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SURFACE VEHICLE STANDARD

SAE J573

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An American National Standard

(R) Miniature Lamp Bulbs

1. ***Scope—***Most lighting devices on motor vehicles today are required by law and are essential to operation on public roadways. Additionally, most lighting devices have replaceable light sources (bulbs). To assure field replacement, it is important that bulb types employed be readily available in normal service channels. This document attempts to define the physical, electrical, and photometric characteristics necessary to achieve a proper replacement for popular types of bulbs.

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.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of the specification to the extent specified herein.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J567—Lamp Bulb Retention System
SAE J1330—Photometry Laboratory Accuracy Guidelines

2.1.2 ANSI PUBLICATIONS—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002..

C81.61—Electric Lamp Bases
C81.62—Lamp Holders for Electric Lamps
C81.63—Gauges for Electrical Lamp Bases and Lamp Holders
C78-7 / SR25C—Assembled Miniature Lamp Code

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5		Filament Location on Dual Function Bulbs
6	4	BA9s Base Dimensions to be Controlled on a Finished Bulb (Old base designation: A1)
7a, 7b, 7c	5	BA15s, BA15d, and BAY15d Base Dimensions to be Controlled on a Finished Bulb (Old base designation: B1, B2, and C2)
8	6	Base Type W2.1x4.9d (Old base designation: W-1 Wedge)
9	7	Base Type W2.1x9.2d (Old base designation: W-2 Wedge)
10	8	Base Type W2.5x16d Wedge and W2.5x16q Wedge (Old base designation: SC Wedge and DC Wedge)

3. Definitions

3.1 Test Samples—Test samples shall be new unused lamp bulbs fabricated from a normal production process.

3.2 Seasoned Bulb (Lamp)—A bulb which is lighted (lit), at design voltage, for 1% of its rated life or 10 hours, whichever is shorter. See Table 2 for design voltage and life rating (for bulbs not listed see manufacturer's data).

3.3 Standard Bulb (Lamp)—A bulb which meets reduced (tighter) tolerances for both filament position and photometry. Bulbs are seasoned to attain photometric stability.

3.4 Accurate Rated Miniature Bulb (Lamp)—A properly seasoned bulb 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. Accurate rated bulbs are necessary to certify that lighting devices (lamps) meet legal illumination requirements. This normally applies to bulbs used for tail, stop, park, turn, or combination functions in addition to forward lighting devices.

3.5 Abbreviations

L—Maximum Exposed Length (as indicated in Table 3 and Figure 3)
LCL—Light Center Length
WAA— Wide Axial Alignment
NAA—Narrow Axial Alignment

TABLE 2—TYPICAL LAMP BULBS FOR MOTOR VEHICLES

ANSI No.	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	Bulb Type(3)	Base Type(4)	Old Base Designation
37	0.5	30	14.0	0.09	15	1500	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d	W1 SUB-MIN. WED
73	0.3	30	14.0	0.08	15	15000	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d	W1 SUB-MIN. WED
74	0.7	30	14.0	0.10	15	500	C-2F	10.2	1.0	1.0	T-1 ¾	W2.1x4.9d	W1 SUB-MIN. WED
57	2	20	14.0	0.24	10	500	C-2V	14.2	2.3	2.3	G-4 ½	BA9s	MIN BAY
1895	2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.3	G-4 ½	BA9s	MIN BAY
67	4	15	13.5	0.59	8	5000	C-2R	20.6	2.3	2.3	G-6	BA15s	SC BAY
89	6	15	13.0	0.58	8	750	C-2R	19.0	2.3	2.3	G-6	BA15s	SC BAY
97	4	15	13.5	0.69	8	5000	C-2V	20.6	2.3	2.3	G-6	BA15s	SC BAY
161	1	20	14.0	0.19	10	1500	C-2F	14.2	2.3	2.0	T-3 ¼	W2.1x9.2d	W2 WEDGE
168	3	20	14.0	0.35	10	1500	C-2F	14.2	2.3	2.0	T-3 ¼	W2.1x9.2d	W2 WEDGE
194	2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.0	T-3 ¼	PC	PC
PC175	5	20	14.0	0.58	10	1000	C-2F	14.2	2.3	2.0	T-3 ¼	PC	PC
PC194	2	20	14.0	0.27	10	1500	C-2F	14.2	2.3	2.0	T-3 ¼	W2.1x9.2d	W2 WEDGE
906	6	15	13.0	0.69	10	1000	C-2F	20.6	2.3	2.3	T-5	W2.1x9.2d	W2 WEDGE
912	12	15	12.8	1.00	10	1000	C-2R	20.6	2.3	2.3	T-5	W2.1x9.2d	W2 WEDGE
921	21	20	12.8	1.40	10	1000	C-2R	20.6	2.3	2.3	T-5	W2.1x9.2d	W2 WEDGE
1156	32	10	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BA15s	SC BAY(5)
1157	32	10	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BAY15d	DC BAY(5)
	3	12	14.0	0.59	8	5000	C-6	(6)					INDEX(5)
1157NA	24	30	12.8	2.10	5	600	C-6	31.75	1.5	1.5	S-8	BAY15d	DC BAY
	2.2	30	14.0	0.59	8	5000	C-6	(6)					INDEX (5)
2057	32	10	12.8	2.10	5	1200	C-6	31.75	1.5	1.5	S-8	BAY15d	DC BAY
	2	12	14.0	0.48	8	5000	C-6	(6)					INDEX (5)
2057NA	24	30	12.8	2.10	5	1200	C-6	31.75	1.5	1.5	S-8	BAY15d	DC BAY
	1.5	30	14.0	0.48	8	5000	C-6	(6)					INDEX (5)
3057	32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q	DC WEDGE
	2	12	14.0	0.48	8	5000	C-6	(6)					
3057NA	24	30	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q	DC WEDGE
	1.6	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	SC WEDGE
3156	32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16d	SC WEDGE
3157	32	10	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q	DC WEDGE
	3	12	14.0	0.59	8	5000	C-6	(6)					
3157NA	24	30	12.8	2.10	5	1200	C-6	27.9	1.0	1.0	S-8/GT-8	W2.5x16q	DC WEDGE
	2.2	30	14.0	0.59	8	5000	C-6	(6)					

1. ANSI Rating
2. Filament types—See Figure 4
3. Bulb Types—See Figure 3
4. Base Types—See Figures 6, 7A, 7B, 7C, 8, 9, and 10
5. Plane of pins with respect to filament is 90 degrees ± 15 degrees
6. See Figure 5 for filament spacing and light center length

3.6 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.

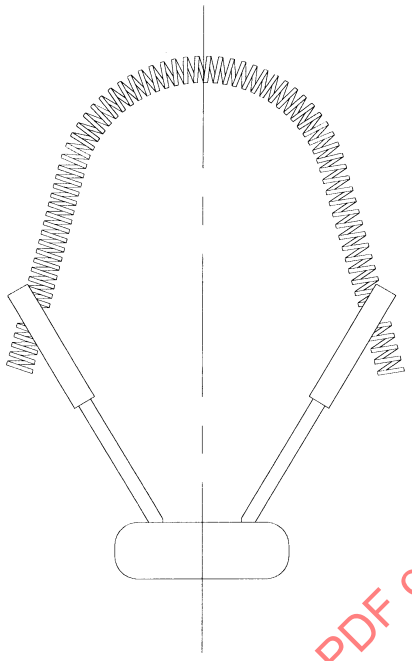

FIGURE 1—CONTINUOUS FILAMENT
(WAA VIEWS, C-2R FILAMENT SHAPE)

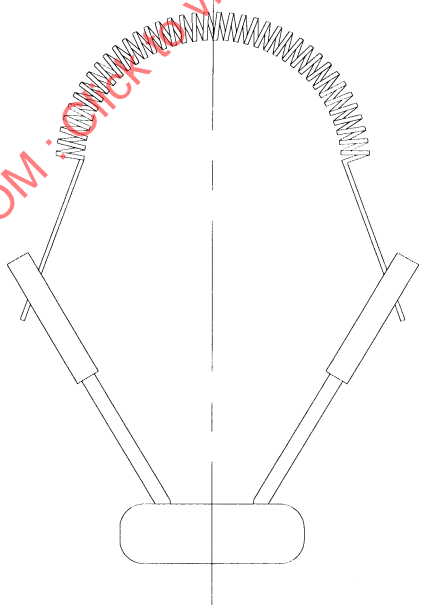

FIGURE 2—LEGGED FILAMENT
(WAA VIEW, C-2R FILAMENT SHAPE)

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

Major Filament—The filament that has the higher light output.
Minor Filament—The filament that has the lower light output.

TABLE 3—BASIC BULB DIMENSIONS (SEE FIGURE 3)

Bulb Type	Base Type	Maximum Bulb Diameter mm	Maximum Bulb Diameter in	Maximum Exposed Length (L) mm	Maximum Exposed Length (L) in	Typical Application	ANSI Numbers
B - 6	BA15s	19.7	0.775	37.3	1.469	Deck Lid, Engine Compartment	1003, 1004
G - 4 ½	BA9s	15.0	0.590	21.4	0.843	Instrument Cluster, License	57, 1895
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
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 ¾	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 ¼	BA9s	11.0	0.433	23.9	0.941	Instrument Cluster, License	1889, 1893
T - 3 ¼	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

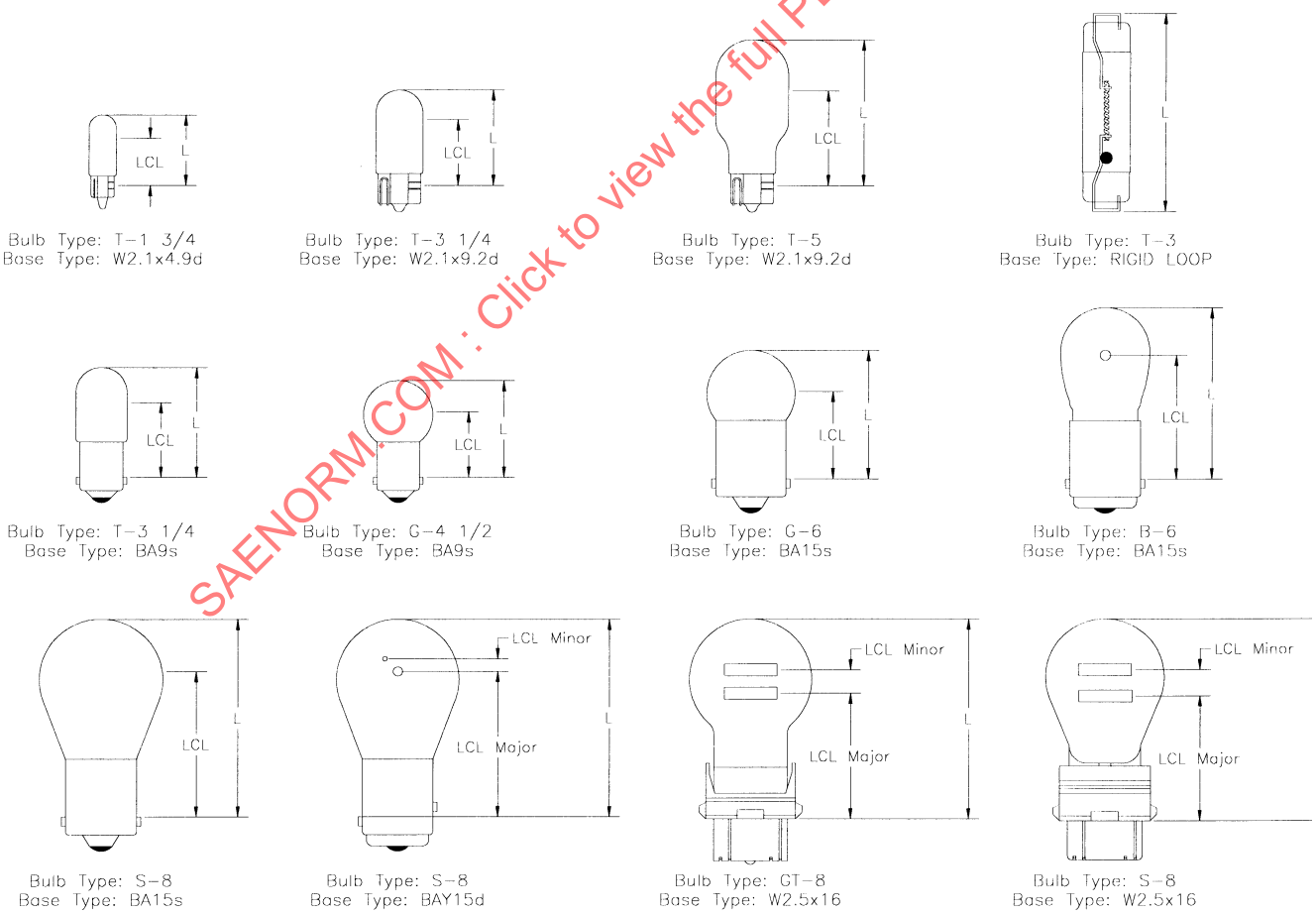

FIGURE 3—TYPICAL LAMP BULBS

3.7 Filament Shape—(See Figure 4.)

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

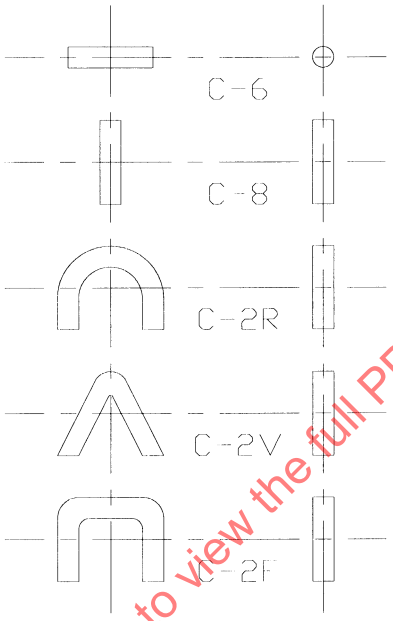

FIGURE 4—FILAMENT SHAPES

3.8 Filament Center—The LCL is to be located at approximately center-of-light mass and examples of possible LCL determinations are as follows in Figure 5:

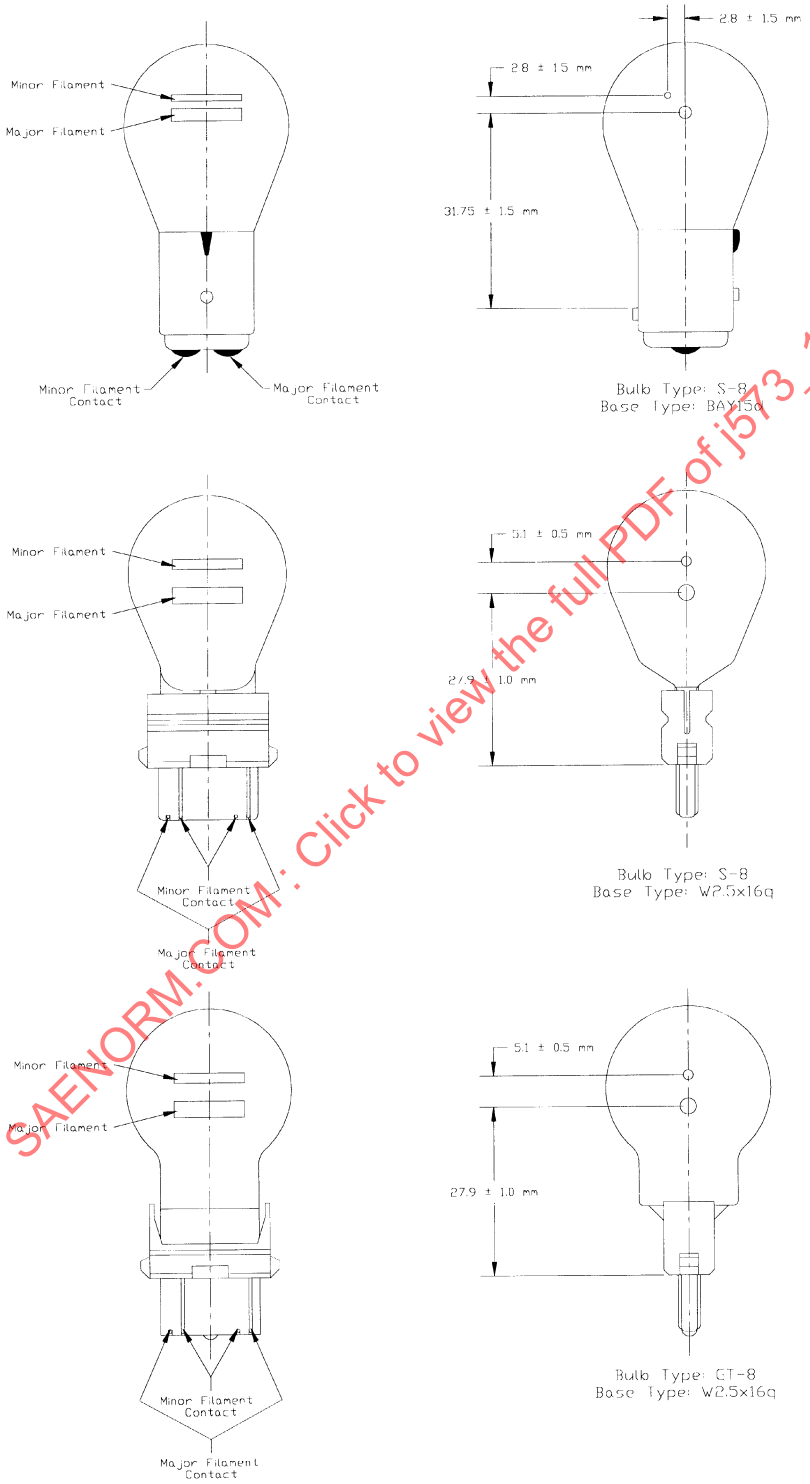

FIGURE 5—FILAMENT LOCATION ON DUAL FUNCTION BULBS

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.

***4. Requirements*—**Test samples shall comply with the following:

4.1 Luminous Flux (MScd)—After seasoning, test samples shall be measured at design voltage in a properly calibrated integrating sphere (Reference SAE J1330) in accordance with accepted photometric procedures. See Table 2 for luminous flux values. For bulbs not listed, refer to the manufacturer's published data.

4.2 Physical Dimensions

4.2.1 Table 3 lists the basic bulb dimensions for maximum bulb diameter, maximum exposed length, typical application, and ANSI Numbers .

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

4.2.3 Tables 4, 5, 6, 7, and 8 list the dimensions necessary to insure interchangeability.

4.2.3.1 Figure 3 shows typical lamp bulbs

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

4.2.3.3 Figure 5 indicates filament location for dual function bulbs.

4.2.4 Table 4 lists the base dimensions considered important for Miniature Bayonet Base (Base Type BA9s) lamps to insure that lamp bulbs will perform satisfactorily in a bulb-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 BULB (SEE FIGURE 6)

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

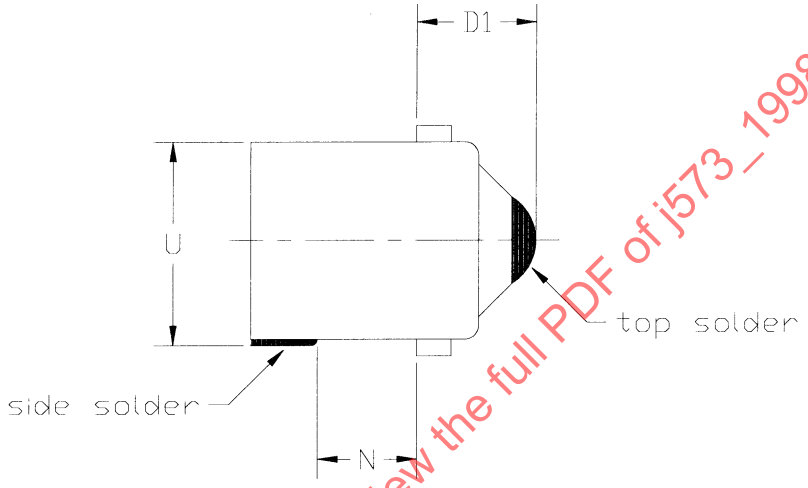

FIGURE 6—BA9s BASE DIMENSIONS TO BE CONTROLLED ON A FINISHED BULB

4.2.5 Table 5 lists the base dimensions considered important for Candelabra Bayonet Bases (Base Type BA15s, BA15d, BAY15d) lamps to insure that lamp bulbs will perform satisfactorily in a bulb-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 BULB
(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 Bulb Manufacturers and is different than the European Bulb Manufacturers.

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

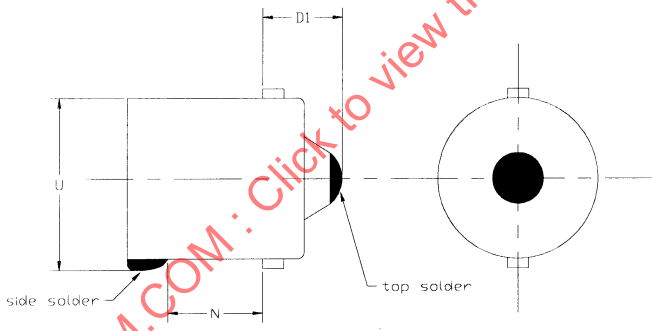

FIGURE 7A—BA15s DIMENSIONS TO BE CONTROLLED ON A FINISHED BULB

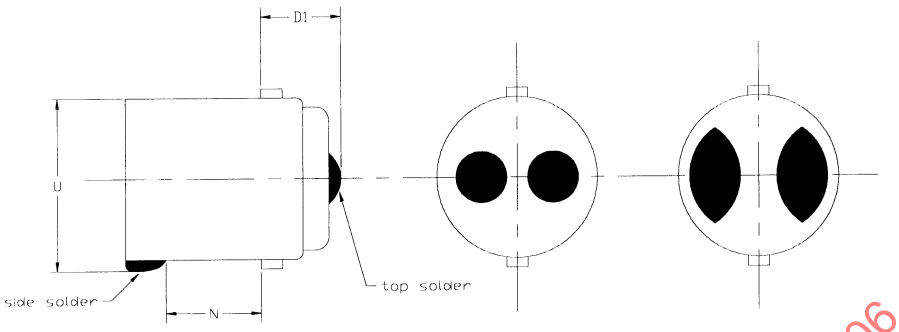

FIGURE 7B—BA15d DIMENSIONS TO BE CONTROLLED ON A FINISHED BULB

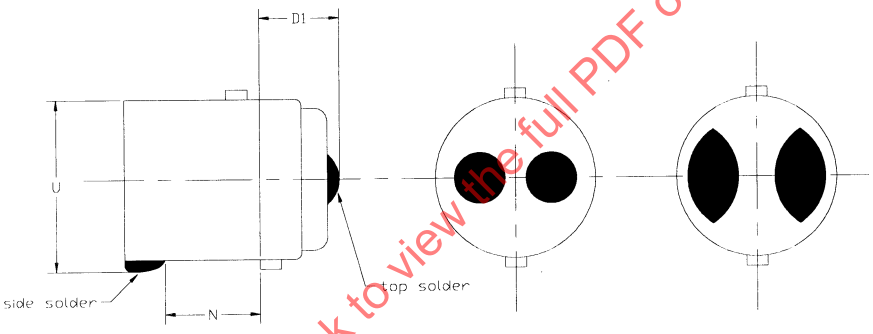

FIGURE 7C—BAY15d DIMENSIONS TO BE CONTROLLED ON A FINISHED BULB

4.2.6 Table 6 lists the base dimensions considered important for subminiature wedge base (Base Type W2.1x4.9d) lamps to insure that lamp bulbs will perform satisfactorily in a bulb retaining device (socket) made in accordance with SAEJ567 and ANSI C81.62 standard sheet 2-900-x and its related documents.

TABLE 6—WEDGE BASE DIMENSIONS
(SEE FIGURE 8)
BASE TYPE W2.1 x 4.9d

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

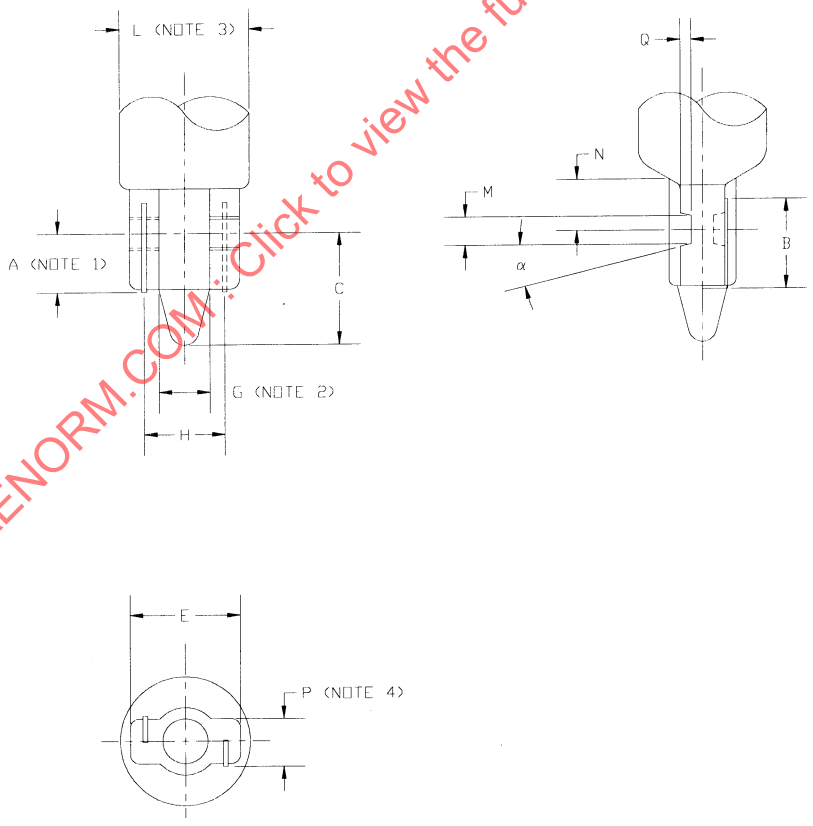

FIGURE 8—BASE TYPE W2.1x4.9d

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. See ANSI C81.61-19xx Standard Sheet 1-530-x.
NOTE 4—Dimension P to be measured over the lead wire.

4.2.7 Table 7 lists the base dimensions considered important for wedge base (Base Type W2.1x9.2d) lamps to insure that the lamp bulbs will perform satisfactorily in a bulb-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

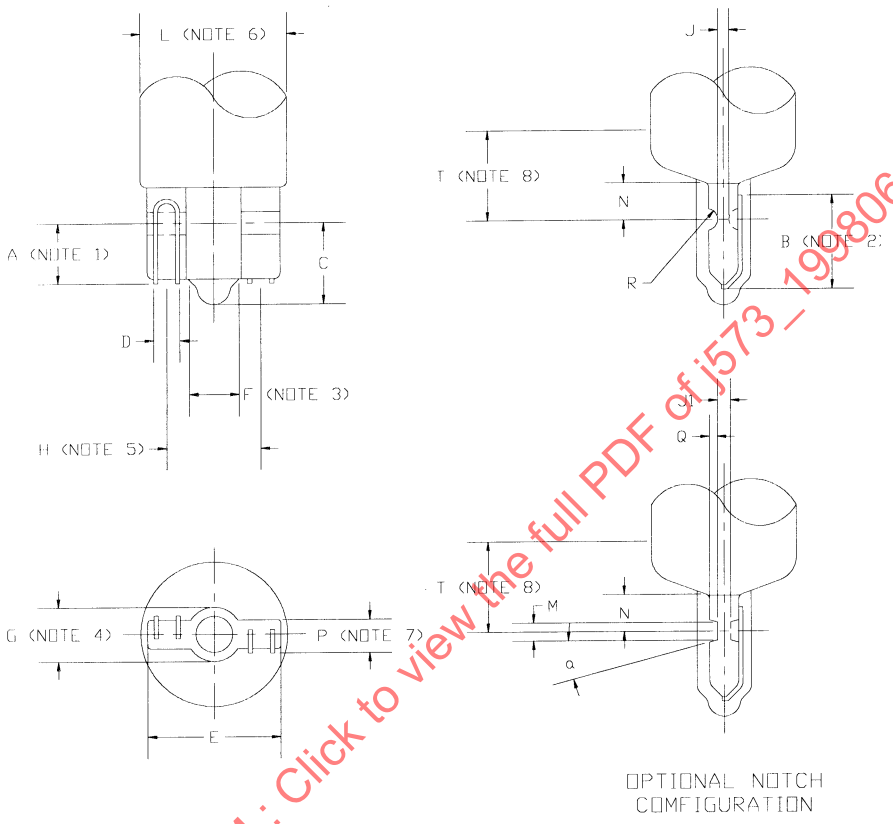

FIGURE 9—BASE TYPE W2.1x9.2d

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. See 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 bulb.