SURFACE VEHICLE RECOMMENDED PRACTICE

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Signal and Marking Light Sources

RATIONALE

The following revisions were made:

a. Inserted 2.2.2 with references for UN Regulations 37 and 128 and UN R.E.5.

b. A cross-reference to SAE J2560 was added for halogen filament light sources suitable for signal and marking lighting.

c. Added the option of using IEC 60809, UN Regulations 37 and 128, and UN R.E.5 as alternate sources for determining filament, or light emitting area location.

d. Table 2A was expanded to include more typical signal and marking filament light sources for motor vehicles.

e. Table 2B was expanded to include new standardized LED light sources: LW2, LR3A/B, LW3A/B, LY3A/B, LR4A/B, LR5A/B, LW5A/B, LY5A/B, LR6A/B, L1A/6, and L1B/6.

f. Newly entered light source specification data was taken from U.N. R.E.5 and/or provided by light source manufacturers.

g. The definition of light center was harmonized with UN R.E.5, which is an improved definition that also adequately covers LED light sources.

h. The test section (4.3) for LED light sources was split between the legacy LR1 light source (present in the June 2011 issue of SAE J573) and the other new LED light sources. Test methods for all LED light sources other than LR1 are included through normative referencing to UN Regulation 128, UN R.E.5, and IEC-60061-1, where the newly introduced Table 9 provides the references.

i. The requirements sections for LED light sources (5.4 and following) are dedicated to all LED light sources other than LR1. Specifications and requirements for all LED light sources other than LR1 are included through normative referencing to UN Regulation 128, UN R.E.5, and IEC-60061-1, where the newly introduced Table 9 (Replaceable LED light sources and related dimensional figures) provides the references.

j. The existing requirements for the LR1 were moved to a new Section 6.

k. Introduction of a new Table 10 to provide a direct reference to UN Regulation 128 and UN R.E.5 for the thermal behavior of the luminous flux of LED light sources.

l. Existing tables were converted to a new format.

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For more information on this standard, visit
https://www.sae.org/standards/content/J573_202212/

1. SCOPE

Most signal and marking lighting devices have light sources (bulbs), which can be based on either filament or LED technology. To assure field replacement, it is important that light source types employed be readily available in normal service channels. This document defines the physical, electrical, and photometric characteristics necessary to achieve a proper replacement for popular types of signal and marking light sources.

Some of the design characteristics in this document are listed solely for the sake of standardization and are not intended to describe the performance of lighting devices (lamp assemblies) on the vehicle.

Halogen filament light sources suitable for signal and marking lighting are specified in SAE J2560.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J567	Light Source Retention System
SAE J578	Chromaticity Requirements for Ground Vehicle Lamps and Lighting Equipment
SAE J1330	Photometry Laboratory Accuracy Guidelines
SAE J2357	Application Guidelines for Electronically Driven and/or Controlled Exterior Automotive Lighting Equipment
SAE J2560	Halogen Light Source Performance Requirements for Motor Vehicle Forward Lighting

2.1.2 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI_ANSLG_C81.61	Electric Lamp Bases
ANSI_ANSLG_C81.62	Lamp Holders for Electric Lamps
ANSI_ANSLG_C81.63	Gauges for Electrical Lamp Bases and Lamp Holders
ANSI ANSLG SR25e - 2009	Assigned Miniature Lamp Codes

2.1.3 International Electrotechnical Commission (IEC) Publications

Available from IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 02 11, www.iec.ch.

IEC Publication 60061-1	Lamp Caps and Holders Together with Gauges for the Control of Interchangeability and Safety - Part 1: Lamp caps
IEC Publication 60809	Lamps and Light Sources for Road Vehicles - Dimensional, Electrical and Luminous Requirements

IEC Publication 60810 Lamps, Light Sources and LED Packages for Road Vehicles - Performance Requirements

IEC Technical Report 62471-2 Photobiological Safety of Lamps and Lamp Systems - Part 2: Guidance on Manufacturing Requirements Relating to Non-Laser Optical Radiation Safety

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J387 Terminology - Motor Vehicle Lighting

SAE J2442 Harmonized Provisions for Installation of Exterior Lamps and Retro-Reflecting Devices on Road Vehicles Except Motorcycles

2.2.2 United Nations Publications

Available from United Nations Economic Commission for Europe, Palais des Nations, CH-1211, Geneva 10, Switzerland, Tel: +41-0-22-917-12-34, www.unece.org.

UN Regulation 37 Uniform Provisions Concerning the Approval of Filament Light Sources for Use in Approved Lamp Units of Power-Driven Vehicles and of Their Trailers

UN Regulation 128 Uniform Provisions Concerning the Approval of Light Emitting Diode (LED) Light Sources for Use in Approved Lamp Units on Power-Driven Vehicles and Their Trailers

UN R.E.5 Consolidated Resolution on the Common Specification of Light Source Categories (R.E.5) (ECE/TRANS/WP.29/1127 and revisions)

2.2.3 CIE Publications

Available from CIE Central Bureau, Babenbergerstrasse 9/9A, 1010 Vienna, Austria, Tel: +43 1 714 31 87, www.cie.co.at.

Publication No. 70 - 1987 The Measurement of Absolute Luminous Intensity Distributions

2.2.4 IES Publications

Available from Illuminating Engineering Society, 120 Wall Street, Floor 17, New York, NY 10005-4001, Tel: 212-248-5000, www.ies.org.

LM-45 Approved Method for Electrical and Photometric Measurements of General Service Incandescent Filament Lamps, IES Lighting Handbook, Reference Volume, Ill.NA

LM-79-19 Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products

2.3 Index of Tables and Figures

See Table 1.

Table 1 - Index of tables and figures

Figure	Table	Description
1		Continuous filament
2		Legged filament
3		Typical signal and marking filament light sources
	2A	Typical signal and marking filament light sources for motor vehicles
	2B	Typical signal and marking LED light sources for motor vehicles
	3	Basic filament light source dimensions
4		Filament shapes
5		Filament location on dual function light sources
6	4	BA9s base dimensions to be controlled on a finished filament light source (previous base designation: A1)
7a, 7b, 7c	5	BA15s, BA15d, and BAY15d base dimensions to be controlled on a finished filament light source (previous base designation: B1, B2, and C2)
8	6	Base type W2.1x4.9d (previous base designation: W-1 wedge)
9	7	Base type W2.1x9.2d (previous base designation: W-2 wedge)
10	8	Base type W2.5x16d wedge and W2.5x16q wedge (previous base designation: SC wedge and DC wedge)
11		LED light source - LR1
12		LED light emitting area
13		Set up to measure LED luminous intensity distribution
	9	Replaceable LED light sources and related dimensional figures
	10	Replaceable LED light sources and thermal behavior of luminous flux
	11	Relative intensity values for stop function of normal and rated LED light source LR1

3. DEFINITIONS

3.1 TEST SAMPLE

Test samples are light sources fabricated from a normal production process.

3.2 FILAMENT LIGHT SOURCE

Device in which light is produced by means of one or more filaments heated to incandescence by the passage of an electric current.

3.3 LED LIGHT SOURCE

A light source where the visible radiation is emitted from one or more LEDs. An LED light source may or may not require an additional electronic control unit (gear) and may or may not require additional provisions for thermal management.

3.4 SEASONED LIGHT SOURCE

3.4.1 FILAMENT TYPE

A filament light source which is energized, at design voltage, for 1% of its rated life or 10 hours; whichever is shorter. See Table 2A for design voltage and life rating (for light sources not listed see manufacturer's data).

3.4.2 LED TYPE

LED light sources operated at their design voltage for at least 48 hours. Operation shall be at the highest design power function (mode). If multiple functions are present with separate LED sources, each function (mode) shall be seasoned individually. See Table 2B for design voltage and life rating (for light sources not listed see manufacturer's data).

3.5 STANDARD FILAMENT LIGHT SOURCE (BULB, LAMP)

A light source which meets reduced (tighter) tolerances for both filament position and photometry. Light sources are seasoned to attain photometric stability.

3.6 ACCURATE RATED LIGHT SOURCE

A seasoned light source unit operated at design mean spherical luminous intensity and having its light source(s) positioned within strict tolerances as specified in the applicable standard.

Informational note: Accurate rated light sources are necessary to certify that lighting devices (lamps) meet legal illumination requirements. This normally applies to light sources used for tail, stop, park, turn, or combination functions in addition to forward lighting devices.

3.6.1 FILAMENT TYPE

A properly seasoned filament light source operated at design mean spherical candela (mscd), and having its filament(s) within ±0.25 mm of nominal design position (X, Y, Z axes). It is necessary to rate each filament separately in a double filament bulb and may require calibrating two separate bulbs to achieve an accurate rated bulb qualification for each filament.

3.6.2 LED TYPE

A properly seasoned LED light source operated in steady-state condition at design mean spherical candela (mscd) and with the light center length and light emitting area within ±0.10 mm of nominal design position (X, Y, Z axes). It is necessary to rate each function separately in multi-function LED light sources and may require calibrating two separate LED light sources to achieve an accurate rated source qualification for each function.

3.7 FILAMENT LIGHT SOURCES ABBREVIATIONS

L = maximum exposed length

LCL = light center length

WAA = wide axial alignment

NAA = narrow axial alignment

Table 2A - Typical signal and marking filament light sources for motor vehicles

ANSI No.	UN/IEC Designation	Mean Spherical Candela	MScd Tol. ± %	Design Voltage	Design Amps	Amp Tol. ± %	Rated Average Lab Life Hours[1]	Filament Shape or Type[2]	LCL mm	LCL Tol. ± mm	Axial Align. ± mm	Light Source Type[3]	Base Type[4]
37		0.5	30	14.0	0.09	15	1500	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d
73		0.3	30	14.0	0.08	15	15000	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d
74		0.7	30	14.0	0.10	15	500	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d
57[7]		2	20	14.0	0.24	10	500	C-2V	14.2	2.3	2.3	G-4 1/2	BA9s
1895[7]		2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.3	G-4 1/2	BA9s
67[7]		4	15	13.5	0.59	8	5000	C-2R	20.6	2.3	2.3	G-6	BA15s
89[7]		6	15	13.0	0.58	8	750	C-2R	19.0	2.3	2.3	G-6	BA15s
97[7]		4	15	13.5	0.69	8	5000	C-2V	20.6	2.3	2.3	G-6	BA15s
158		2	20	14.0	0.24	10	500	C-2F	14.2	2.3	1.5	T-3 1/4	W2.1x9.2d
161[7]		1	20	14.0	0.19	10	1500	C-2F	14.2	2.3	2.0	T-3 1/4	W2.1x9.2d
168		3	20	14.0	0.35	10	1500	C-2F	14.2	2.3	2.0	T-3 1/4	W2.1x9.2d
194		2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.0	T-3 1/4	W2.1x9.2d
No ANSI Number	W3W[10]	1.75	30	13.5	0.255	Max	2000	C-2R	12.7	1.5	1.5	T-3 1/4	W2.1x9.5d
No ANSI Number	W5W[10]	4	20	13.5	0.407	Max	1000	C-2R C-2V	12.7	1.5	1.5	T-3 1/4	W2.1x9.5d
No ANSI Number	WR5W[10]	0.95	25	13.5	0.37	10	1000	C2-R	12.7	1.5	1.5	T3-1/4	W2.1x9.5d
No ANSI Number	WY5W[10]	2.4	30	13.5	0.407	Max	1000	C-2R	12.7	1.5	1.5	T-3 1/4	W2.1x9.5d
PC175		5	20	14.0	0.58	10	1000	C-2F	14.2	2.3	2.0	T-3 1/4	PC
PC194		2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.0	T-3 1/4	PC
906		6	15	13.0	0.69	10	1000	C-2F	20.6	2.3	2.3	T-5	W2.1x9.2d
912		12	15	12.8	1.00	10	1000	C-2R	20.6	2.3	2.3	T-5	W2.1x9.2d
921		21	20	12.8	1.40	10	1000	C-2R	20.6	2.3	2.3	T-5	W2.1x9.2d
	W16W[10]	24.66	20	13.5	1.58	Max	500	C-2R	20.6	2.3	1.0	T-5	W2.1x9.5d
1003[7]		15		12.8	0.94		200	C-6	26.9			B-6	BA15s
1141[7]		21		12.8	1.44		1000	C-6	31.75	1.5	1.5	S-8	BA15s
1156[7]		32	10	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BA15s
1156NA[7]		24	10	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BA15s
1157[7]		32	10	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BAY15d
		3	12	14.0	0.59	8	5000	C-6	[6]				
1157A / 1157NA[7]		24	30	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BAY15d
		2.2	30	14.0	0.59	8	5000	C-6	[6]				
2057[7]		32	10	12.8	2.10	5	1200	C-6	31.75	1.5	1.5	S-8	BAY15d
		2	12	14.0	0.48	8	5000	C-6	[6]				
2057A / 2057NA[7]		24	30	12.8	2.10	5	1200	C-6	31.75	1.5	1.5	S-8	BAY15d
		1.5	30	14.0	0.48	8	5000	C-6	[6]				
2357[7]		40	10	12.8	2.23	5	400	C-6	31.75	1.5	1.5	S-8	BAY15d
		3	12	14	0.59	8	5000	C-6	[6]				
2357NA[7]		30	30	12.8	2.23	5	400	C-6	31.75	1.5	1.5	S-8	BAY15d
		2.2	30	14	0.59	8	5000	C-6	[6]				

Table 2A - Typical signal and marking filament light sources for motor vehicles (continued)

ANSI No.	UN/IEC Designation	Mean Spherical Candela	MScd Tol. ± %	Design Voltage	Design Amps	Amp Tol. ± %	Rated Average Lab Life Hours[1]	Filament Shape or Type[2]	LCL mm	LCL Tol. ± mm	Axial Align. ± mm	Light Source Type[3]	Base Type[4]
3047		21	12	12.8	1.6	5	2300	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2	12	14.0	0.48	8	10000	C-6	[6]				
3057		32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2	12	14.0	0.48	8	5000	C-6	[6]				
3057K		32	10	12.8	2.10	5	2000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2	12	14.0	0.48	8	10000	C-6	[6]				
3057A / 3057NA		24	30	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		1.5	30	14.0	0.48	8	5000	C-6	[6]				
3155		21	10	12.8	1.60	8	1500	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16d
3156	P27W	32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16d
3156NA		24	30	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16d
3157	P27/7W	32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3	12	14.0	0.59	8	5000	C-6	[6]				
3157K	P27/7W	32	10	12.8	2.10	5	2000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3	12	14.0	0.59	8	10000	C-6	[6]				
3157A / 3157NA		24	30	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2.2	30	14.0	0.59	8	5000	C-6	[6]				
3157AK		24	30	12.8	2.10	5	2000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2.2	30	14.0	0.59	8	10000	C-6	[6]				
3456 / 3456K		40	10	12.8	2.23	5	800	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16d
3357		40	10	12.8	2.23	5	400	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3.0	12	14.0	0.59	8	5000	C-6	[6]				
3357A / 3357NA / 3457A / 3457NA		30	30	12.8	2.23	5	400	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2.2	30	14.0	0.59	8	5000	C-6	[6]				
3457 / 3457K		40	10	12.8	2.23	5	800	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3.0	12	14.0	0.59	8	10000	C-6	[6]				
3457NAK		30	30	12.8	2.23	5	800	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2.2	30	14.0	0.59	8	10000	C-6	[6]				
3757A / 3757NA	PY27/7W	22.28	15	13.5	2.38	Max	600	C-6	27.9	1.0	1.0	S-8/GT-8	WX2.5x16q
		1.67	15	13.5	0.63	Max	5000	C-6	[6]				
4057		32	10	12.8	2.23	5	4000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2	12	14.0	0.48	8	10000	C-6	[6]				
4114		32	10	14.0	2.23	5	4000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3	12	14.0	0.59	8	10000	C-6	[6]				
4157		32	10	12.8	2.23	5	4000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		3	12	14.0	0.59	8	10000	C-6	[6]				
4157NAK		24	30	12.8	2.23	5	4000	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q
		2.2	30	14.0	0.59	8	10000	C-6	[6]				

Table 2A - Typical signal and marking filament light sources for motor vehicles (continued)

ANSI No.	UN/IEC Designation	Mean Spherical Candela	MScd Tol. ± %	Design Voltage	Design Amps	Amp Tol. ± %	Rated Average Lab Life Hours[1]	Filament Shape or Type[2]	LCL mm	LCL Tol. ± mm	Axial Align. ± mm	Light Source Type[3]	Base Type[4]
5200	PY24W[10]	23.9	+15 -25	13.5	1.78	4.1	1900 Flashing	C-8Z	24	0.5	0.5	P-6	PGU20-4
5201	PS19W[10]	27.9	15	13.5	1.41	5.2	1900	C-8Z	24	0.5	0.5	P-6	PG20-1
5202	PS24W[10]	39.8	+10 -20	13.5	1.78	4.1	1400	C-8Z	24	0.5	0.5	P-6	PG20-3
7010[11]	PC16W[10]	23.9	15	13.5	1.19	6	2800	C-8Z	18.5	0.5	0.7	G-5-1/4	PU20d-1
7011[12]	PCY16W[10]	14.3	20	13.5	1.19	6	2300 Flashing	C-8Z	18.5	0.5	0.5	G5-1/4	PU20d-2
7012[13]	HiPerClick19W	27.9	15	13.5	1.41	5.2	1900	C-8Z	19.5	0.5	0.5	P-6	PU20d-3
7013[14]	HiPerClick24W	39.8	+10 -20	13.5	1.78	4.1	1400	C-8Z	19.5	0.5	0.5	P-6	PU20d-5
7014[15]	HiPerClick24W NA	23.9	+15 -25	13.5	1.78	4.1	2300 Flashing	C-8Z	19.5	0.5	0.5	P-6	PU20d-6
828	P13W[10]	19.9	+15 -20	13.5	1.25	11	7400	C-8Z	25	0.3	0.5	G-5-1/4	PG18.5d-1
2502	PSY19W[10]	17.1	20	13.5	1.41	5.2	2200 Flashing	C-8Z	24	0.5	0.5	P-6	PG20-2
2503	PSY24W[10]	23.9	+15 -25	13.5	1.78	4.1	1900 Flashing	C-8Z	24	0.5	0.5	P-6	PG20-4
2504	PSX24W[10]	39.8	+10 -15	13.5	1.78	4.1	1400	C-8Z	24	0.35	0.5	P-6	PG20-7
6851	PSX26W[10]	39.8	10	13.5	1.78	4.1	1400	C-8Z	24	0.3	0.5	P-6	PG18.5d-3
7440	W21W[10]	36.6	15	13.5	1.85	6	300	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	W3x16d
7440A/ 7440NA		22	30	13.5	1.85	6	300	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	W3x16d
7440LL	W21W[10]	36.6	15	13.5	1.85	6	600	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	W3x16d
7440ULL	W21W[10]	36.6	15	13.5	1.85	6	3000	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	W3x16d
7441	-	32	15	12.8	2.1	5	600	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	W3x16d
7442	-	32	15	12.8	2.1	5	600	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
	-	3	26	14.0	0.59	10	5000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7442NA	-	24	30	12.8	2.23	10	2000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
	-	2.2	30	14.0	0.59	10	5000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7443	W21/5W[10]	35	15	13.5	1.85	6	500	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
		2.8	20	13.5	0.44	10	1000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q

Table 2A - Typical signal and marking filament light sources for motor vehicles (continued)

ANSI No.	UN/IEC Designation	Mean Spherical Candela	MScd Tol. ± %	Design Voltage	Design Amps	Amp Tol. ± %	Rated Average Lab Life Hours[1]	Filament Shape or Type[2]	LCL mm	LCL Tol. ± mm	Axial Align. ± mm	Light Source Type[3]	Base Type[4]
7443LL	W21/5W[10]	35	15	13.5	1.85	6	750	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
		2.8	20	13.5	0.44	10	1500	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7443ULL	W21/5W[10]	35	15	13.5	1.85	6	3000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
		2.8	20	13.5	0.44	10	6000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7444	-	32	15	12.8	2.23	10	800	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
	-	3	26	14.0	0.59	10	5000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7444LL	-	32	15	12.8	2.23	10	2000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
	-	3	26	14.0	0.59	10	10000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
7444NA	-	30	30	12.8	2.23	10	800	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
	-	2.2	30	14.0	0.59	10	5000	C-6	25	Note (8)	Note (8)	T-6-1/2[9]	W3x16q
No ANSI Number-	WY21W[10]	22.3	20	13.5	1.85	6	300	C-6	29	Note (8)	Note (8)	T-6-1/2[9]	WX3x16d
7445	PW16W	23.9	15	13.5	1.19	6	2200	C-8Z	17.1	0.4	0.5	G-5-1/4	WP3.3x14.5-8
7446	PW19W	27.9	15	13.5	1.41	5.2	1900	C-8Z	18.1	0.4	0.5	P-6	WP3.3x14.5-1
7447	PW24W	39.8	+10/-20	13.5	1.78	4.1	1400	C-8Z	18.1	0.4	0.5	P-6	WP3.3x14.5-3
7448	PWY16W	14.3	20	13.5	1.19	6	2200 Flashing	C-8Z	17.1	0.4	0.5	G-5-1/4	WP3.3x14.5-9
7449	PWY19W	17.1	20	13.5	1.41	5.2	2200 Flashing	C-8Z	18.1	0.4	0.5	P-6	WP3.3x14.5-2
7450	PWY24W	23.9	+15/-25	13.5	1.78	4.1	1900 Flashing	C-8Z	18.1	0.4	0.5	P-6	WP3.3x14.5-4
No ANSI Number	WT21W	36.6	15	13.5	1.85	6	1000	C-6	27.9	1.0	1.5	T-6-1/2	WUX2.5x16d
No ANSI Number	WTY21W	22	20	13.5	1.85	6	1000	C-6	27.9	1.0	1.5	T-6-1/2	WUY2.5x16d
No ANSI Number-	WT21/7W	35	15	13.5	1.85	6	1000	C-6	27.9	1.0	1.5	T-6-1/2	WZX2.5x16q
		2.79	20	13.5	0.58	8	10000	C-6			2.4	T-6-1/2	WZX2.5x16q
No ANSI Number -	WTY21/7W	22	20	13.5	1.85	6	1000	C-6	27.9	1.0	1.5	T-6-1/2	WZY2.5x16q
		1.75	20	13.5	0.58	8	10000	C-6			2.4	T-6-1/2	WZY2.5x16q
4257	-	40.0		12.8	2.23		800	C-6	27.9	1.0	1.5	T-6-1/2	WUU2.5x16q
		3.0		14.0	0.59		10000	C-6			2.4	T-6-1/2	WUU2.5x16q
4257NAN	-	30.0		12.8	2.23		800	C-6	27.9	1.0	1.5	T-6-1/2	WUZ2.5x16q
		2.2		14.0	0.59		10000	C-6			2.4	T-6-1/2	WUZ2.5x16q

Table 2A - Typical signal and marking filament light sources for motor vehicles (continued)

ANSI No.	UN/IEC Designation	Mean Spherical Candela	MScd Tol. ± %	Design Voltage	Design Amps	Amp Tol. ± %	Rated Average Lab Life Hours[1]	Filament Shape or Type[2]	LCL mm	LCL Tol. ± mm	Axial Align. ± mm	Light Source Type[3]	Base Type[4]
No ANSI Number	H6W[10]	10	12	13.5	0.52	5	650	C-6	15.0	0.75	0.75		BAX9s
No ANSI Number	H21W[10]	48	12	13.5	1.85	5	300	C-6	20.0	0.5	0.75		BAY9s
No ANSI Number	HY21W[10]	8	17	13.5	1.85	5	300 Flashing	C-6	20.0	0.5	0.75		BAW9s
No ANSI Number	P21W	36.6	15	13.5	1.85	6	250	C-6	31.8	Note (8)	Note (8)	S-8	BA15s
No ANSI Number	P21/5W	35	15	13.5	1.85	6	220	C-6	31.8	Note (8)	Note (8)	S-8	BAY15d
		2.7	20	13	0.44	10	14	C-6	31.8	Note (8)	Note (8)	S-8	BAY15d
No ANSI Number	PR21W[10]	8.75	20	13.5	1.85	6	500	C-6	31.8	Note (8)	Note (8)	S-8	BAW15s
No ANSI Number	PR21/5W[10]	8.36 0.64	20 25	13.5 13.5	1.85 0.44	6 10	800 1800	C-6 C-6	31.8	Note (8)	Note (8)	S-8	BAW15d
No ANSI Number	PY21W	22.3	20	13.5	1.85	6	450	C-6	31.8	Note (8)	Note (8)	S-8	BAU15s

(1) ANSI rating.
(2) Filament types - see 3.9 and Figure 4.
(3) Light source types - see Figure 3.
(4) Base types - see Figures 6, 7A, 7B, 7C, 8, 9, and 10.
(5) See Figure 5 for filament spacing and light center length.
(6) Plane of pins with respect to filament is 90 degrees ± 15 degrees.
(7) Light-source listed for historical purpose. Typically used only for parts and service.
(8) Refer box system shown in Figure 5.
(9) See Figure 3.
(10) See 5.3.3.
(11) Alternate non-ANSI, non-UN designation HPC16W.
(12) Alternate non-ANSI, non-UN designation HPC16WY.
(13) Alternate non-ANSI, non-UN designation HPC19W.
(14) Alternate non-ANSI, non-UN designation HPC24W.
(15) Alternate non-ANSI, non-UN designation HPC24WY.

Table 2B - Typical signal and marking LED light sources for motor vehicles

Desig-nation	Luminous Flux Lm	Flux Tol. ± %	Design Voltage	Operating Voltage Range[3]	Wattage (Max)	Rated Average Lab Life Hours[1]	Color (SAE J578)	Symmetry	LCL mm	LCL Tol. ± mm	Base Type[2]	Connector Type	Status Function	Typical Application
LR1	47	20	13.5	10 - 16	3.5	5000	Red	rotational	24.0	0.2	PGJ21t-1	USCAR 064-S004-1-A02	Yes	Stop/Turn
	3.5	20	13.5	10 - 16	0.75	10000	Red	rotational	24.0	0.2			No	Tail
LW2	725	15	13.5	10 - 16	12	5000	White	axial	26.4	0.2	PGJY50	FCI 4-way 1.5x0.8 SICFHPE04BK	Optional	DRL
	50	15	13.5	10 - 16	1	5000	White	axial	26.4	0.2			No	Parking
LR3A LR3B	80	20	13.5	9 - 14	3.5	1000[4]	Red	axial	3.0	0.3	PGJ18.5d-1	IEC 60061	Yes	Stop/Tail
LW3A LW3B	250	20	13.5	9 - 14	5	2200[4]	White	axial	3.0	0.3	PGJ18.5d-24	IEC 60061	Yes	Backup / Position
LY3A LY3B	150	20	13.5	9 - 14	5	500[4][5]	Yellow	axial	3.0	0.3	PGJ18.5d-15	IEC 60061	Yes	Rear Turn
LR4A LR4B	80	20	13.5	9 - 14	3.5	1000[4]	Red	axial	3.0	0.3	PGJ18.5t-5	IEC 60061	Yes	Stop
	6	20	13.5	9 - 14	1	2200[4]	Red	axial	3.0	0.3		IEC 60061	Yes	Tail
LR5A LR5B	120	15	13.5	9 - 14	3.5	1000[4]	Red	axial	3.0	0.3	PGJ18.5d-10	IEC 60061	Yes	Stop / Tail / Rear Fog
LW5A LW5B	350	20	13.5	9 - 14	8	4000[4]	White	axial	3.0	0.3	PGJ18.5d-28	IEC 60061	Yes	DRL / PO / Backup
LY5A LY5B	280	20	13.5	9 - 14	8	500[4] [5]	Yellow	axial	3.0	0.3	PGJ18.5d-19	IEC 60061	Yes	Front Turn
LR6A LR6B	180	15	13.5	9 - 14	8	1000[4]	Red	axial	3.0	0.3	PGJ18.5d-33	IEC 60061	Yes	Stop / Tail / Rear Fog
L1A/6 L1B/6	350	20	13.2	9 - 14	8	2000[4]	White	axial	3.0	0.3	PGJ18.5d-29	IEC 60061	Yes	Front Fog / DRL / Backup

(1) Laboratory life is defined as steady operation of 23.5 hours "on" followed by 0.5 hour "off" at 23 °C ± 2.5 °C.
(2) Per IEC Publication 60061.
(3) Range which shows usual photometric results.
(4) L70 B10 - Life Time Values, refer to IEC Publication 60810.
(5) Flashing mode on-off 1:1.

3.8 FILAMENT

A tungsten wire wound into a coiled body which is heated to incandescence when voltage is applied. Continuous and legged filaments are the two most common styles used in automotive applications. Figure 1 shows a typical example of a continuous filament and Figure 2 shows a typical example of a legged filament.

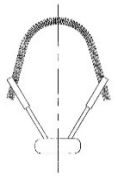

Figure 1 - Continuous filament
(WAA views, C-2R filament shape)

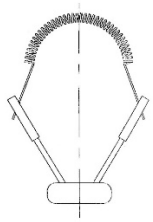

Figure 2 - Legged filament
(WAA view, C-2R filament shape)

In dual function bulbs, filaments are typically designated as follows:

a. Major filament: The filament that has the higher light output.

b. Minor filament: The filament that has the lower light output.

Table 3 - Basic filament light source dimensions (see Figure 3)

Light Source Type	Base Type	Maximum Light Source Diameter mm	Maximum Light Source Diameter Inches	Maximum Exposed Length (L) mm	Maximum Exposed Length (L) Inches	Typical Application	ANSI Numbers
B - 6	BA15s	19.7	0.775	37.3	1.469	Deck Lid, Engine Compartment	1003, 1004
G - 4-1/2	BA9s	15.0	0.590	21.4	0.843	Instrument Cluster, License	57, 1895
G - 5-1/2	P(G)(U)20(d)-n	(1)	(1)	(1)	(1)	Exterior Signal Lighting	7010-7011
G - 6	BA15s	19.0	0.748	30.2	1.189	Deck Lid, Engine Compartment	67, 89, 97
GT - 8	W2.5x16	26.5	1.043	44.0	1.732	Exterior Signal Lighting	3057, 3156, 3157
P - 6	P(G)(U)20(d)-n	(1)	(1)	(1)	(1)	Exterior Signal Lighting	5200, 5201, 5202, 7012-7014
S - 8	BA15s	26.5	1.043	45.0	1.772	Exterior Signal Lighting	1073, 1141, 1156
S - 8	BAY15d	26.5	1.043	45.0	1.772	Exterior Signal Lighting	1157, 2057, 2357
S - 8	W2.5x16	26.5	1.043	44.0	1.732	Exterior Signal Lighting	3057, 3156, 3157
T - 1-3/4	W2.1x4.9d	5.8	0.230	15.2	0.598	Indicator, Radio	37, 73, 74
T - 3	RIGID LOOP	10.16	0.400	43.7	1.720	Interior application	561, 562, 563, 564, 567
T - 3-1/4	BA9s	11.0	0.433	23.9	0.941	Instrument Cluster, License	1889, 1893
T - 3-1/4	W2.1x9.2d	10.3	0.405	20.7	0.815	Instrument Cluster, License	161, 168, 194
T - 5	W2.1x9.2d	15.7	0.620	32.0	1.500	Interior application, CHMSL	906, 912, 921
T - 6-1/2	W3x16d		0.807		1.693	Turn signal, Stop	7440
T - 6-1/2	W3x16q		0.807		1.535	Exterior Signal Lighting	7443, 7444NA
T - 6-1/2	WX3x16d		0.807		1.693	Turn Signal	

(1) Refer to UN Regulation 37 and UN R.E.5, consolidated resolution on the common specification of light source categories.

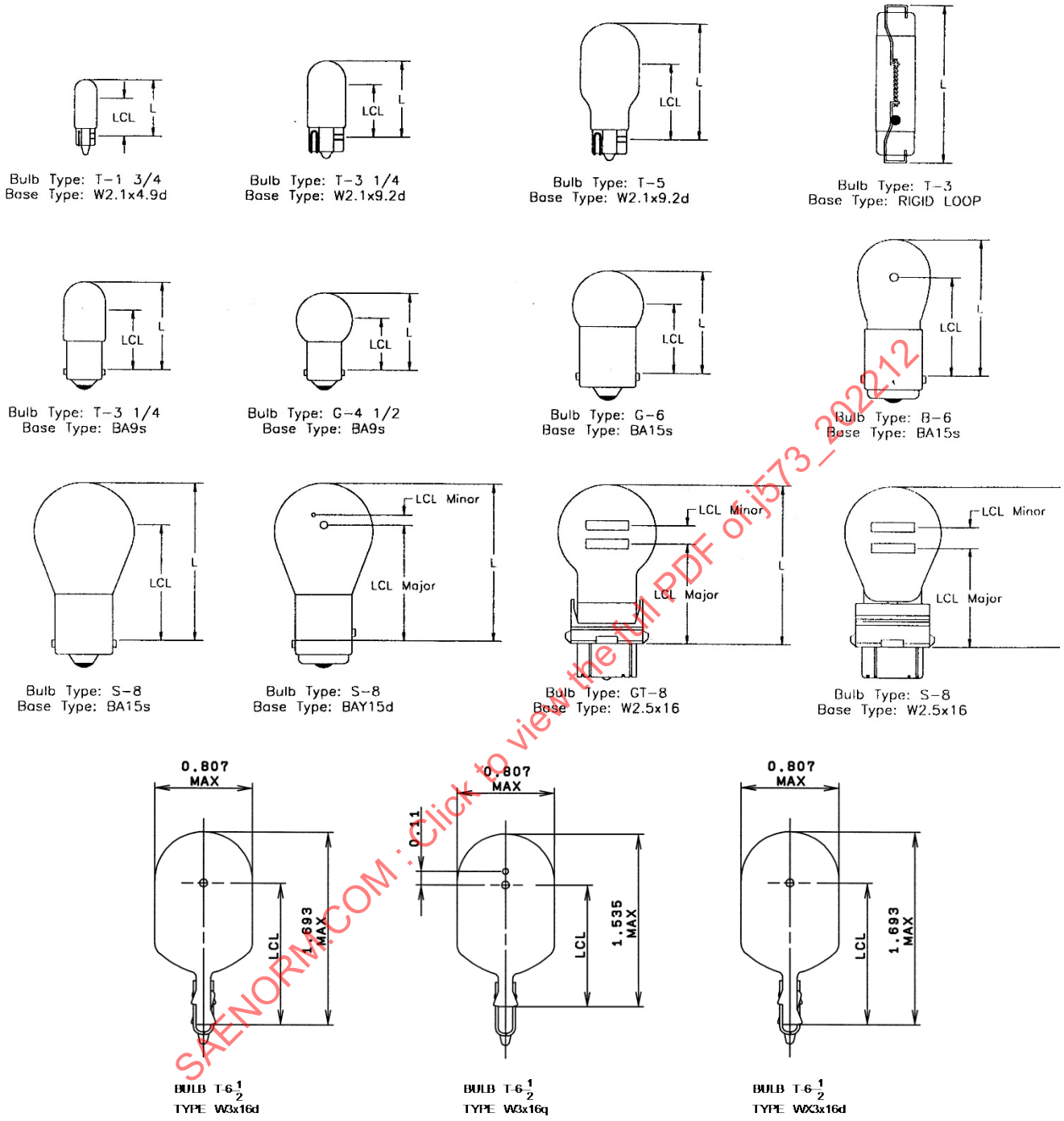

Figure 3 - Typical signal and marking filament light sources

3.9 FILAMENT SHAPE

See Figure 4.

where:

C-6 = straight transverse mounted (horizontal)

C-8 = straight axial mounted (vertical)

C-2R = non support (arched)

C-2V = single support (v-eed)

C-2F = dual support

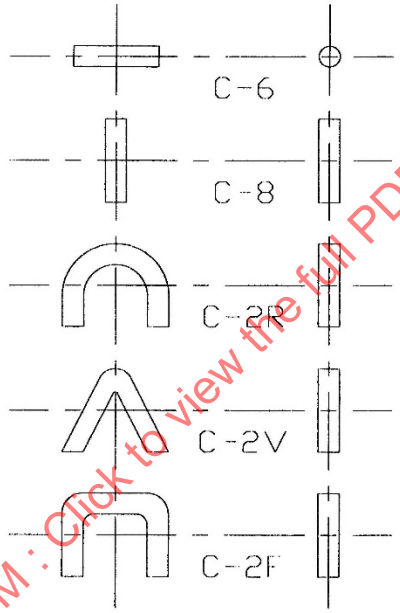

Figure 4 - Filament shapes and determination of filament center

3.10 FILAMENT CENTER

The LCL is to be located at approximately center-of-light mass and examples of possible LCL determinations are as shown in Figure 5.

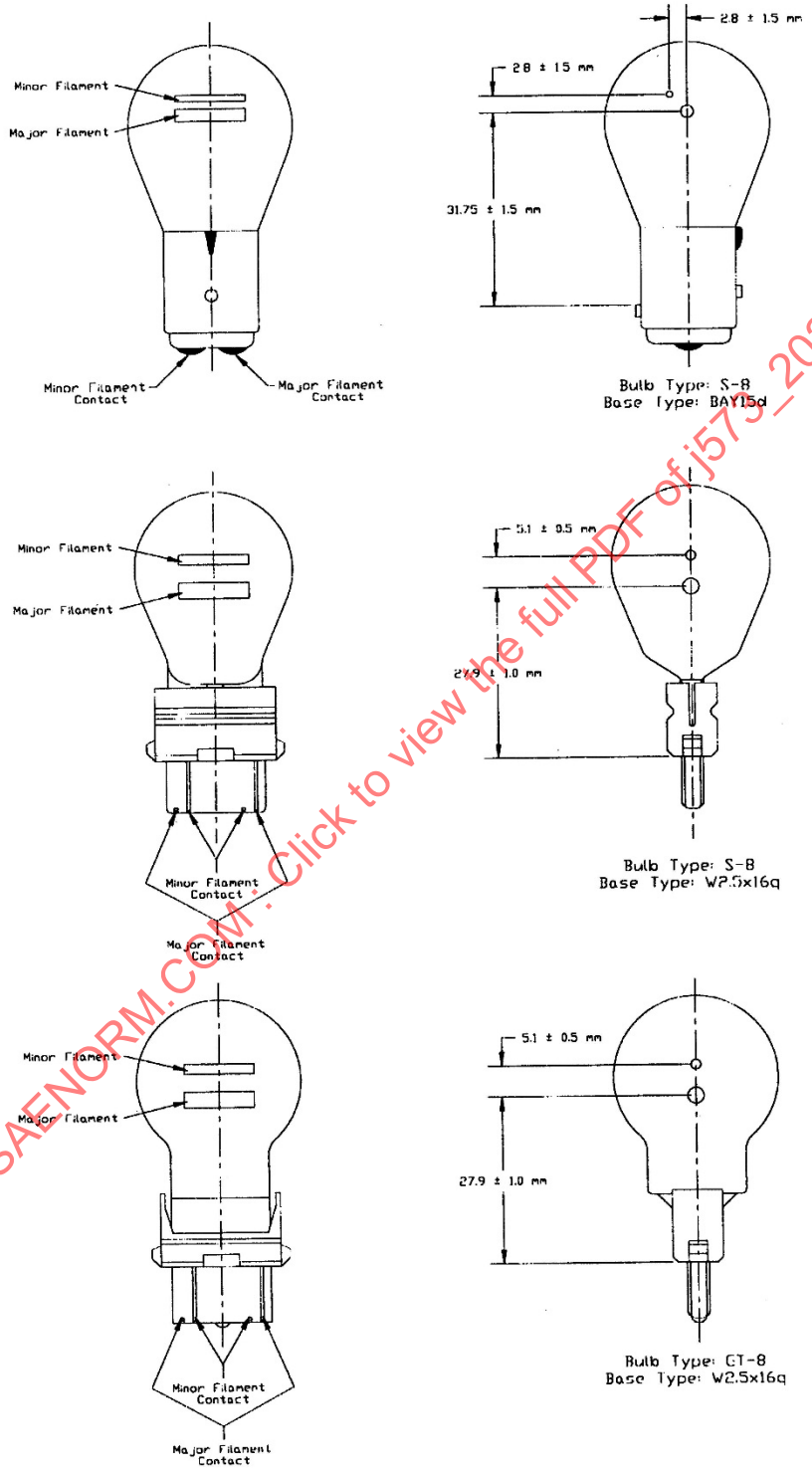

Figure 5 - Filament location for dual function filament light sources

a. Continuous coil:

   1. For LCL: Half the distance between the clamped filament and the most upward bound part of the filament.

   2. For WAA: Half the distance between the lead wire clamps.

   3. For NAA: Half the distance between the lead wire clamps and the most outward bound part of the filament.

b. Legged coil:

   1. For LCL: Half the distance between the first turn of the coil and the most upward bound part of the filament.

   2. For WAA: Half the distance between the first turn on each end of the coil.

   3. For NAA: Half the distance between the lead wire clamps and the most outward bound part of the filament.

3.11 LIGHT CENTER

A point that represents the apparent (virtual) origin of the light emitted.

3.12 LIGHT CENTER LENGTH (LCL)

The distance between the reference plane and the light center.

3.13 LED LIGHT EMITTING AREA (LEA)

An area that contains the source of radiation when observed under a certain viewing axis. This area is defined in a plane that contains the light center and that is perpendicular to the corresponding viewing axis.

3.14 LED APPARENT LIGHT EMITTING AREA

An area that contains the apparent source of radiation when observed under a certain viewing axis. This area is defined in a plane that contains the light center and that is perpendicular to the corresponding viewing axis.

3.15 NORMALIZED LUMINOUS INTENSITY

Luminous intensity divided by the luminous flux of the light source in order to characterize the angular radiation pattern of a light source.

3.16 VIEWING AXIS (OF A LIGHT SOURCE)

An axis through the light center at defined polar and azimuthal angle used to characterize photometrical properties of the LED light source.

3.17 REFERENCE AXIS

An axis defined with reference to the base and to which certain dimensions of the light sources are referred.

3.18 REFERENCE PLANE

A plane defined with reference to the base perpendicular to the reference axis and to which certain dimensions of the light sources are referred.

4. TESTS

4.1 Samples

Samples shall be selected in accordance with 3.1 and then seasoned according to 3.4. Any associated electronics shall be also used in order to meet the requirements of samples as defined by 3.1.

4.2 Mean Spherical Candela/Luminous Flux

The mean spherical candela or luminous flux shall be measured per LM-45 (incandescent) and LM-79 (LED) and tabulated per characteristics as outlined in Tables 2A and 2B.

4.3 Optical Characteristics

In addition to the tables and methods indicated in this document, the procedures for determining filament or light emitting area location given in IEC 60809, UN Regulations 37 and 128, and UN R.E.5 are acceptable.

4.3.1 Optical Characteristics of Filament light sources

4.3.1.1 Luminous Flux

A seasoned filament light source shall be measured per 4.2. The ambient temperature shall be 23 °C ± 2 °C, unless otherwise specified in the light source specification.

4.3.2 Optical Characteristics of LED Light Sources

For all optical measurements thermal management of the light source system is essential. Performance will depend on temperature. These considerations may include active (i.e., fan) or passive (i.e., heat sink) components. Also, a minimum free air space for convection may be required. To verify the performance of the thermal management, the following procedure shall be applied: a luminous flux measurement shall be made after 1 minute and after 30 minutes of operation.

4.3.2.1 Luminous Flux

A seasoned LED light source shall be measured per 4.2. The ambient temperature shall be 23 °C ± 2 °C, unless otherwise specified in the light source specification.

4.3.2.2 LED Light Emitting Area

4.3.2.2.1 LR1 Light Source

Figure 12 defines the light emitting area of the LR1 light source to determine whether the light emitting area is correctly positioned relative to the reference axis and reference plane in order to check compliance with the requirements.

The position of the light emitting area is checked in two planes containing the reference axis for C = 0 degree and C = 90 degrees (C is defined in Figure 13). The light source is viewed perpendicular to the reference axis.

4.3.2.2.2 LED Light Sources (Except LR1)

The method for determining the light emitting area is included in the specification referenced in Table 9.

4.3.2.3 Normalized Luminous Intensity Distribution

4.3.2.3.1 LR1 Light Source

The set up for measuring the luminous intensity distribution is shown in Figure 13 and refers to the C-γ system according to CIE publication No. 70 -1987.

The measurements shall be performed in three C-planes containing the reference axis and at several γ-angles with reference to the light center.

4.3.2.3.2 LED Light Sources (Except LR1)

The set-up and measurement procedure for the normalized luminous intensity distribution are included in the specification referenced in Table 9.

4.4 Ultraviolet (UV) Radiation of LED Light Sources

4.4.1 The UV radiation of the LED light source shall be measured in accordance with IEC/TR 62471-2. The measured value shall be evaluated according to:

$$k_{UV} = \frac{\int_{\lambda = 250\ nm}^{400\ nm} E_e(\lambda)\ S(\lambda)\ d\lambda}{k_m \int_{\lambda = 380\ nm}^{780\ nm} E_e(\lambda)\ V(\lambda)\ d\lambda} \quad \text{(Eq. 1)}$$

where:

$E_e(\lambda)$ [W/nm] = the spectral distribution of radiant flux

$V(\lambda)$ = the spectral luminous efficiency

λ [nm] = the wave length

$S(\lambda)$ = the spectral weighting function

k_m = 683 [lm/W] = the maximum value of the luminous efficacy of radiation

This value shall be calculated using intervals of 1 nm. The UV-radiation shall be weighted according to the values as indicated in the table below:

λ	S(λ)	λ	S(λ)	λ	S(λ)
250	0.430	305	0.060	355	0.00016
255	0.520	310	0.015	360	0.00013
260	0.650	315	0.003	365	0.00011
265	0.810	320	0.001	370	0.00009
270	1.000	325	0.00050	375	0.000077
275	0.960	330	0.00041	380	0.000064
280	0.880	335	0.00034	385	0.000530
285	0.770	340	0.00028	390	0.000044
290	0.640	345	0.00024	395	0.000036
295	0.540	350	0.00020	400	0.000030
300	0.300				

NOTE: Values according to IRPA/INIRC guidelines on limits of exposure to ultraviolet radiation. Wavelengths (in nanometers) chosen are representative; other values should be interpolated.

4.5 Spectral Content

The red color content of a LED light source emitting white light shall meet the relative minimum to enable sufficient rendering of traffic signs and is calculated according to:

$$k_{red} = \frac{\int_{\lambda=610\ nm}^{780\ nm} E_e(\lambda)V(\lambda)d\lambda}{\int_{\lambda=380\ nm}^{780\ nm} E_e(\lambda)V(\lambda)d\lambda} \quad \text{(Eq. 2)}$$

where:

E_e (λ) [W/nm] = the spectral distribution of the radiant flux

V (λ) = the spectral luminous efficiency

λ [nm] = the wavelength

This value is calculated using intervals of 1 nm.

4.6 Electronics (Associated Electronics)

If a light source contains or has associated electronics that control or drive the light source it shall be tested per SAE J2357.

5. REQUIREMENTS

5.1 Test Samples Shall Comply with the Following Requirements

5.2 Mean Spherical Candela/Luminous Flux

After seasoning, test samples shall be measured at design voltage in a properly calibrated integrating sphere (refer to SAE J1330) or in accordance with other accepted integrating photometric procedures. See Table 2A and Table 2B for luminous flux values. For light sources not listed, refer to the manufacturer's published data.

5.3 Physical Dimensions of Filament Light Sources

5.3.1 Table 3 lists the basic filament light source dimensions for maximum light source diameter, maximum exposed length, typical application, and ANSI numbers.

5.3.2 Table 2A lists the design value and tolerances for the electrical, photometrical, and physical location of the filament(s).

5.3.3 For UN type light sources indicated by footnote 10 in Table 2A, Regulation 37, and UN R.E.5 and IEC 60061 base data sheets define the dimensions necessary for interchangeability. For other light sources Tables 4, 5, 6, 7, and 8 list the dimensions necessary to insure interchangeability.

5.3.3.1 Figure 3 shows typical signal and marking filament light sources.

5.3.3.2 Figure 4 shows the determination of filament center for different filament configurations.

5.3.3.3 Figure 5 indicates filament location for dual function filament light sources.

5.3.4 Table 4 lists the base dimensions considered important for miniature bayonet base (base type BA9s) light sources to ensure that filament light sources will perform satisfactorily in a light source-retaining device (socket) made in accordance with SAE J567 and ANSI C81.62 standard sheet 2-10-x and its related documents.

Table 4 - BA9s base dimensions to be controlled on a finished filament light source (see Figure 6)

Dimension	(millimeters) Min	(millimeters) Max
D1	4.57	6.48
N	4.50	—
U	—	10.41

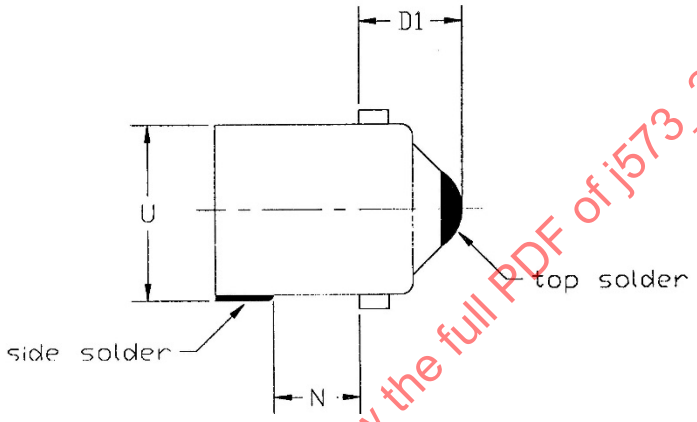

Figure 6 - BA9S base dimensions to be controlled on a finished filament light source

5.3.5 Table 5 lists the base dimensions considered important for candelabra bayonet bases (base type BA15s, BA15d, BAY15d) light sources to ensure that light source will perform satisfactorily in a light source -retaining device (socket) made in accordance with SAE J567 and ANSI C81.62 standard sheet 2-20-x, 2-22-x, and its related documents.

Table 5 - BA15s, BA15d, BAY15d base dimensions to be controlled on a finished filament light source (see Figures 7A, 7B, and 7C)

Dimension	(millimeters) Min	(millimeters) Max
D1	6.32	8.03(1)
N	8.90	—
U	—	16.26

(1) This dimension is used by North American Light Source Manufacturers and is different than the European Light Source Manufacturers.

For full base detail see ANSI standard C81.61 sheet 1-20-x and 1-22-x

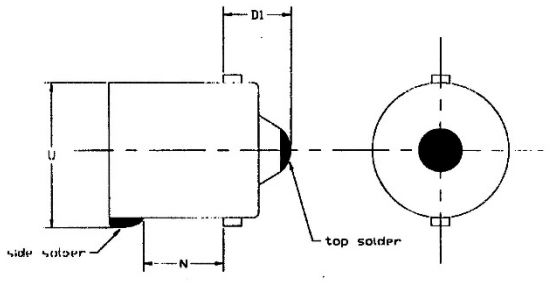

Figure 7A - BA15s base dimensions to be controlled on a finished filament light source

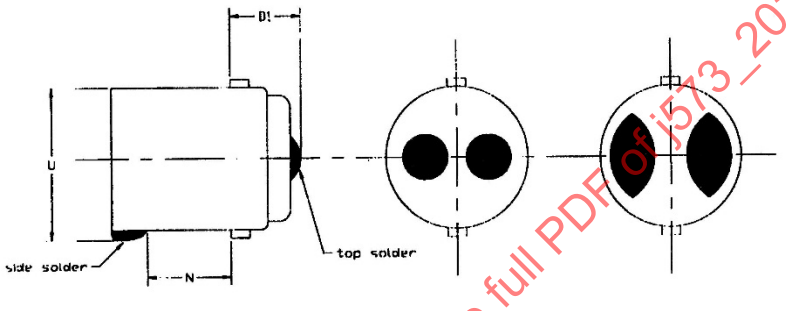

Figure 7B - BA15d base dimensions to be controlled on a finished filament light source

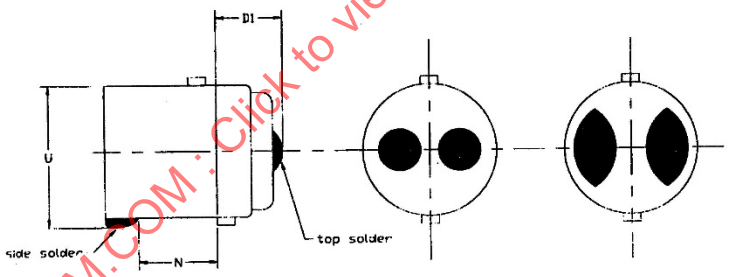

Figure 7C - BAY15d base dimensions to be controlled on a finished filament light source

5.3.6 Table 6 lists the base dimensions considered important for subminiature wedge base (base type W2.1x4.9d) light sources to ensure that light sources will perform satisfactorily in a light source retaining device (socket) made in accordance with SAE J567 and ANSI C81.62 standard sheet 2-900-x and its related documents.

Table 6 - Wedge base dimensions (see Figure 8)
base type W2.1x4.9d

Dimension	(millimeters) Min	(millimeters) Max
A (Note 1)	2.03	3.04
B	3.04	5.08
C	—	5.08
E	4.70	5.08
G (Note 2)	—	3.10
H	3.30 NOM	3.30 NOM
L (Note 3)	—	5.84
M	1.52 NOM	1.52 NOM
N	1.65	—
P (Note 4)	1.78	2.28
Q	0.51 NOM	0.51 NOM
α	10 degrees	18 degrees

For full base detail see ANSI standard C81.61 sheet 1-900-x

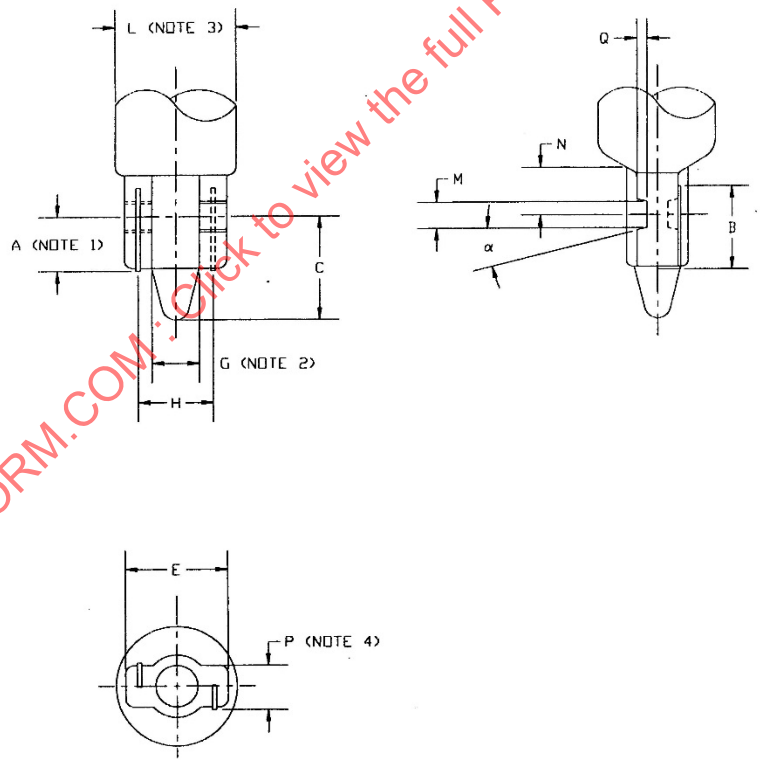

Figure 8 - Base type W2.1x4.9d

NOTE 1: Dimension A to be measured on the longest side only, with the wire in intimate contact with the bottom of the glass.

NOTE 2: Dimension G applies to the cylindrical section, and for exhaust tip clearance.

NOTE 3: Dimension L applies to lamps designed to fit P8.25d bases. Refer to ANSI C81.61 Standard Sheet 1-530-x.

NOTE 4: Dimension P to be measured over the lead wire.

5.3.7 Table 7 lists the base dimensions considered important for wedge base (base type W2.1x9.2d) light sources to ensure that the light sources will perform satisfactorily in a light source-retaining device (socket) made in accordance with SAE J567 and ANSI C81.62 standard sheet 2-920-x and its related documents.

Table 7 - Wedge base dimensions (see Figure 9)
base type W2.1x9.2d

Dimension	(millimeters) Min	(millimeters) Max
A (Note 1)	3.43	4.45
B (Note 2)	4.83	—
C	—	6.35
D	1.5 NOM	1.5 NOM
E	8.89	9.50
F (Note 3)	—	3.04
G (Note 4)	—	4.06
H (Note 5)	5.58 NOM	5.58 NOM
J	0.76 NOM	0.76 NOM
J1	1.20 NOM	1.20 NOM
L	—	10.30
M	1.25 NOM	1.25 NOM
N	1.65	
P	1.91	2.41
Q	0.53	0.67
R	0.76 NOM	0.76 NOM
T (Note 8)	4.90	7.50
α	10 degrees	18 degrees

For full base detail see ANSI standard C81.61 sheet 1-920-x

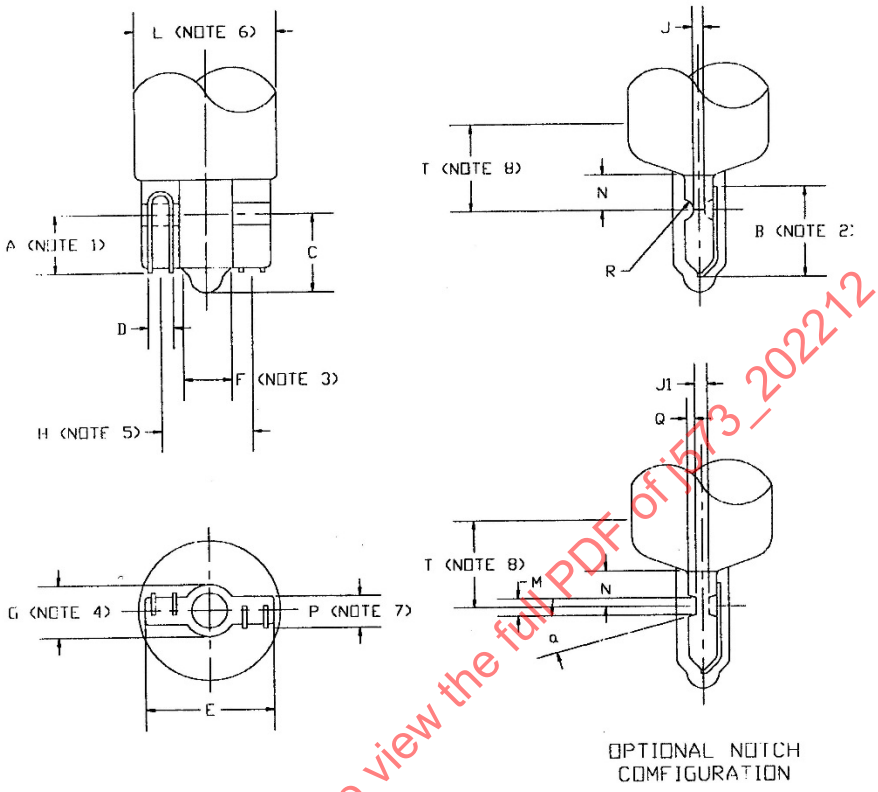

Figure 9 - Base type W2.1x9.2d

NOTE 1: Dimension A to be measured on the longest side only, with the wire in intimate contact with the bottom of the glass.

NOTE 2: Inside of the lead loop to extend past the detent and remain on the flat portion of the base.

NOTE 3: Dimension F is for exhaust tip clearance.

NOTE 4: Dimension G applies to the cylindrical section.

NOTE 5: Dimension H to be maintained over the entire length as specified by Dimension B.

NOTE 6: Dimension L applies to lamps designed to fit P12.4d bases, and is applicable for 7.1 mm minimum from notch centerline. Refer to ANSI C81.61-19xx Standard Sheet 1-550-x.

NOTE 7: Dimension P to be measured over the lead wire.

NOTE 8: Dimension T applies from the notch centerline to the full diameter of the light source.

5.3.8 Table 8 lists the base dimensions considered important for wedge base (base type W2.5x16d and W2.5x16q) light sources to ensure that light sources will perform satisfactorily in a light source-retaining device (socket) made in accordance with SAE J567 and ANSI C81.62 standard sheet 7005-104-x and its related documents.

Table 8 - Wedge base dimensions (see Figure 10)
base type W2.5x16d and W2.5x16q

Dimension	(millimeters) Min	(millimeters) Max
A	19.4	19.6
B	8.0	8.2
C (3) (4)	11.9	12.1
D	5.9	6.3
F	8.4	9.4
F1 (1)	—	10.5
G	2.49	2.79
G1	3.45	4.30
H	4.3	4.6
H1	6.3	6.6
J	15.75	16.25
K (4) (7)	1.0 NOM	1.0 NOM
L	1.8	2.2
M (5)	3.65	3.85
N (5)	5.7	—
P (W2.5x16d)	5.4	5.6
P (W2.5x16q)	2.9	3.1
R (6)	2.75	2.95
T (6)	22.1	22.3
U	9.65	9.85
V	5.6	6.0
W	11.0	11.2
α	44 degrees	46 degrees
β	24 degrees	26 degrees
γ (6)	44 degrees	46 degrees
θ (5)	44 degrees	46 degrees
μ (4)	40 degrees	—