



## Economic and Social Council

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### Economic Commission for Europe

#### Inland Transport Committee

#### World Forum for Harmonization of Vehicle Regulations

#### Working Party on Lighting and Light-Signalling

#### Sixty-fifth session

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Item 10 of the provisional agenda

**Regulation No. 99 (Gas-discharge light sources)**

### **Proposal for Supplement 7 to Regulation No. 99**

#### **Submitted by the expert from Society of Automotive Engineers\***

The text reproduced below was prepared by the expert from the Society of Automotive Engineers (SAE) to introduce a new category of gas discharge light source D7S in the regulation. The proposal is in addition to ECE/TRANS/WP.29/GRE/2011/3. The modifications to the existing text of the Regulation are marked in bold for new characters.

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\* In accordance with the programme of work of the Inland Transport Committee for 2006–2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## I. Proposal

*Annex 1, list of categories of gas-discharge light sources and their sheet numbers, amend to read:*

"

<i>Light source category</i>	<i>Sheet numbers</i>
D1R	DxR/1 to 7
D1S	DxS/1 to 6
D2R	DxR/1 to 7
D2S	DxS/1 to 6
D3R	DxR/1 to 7
D3S	DxS/1 to 6
D4R	DxR/1 to 7
D4S	DxS/1 to 6
D5S	D5S/1 to 5
D6S	D6S/1 to 5
<b>D7S</b>	<b>D7S/1 to 5</b>

"

*Annex 1, list of sheets for gas-discharge light sources and their sequence in this annex, amend to read:*

"

<i>Sheet numbers</i>	
DxR/1 to 7	(Sheet DxR/6: two pages)
DxS/1 to 6	
D5S/1 to 5	
D6S/1 to 5	
<b>D7S/1 to 5</b>	

"

*Insert new sheets D7S/1 to 5 after D6S/5, to read:*

## CATEGORY D7S

Sheet D7S/1

The drawings are intended only to illustrate the essential dimensions (in mm)

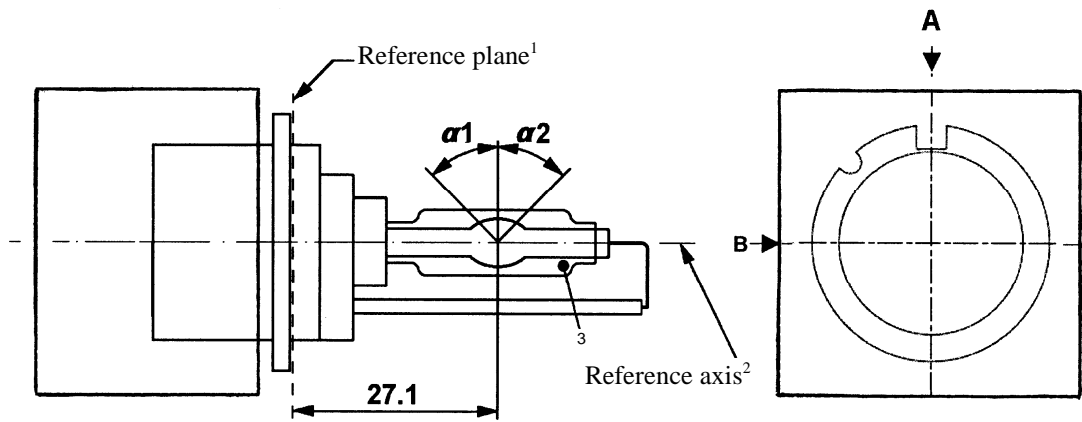


Figure 1  
Category D7S - Cap PK32d-1

- 1 The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
- 2 See sheet D7S/2.
- 3 When measured at a distance of 27.1 mm from the reference plane and with respect to the mid-point of the inner bulb, the outer bulb shall have an eccentricity of 1 mm max.

Figure 2  
Definition of reference axis<sup>1</sup>

The cap shall be pushed in this direction

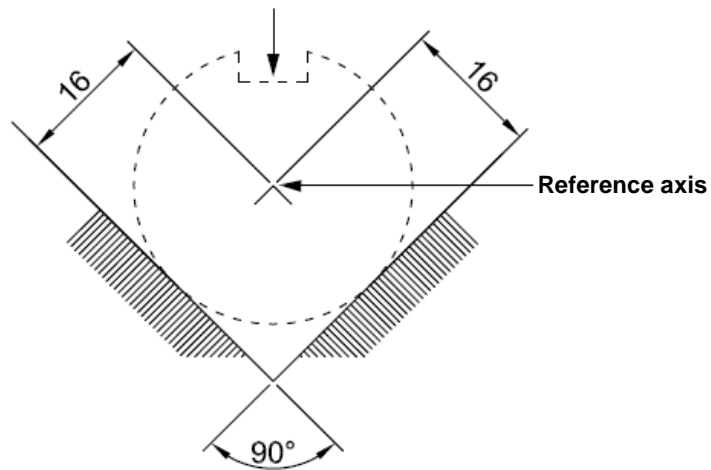
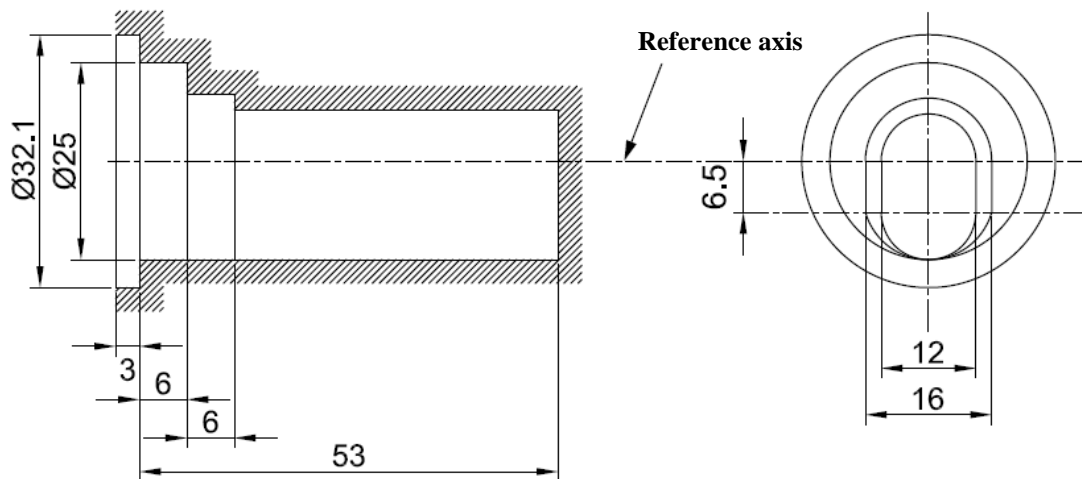


Figure 3  
Maximum lamp outline<sup>2</sup>



- <sup>1</sup> The reference axis is perpendicular to the reference plane and crosses the intersection of the two parallel lines as indicated in figure 2.
- <sup>2</sup> Glass bulb and supports shall not exceed the envelope, as indicated in figure 3. The envelope is concentric with the reference axis.

## CATEGORY D7S

## Sheet D7S/3

<i>Dimensions</i>		<i>Production light sources</i>	<i>Standard light sources</i>	
Position of the electrodes		Sheet D7S/4		
Position and form of the arc		Sheet D7S/5		
$\alpha 1, \alpha 2$ <sup>1</sup>		55° min.	55° min.	
D7S: Cap PK32d-1 in accordance with IEC Publication 60061 (sheet 7004-111-[4])				
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS				
Rated voltage of the ballast	V	12 <sup>2</sup>	12	
Rated wattage	W	25	25	
Test voltage	V	13.2	13.2	
Objective lamp voltage	V	42 ± 9	42 ± 4	
Objective lamp wattage	W	25 ± 3	25 ± 0.5	
Objective Luminous flux	lm	2000 ± 300	2000 ± 100	
Chromaticity coordinates	Objective	x = 0.375 y = 0.375		
	Tolerance area <sup>3</sup>	Boundaries	x = 0.345 y = 0.150 + 0.640 x	x = 0.405 y = 0.050 + 0.750 x
		Intersection points	x = 0.345	y = 0.371
			x = 0.405	y = 0.409
			x = 0.405	y = 0.354
	x = 0.345	y = 0.309		
Hot-restrike switch-off time	s	10	10	

<sup>1</sup> The part of the bulb within the angles  $\alpha 1$  and  $\alpha 2$  shall be the light emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles  $\alpha 1$  and  $\alpha 2$ .

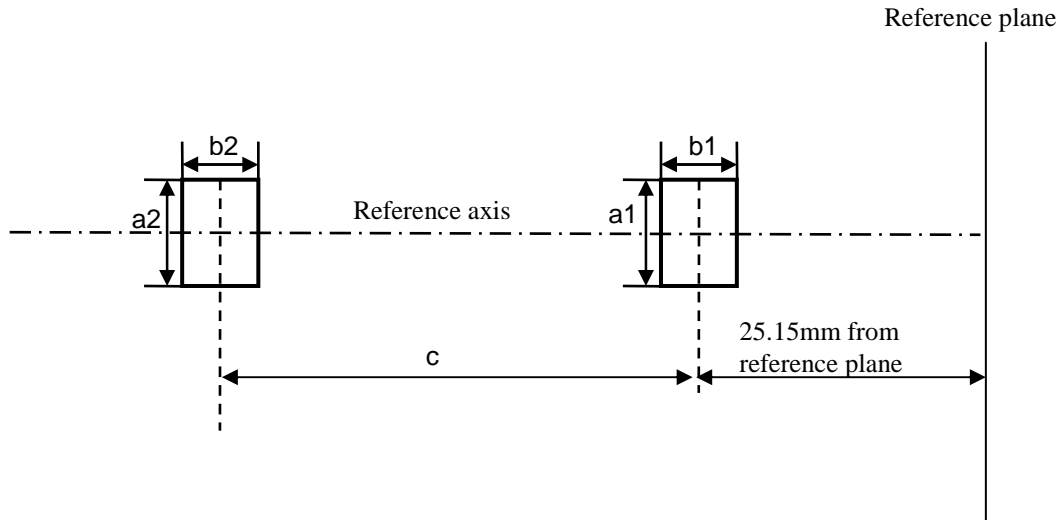
<sup>2</sup> Application voltages of ballasts may differ from 12 V.

<sup>3</sup> See Annex 4.

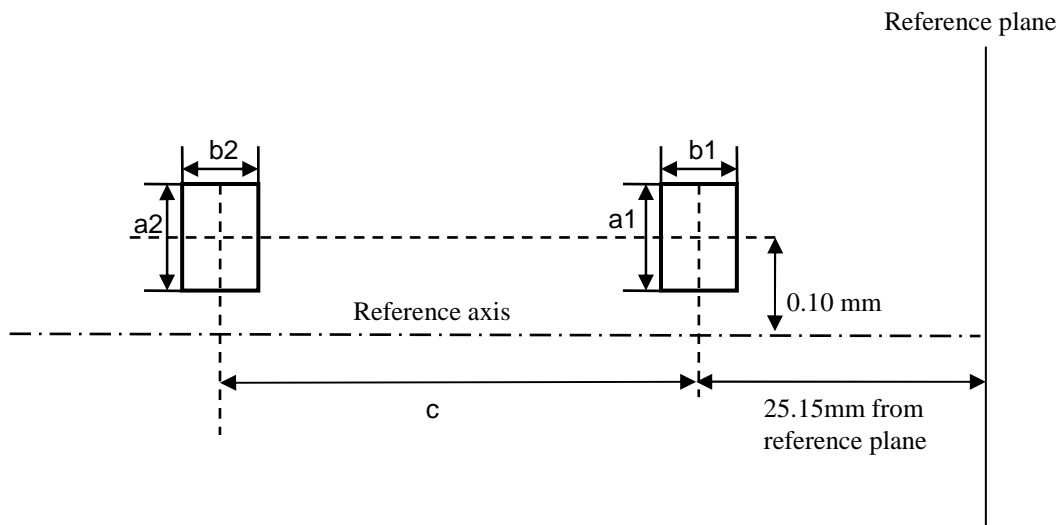
Position of the electrodes

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

Top view (schematic):



Side view (schematic):



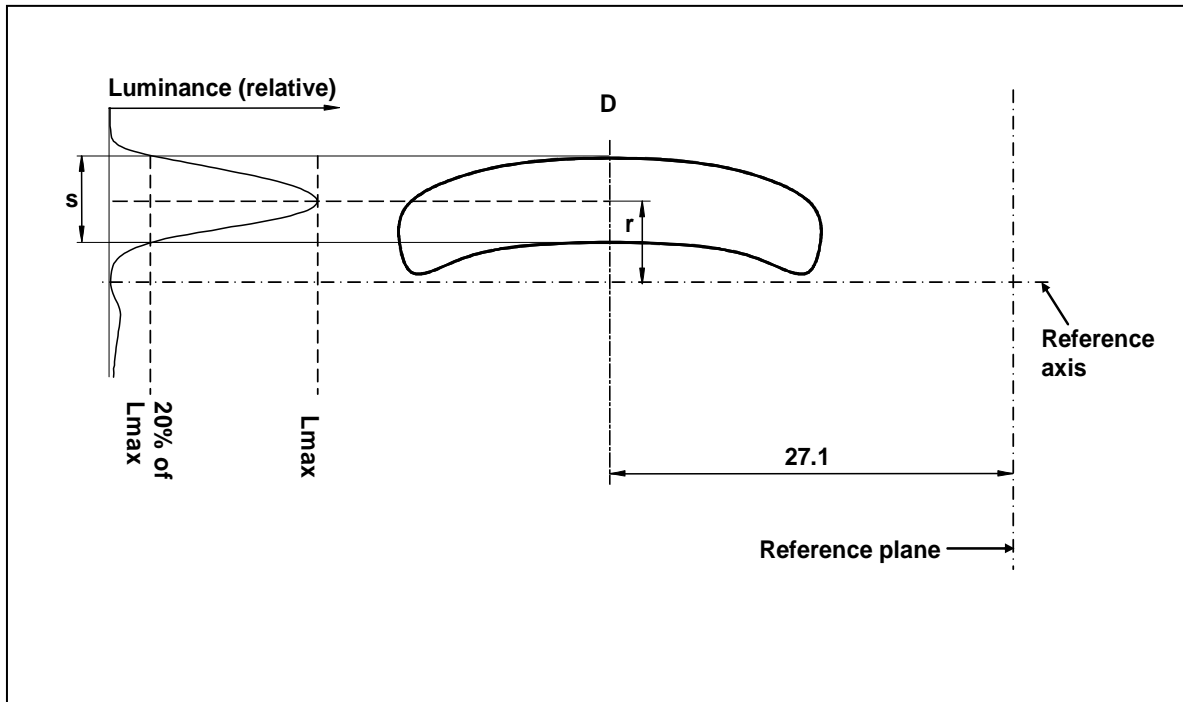
Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	0.30	0.20
a2	0.50	0.25
b1	0.30	0.15
b2	0.60	0.30
c	3.90	3.90

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

Position and form of the arc

This test is used to determine the form of the arc and its position relative to the reference axis and the reference plane by measuring its bending and diffusion in the cross section at a distance 27.1 mm from the reference plane.



**Relative luminance distribution in the central cross section D.**

**The form of the arc is for illustration purpose only.**

**Measuring direction: light source side view**

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

<i>Dimension in mm</i>	<i>Production light sources</i>	<i>Standard light sources</i>
r (arc bending)	0.50 +/- 0.25	0.50 +/- 0.15
s (arc diffusion)	0.70 +/- 0.25	0.70 +/- 0.15

## II. Justification

1. The D7S is a high intensity discharge (HID) light source with reduced lamp power (25W) according to the latest, high efficiency, mercury free technology. The D7S is proposed to create a suitable complementary technical solution to the D6S HID light source (see ECE/TRANS/WP.29/GRE/2011/3, based on ECE/TRANS/WP.29/GRE/2010/53 and GRE-64-30), from the perspective of common light centre length (LCL) and base technology, but with a different level of electronic integration.

Key features of the D7S are:

(a) The D7S is proposed with the existing IEC cap-concept of D1, D2, D3 and D4, with a key that has not been used so far for approved light sources;

(b) The light centre length and arc length are identical to the D6S proposal (e.g. LCL of 27.1mm and arc length of 3.90 mm)

(c) The D7S has an integrated igniter and the light source requires a separate ballast, in the same philosophy as D1S and D3S light sources;

(d) The D7S uses an identical burner to D6S and is able to fulfil the same run-up requirements.

2. The D7S/D6S form a complementary pair in the same manner as the D1S/D2S and D3S/D4S.

3. With the introduction of D7S, the three 25W HID light sources (D5S, D6S, D7S) provide a technical solution for a wide range of electronic integration levels ranging from no integrated electronics (D6S), partially integrated electronics (D7S) and fully integrated electronics (D5S).

4. A standardized replaceable D7S light source has a technical significance for headlamp construction in the United States of America and in regions where UNECE Regulations apply, since it offers a simplified and end-user-friendly solution while eliminating the need for less favourable non-replaceable solutions (e.g. integral beam) using the same fundamental light source.

5. To follow the recommended practice for introduction of light source categories to be adopted by the Working Party on Lighting and Light-Signalling (GRE), the D7S proposal has been evaluated following a procedure similar to the one documented in ECE/TRANS/WP.29/GRE/2009/32 (Working Party "Brussels 1952" (GTB) internal process for introduction and evaluation of new light source categories) and the flow chart and recommended practice (GTB reference: CE-4179 Annex 1 and Annex 2) referenced therein. Even though this procedure was introduced for the evaluation of Regulation No. 37 filament lamp categories, the framework of the document (e.g. the "aims of the World Forum for Harmonization of Vehicle Regulations" flow chart in CE-4179 Annex 1) is also applicable to Regulation No. 99 light sources, and from that point of view it is appropriate to extend the scope ECE/TRANS/WP.29/GRE/2009/32, and follow the recommended practice.



6. Following the process of CE-4179 Annex 1 three basic questions have to be answered:

(a) Application Study:

**Is the new LS category suitable for the proposed application(s)?**

- (i) The basic concept of a 25 W HID with the same arc and burner definition has already been provisionally approved by GRE as D6S. Currently the industry is developing headlamps which will be approved under Regulation No. 98 and several prototypes (ii) have been demonstrated. The concept of integrated igniter with corresponding ballast has been in the market for many years as D1S and D3S.
  - (ii) The D7S takes advantage of state-of-the-art 25 W HID technology in combination with proven integrated igniter technology and is a logical extension in the line-up of 25 W HID light sources.
- (b) Evidence for significant differentiation of the new light source category from existing light source categories:

**Does the new LS category lead to an improvement of relevant characteristics in the specific application(s)?**

- (i) The D7S enables the industry to avoid the high voltage cable due to the integrated igniter, which differentiates it from D6S.
  - (ii) With its lower weight compared to D5S and the LCL of 27.1 mm the D7S is compatible with the mechanical design of today's 35 W projector modules, especially with regard to mechanical shock and vibration.
  - (iii) Compared to D3S, the D7S reduces the power consumption by 30 per cent while maintaining the high safety level of a headlamp type approved according to Regulation No. 98.
- (c) Patent information:

**Q3: Are the members of the group aware of patents relevant to the proposed light source category?**

As outlined under Q1, the D7S is a combination of state-of-the-art technologies (25W burner and integrated igniter) which can be considered as "prior art" and therefore no patent issues are expected.

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