the main beam distribution diagram for compliance of the headlight with the requirements of 4.10.3.

6.6 Life test

Test the sample of sealed headlights as for R2 and H4 lamps in accordance with 7.7 of CD/K/029-1:2008 and check for compliance with the requirements of 4.11.

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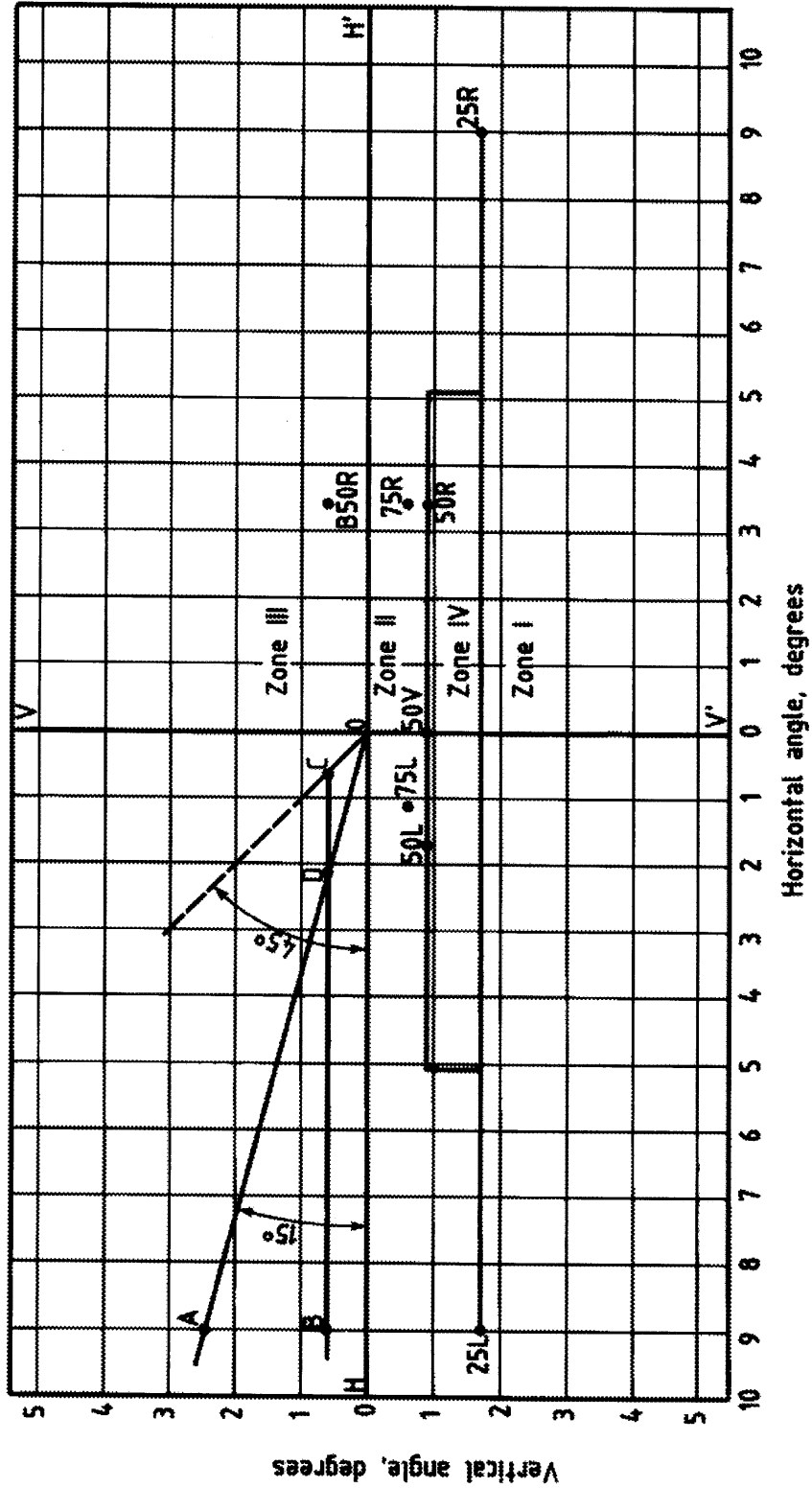


Figure 1 — Overlay

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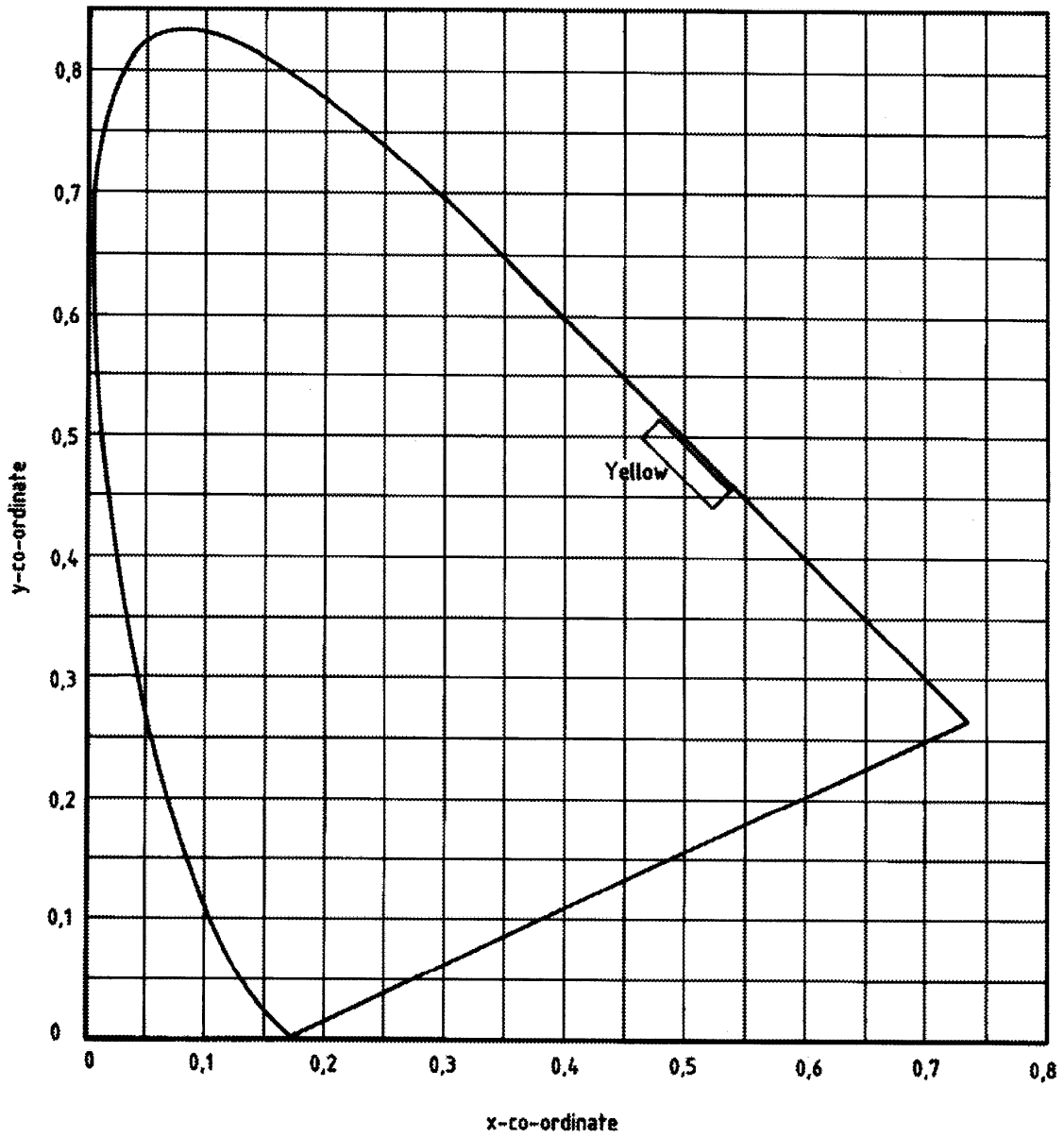


Figure 2 — Chromaticity diagram

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Annex A
(informative)

**Quality evaluation of headlights produced to the requirements laid down in
this part of the specification**

Standard

A.1 Quality verification

A.1.1 When a purchaser requires quality verification on an ongoing basis of headlights produced to this East African Standard, it is suggested that, rather than to evaluation of the final product only, be also direct his attention to the quality management system applied by the manufacturer. In this connection it should be noted that ISO 9001, covers the provision of an integrated quality management system.

A.1.2 If the headlights do not bear the standardization mark and no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of a lot, and a purchaser wishes to establish by inspection and testing of samples of the final product whether a lot (as defined in A.2.1) of the headlights produced to this East African Standard complies with its requirements, the sampling plan given in A.2 and based on the stated AQL can be applied.

It must be noted that

- a) such a sampling plan applies to fully manufactured products only; and
- b) a lot that in terms of the plan is deemed to comply with this East African Standard, could contain defective headlights to an extent proportional to that permitted by the relevant acceptance numbers given in the sampling table.

A.2 Assessment of compliance with the specification

A.2.1 Definitions

acceptable quality level AQL

the maximum percentage defective that for the purpose of sampling inspection can be considered satisfactory as a process average

defective

a headlight that fails in one or more respects to comply with the relevant requirements of the specification

lot

not less than 3 and not more than 10 000 headlights of the same design and size, from one manufacturer, bearing the same marking, submitted at any one time for inspection and testing

A.2.2 Sampling

Use the following sampling procedure to determine whether a lot complies with this East African Standard, and deem the samples so taken to represent the lot for the respective properties.

From the lot draw at random the number of headlights given in column 2 of Table A.1 relative to the appropriate lot size given in column 1.

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Table A.1 — Sample sizes

1 Lot size, headlights	2	3
	Sample for inspection and testing*	
	Sample size, headlights	Acceptance No. (AQL = 6.5)
3 — 25	2	0
26 — 150	8	1
151 — 500	13	2
501 — 1200	20	3
1201 — 10000	32	5

* Based on EAS 381 for Special Inspection Level S-4.

A.2.3 Criteria of compliance

Deem the lot to comply with the relevant requirements of this East African Standard if on inspection and testing of the sample taken in accordance with B.2.2, the number of defectives found does not exceed the relevant acceptance number given in column 3 of Table A.1 and the average life of the sample tested is not less than 90 % of the relevant value given in 4.11.

A.2.4 Conformity of production

Tests undertaken to check for conformity of production shall be conducted in accordance with the conformity of production clause of the relevant of the following standards:

UNECE R 1, UNECE R 5, UNECE R 8, UNECE R 20 and UNECE R 31.

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