



Application and Design Factors

SERIES OPERATION

Life of a lamp can be severely reduced by using a series application because of the different resistances of the lamps used in the series. The applied voltage is not distributed evenly over all of the lamps in the series, so each lamp is operating at a slightly different voltage. This means embrittlement and the evaporation rate will not be equal, so some lamps could fail prematurely. It is recommended that lamps be selected for amperage and operated at a derated voltage for maximum reliability in series operations.

SHOCK AND VIBRATION

The best filament design for use in a shock and vibration environment is a low voltage, high amperage filament. This represents a short, thick filament. The higher you go in voltage, the longer the filament, which then necessitates the use of hangers. The hangers will increase the higher voltage filament reliability, but the effects of notching due to the soret effect are increased.

Orientation of the filament in relationship to the axis of vibration will also affect the lamp performance in a shock and vibration environment.

The most critical consideration in protecting a lamp against the effects of shock and vibration is the packaging by the user. Filament damage, due to shock and vibration, can be reduced or amplified by the way the lamp has been assembled into the user's product.

DC VOLTAGE LAMP OPERATION

DC voltage can reduce life by approximately 50% - 70% due to the "sawtooth" or notching effect. Notching, also known as electromigration, is a change in the molecular structure of tungsten due to the DC voltage. The results are hot spots that accelerate the thermal conditions, the evaporation rate and embrittlement. DC voltage operation is not recommended for filament lamps.

130 VOLT FILAMENTS

Most line voltage lamps offered in this catalog are manufactured with a 130 volt filament. Since most line voltage power is applied at 120 volts, the result is a slight undervolting of the filament. The effect of this is substantially enhanced lifehours, protection from voltage spikes and energy cost savings.

APPLICATION RECOMMENDATIONS

- Consult us in the early stages of design for technical assistance and recommendations as to the best lamp to use for a specific application. We can offer a variety of customized lamps which include lamps that have longer or shorter leads, bent or formed leads, and/or electrical characteristics that are tailored to your individual requirements.
- Use low voltage, high amperage lamps for shock and vibration environments.
- Provide good heat sinking and airflow to keep the ambient temperature below 100 degrees Celsius.
- Derate the lamps, whenever possible, to reduce tungsten evaporation and increase life.
- Use AC voltage over DC voltage, when possible.
- Use the lowest efficacy lamps for the longest life. Consider reflective coatings, contrast filters, or lenses for increased luminance or enhancement.
- Design your system to insulate the lamps as much as possible from the effects of shock and vibration.
- Take care in handling – avoid excessive shock and vibration during packaging, shipping and production. Avoid lead bending or stress at the seal area to prevent vacuum leaks.
- Avoid excessive torque during lamp insertion.

AMBIENT TEMPERATURE

It is important to consider the lamp housing from the standpoints of radiation, absorption, and ventilation. Normal variations in ambient temperature do not affect the performance of lamps. Above 175°C (350°F), the solder on conventional lamps may soften, deform, or melt, and the basing cement may loosen. All-glass wedge base lamps can be operated in lamp ambient temperatures of up to 230°C (450°F).

SOLDER READY LEADS

All wire terminal lamps offered in this catalog are supplied in solder ready condition. After the manufacturing process, wire terminals are washed clean and tin plated in order to provide for reliable soldering.

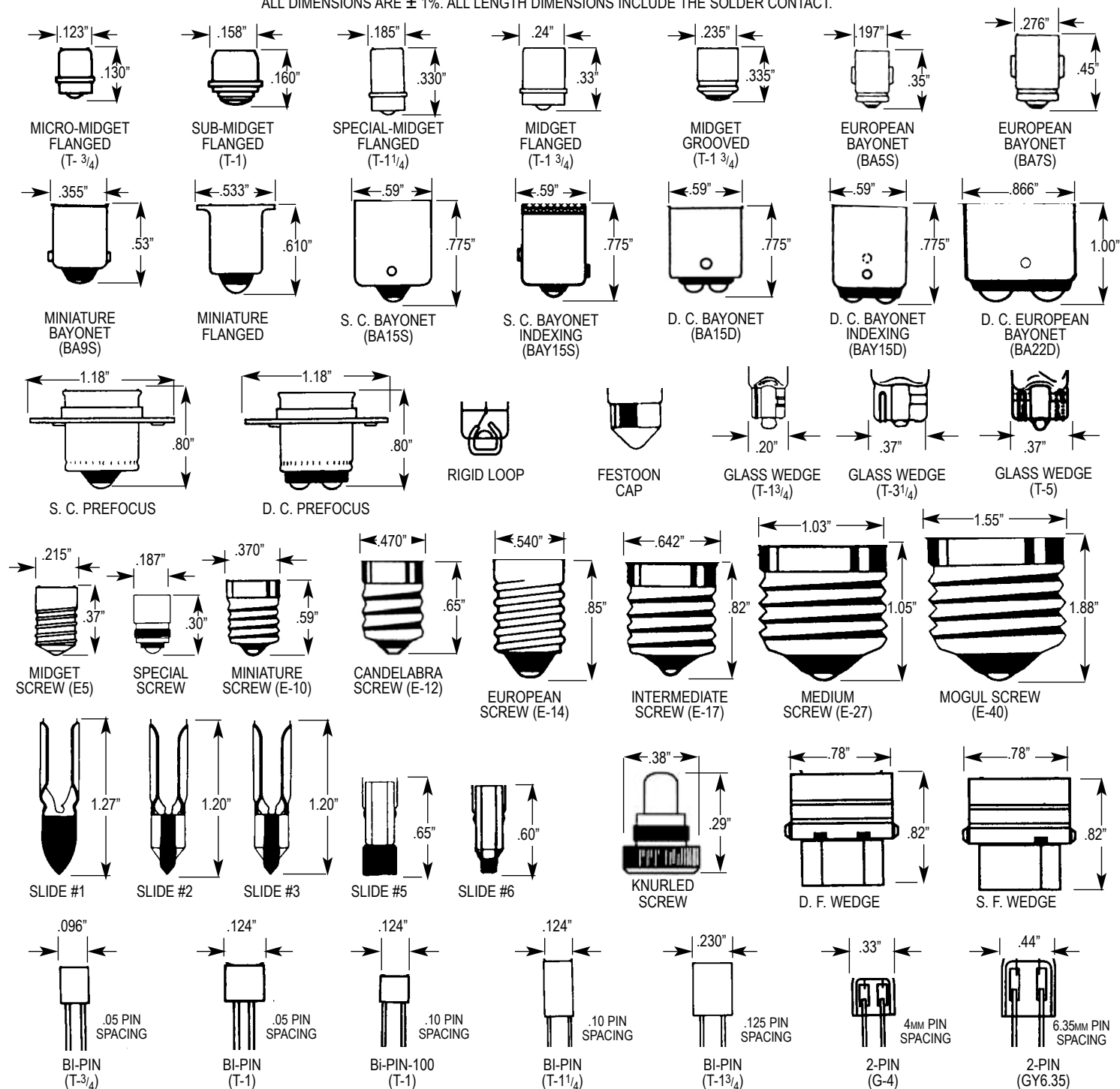


Common Lamp Bases with Dimensions

Bases provide electrical contact to the lamp and, in most cases, also support the lamp in the fixture. For miniature and subminiature lamps, bayonet or wedge base types are generally preferred over

screw types when vibration is present. In addition, wedge bases reduce socket size and complexity. Flanged or collared types are usually associated with requirements for filament location.

ALL DIMENSIONS ARE $\pm 1\%$. ALL LENGTH DIMENSIONS INCLUDE THE SOLDER CONTACT.

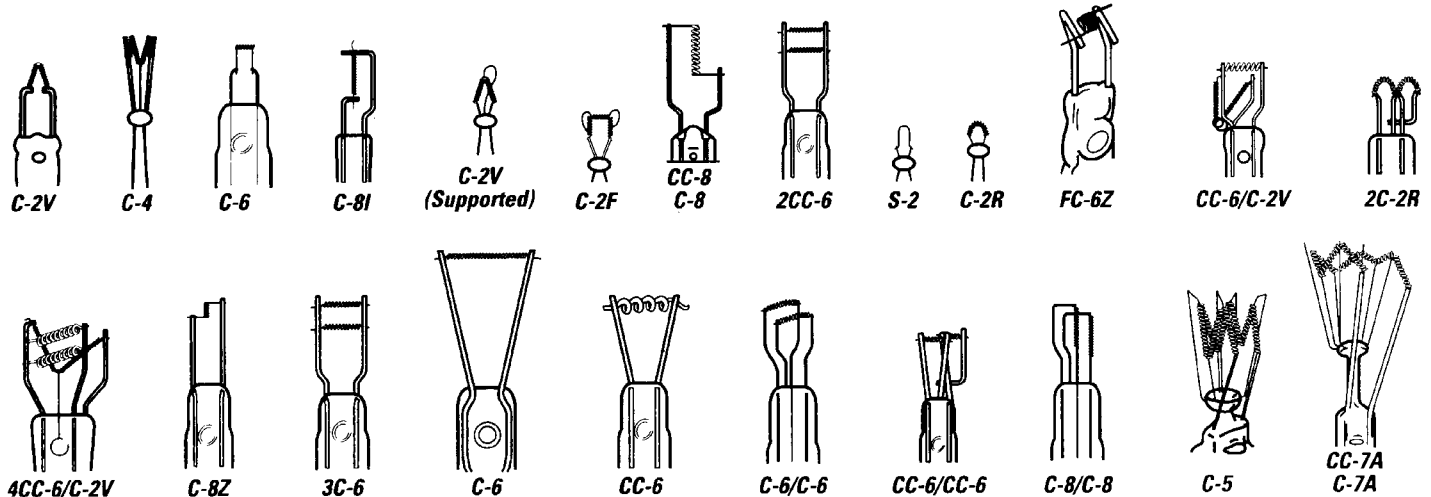




Common Filament Arrangements

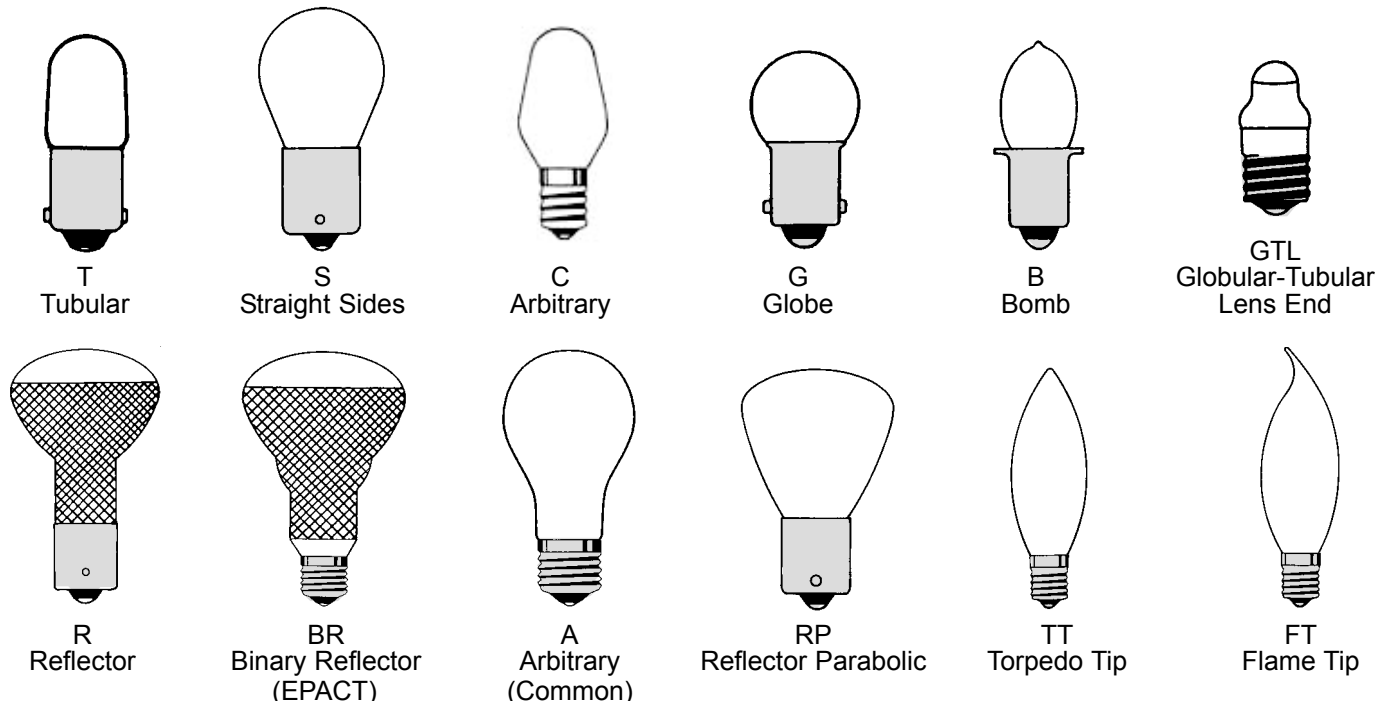
Filaments for miniature and subminiature lamps may be a straight wire, a coil, or a coiled coil (indicated by the letters "S", "C", and "CC" respectively). Coiling the filament wire effectively shortens the filament length so that smaller bulbs can be used. In addition, in gas-filled lamps, coiling the wire reduced thermal losses and

increases efficiency. Tungsten is almost universally used as lamp filament material because of its high melting point at incandescence. The number following the coil identification letter(s) denoted the arrangement of the filaments on the supports.



Basic Lamp Shapes (Glass Only)

There are twelve basic glass shapes that most lamps made today are classified by. They are denoted by the letters listed below.



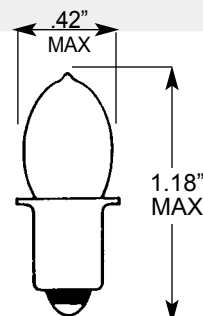


Miniature Lamps

Incandescence • Neon • European

B-3¹/₂ FLASHLIGHT LAMPS

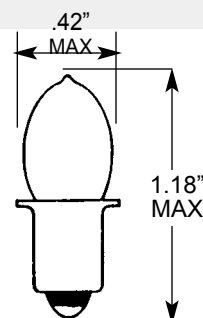
HIGH QUALITY STANDARD FLASHLIGHT LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE FLANGED BASE
1						
2	2.33	0.27	0.40	10	C-2R	PR 4
3	2.35	0.35	0.45	35	C-2R	PR 5
4	2.38	0.50	0.80	15	C-2R	PR 2
5	2.47	0.30	0.45	30	C-2R	PR 6
6	2.70	0.15	0.25	45	C-2R	PR 9
7	3.57	0.50	1.50	15	C-2R	PR 3
8	3.70	0.30	0.90	30	C-2R	PR 7
9	3.75	0.86	2.25	40	C-2R	PR 30
10	4.75	0.50	2.20	15	C-2R	PR 13
11						
12	4.82	0.50	1.90	30	C-2R	PR 15
13	5.95	0.50	3.10	15	C-2R	PR 12
14	7.20	0.55	5.50	5	C-2R	PR 18
15	8.63	0.50	4.50	15	C-2R	PR 20
16	12.50	0.25	2.70	50	C-2R	PR 16

B-3¹/₂ KRYPTON FLASHLIGHT LAMPS

KRYPTON GAS FILLED / HIGH INTENSITY / LONGER LIFE
FLASHLIGHTS AND RECHARGABLE POWER TOOLS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	CROSS REFERENCE	MINIATURE FLANGED BASE
17	2.38	0.70	3.9	50	C-2R	KPR102	KPR 2
18	2.38	0.70	4.2	50	C-2R	KPR104	KPR 4
19	2.40	0.80	8.8	50	C-2R	KPR131	KPR 31
20	3.57	0.70	3.9	50	C-2R	KPR103	KPR 3
21	3.70	0.70	4.8	50	C-2R	KPR107	KPR 7
22	4.75	0.70	8.0	50	C-2R	KPR113	KPR 13
23	6.00	0.70	8.2	50	C-2R	KPR112	KPR 12
24	7.20	0.55	8.2	50	C-2R	KPR118	KPR 18
25							
26	12.00	0.70	15.0	20	C-2R		KPR120
27	14.40	0.70	20.0	20	C-2R		KPR144
28	15.60	0.70	24.0	20	C-2R		KPR156
29	18.00	0.70	31.0	20	C-2V SUPPORTED		KPR180
30	19.2	0.70	40.0	20	C-2V SUPPORTED		KPR192
31	24.00	0.70	44.0	20	C-2V SUPPORTED		KPR240

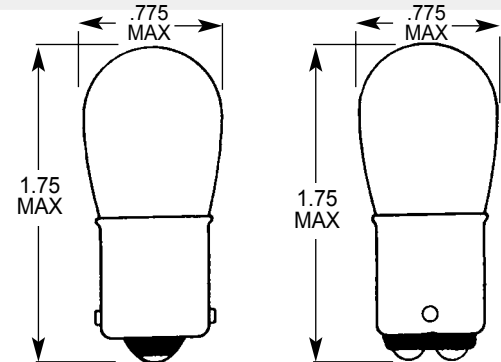


Miniature Lamps

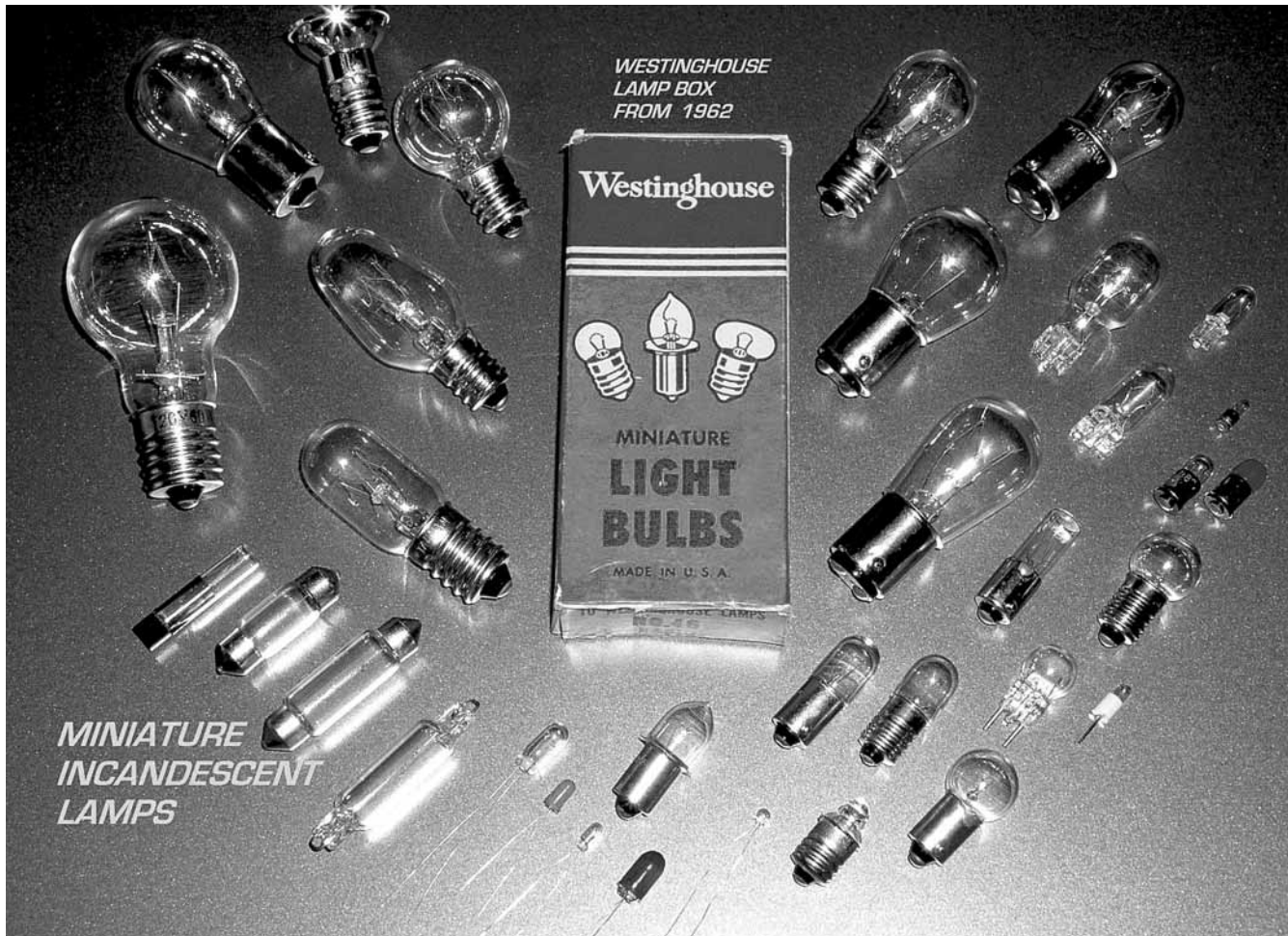
Incandescence • Neon • European

B-6 MINIATURE LAMPS

*Specifications for Second Filament
1309 LAMP IS AVAILABLE INSIDE FROSTED (1309-IF)



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SINGLE CONTACT BAYONET BASE	DOUBLE CONTACT BAYONET BASE
1	6.00	0.51	3.40	100	C-6	1317	
2	6.50	1.78	15.00	100	C-6	209	
3	12.80	0.94	15.00	200	C-6	1003	210
4	12.80	1.00	12.00	500	C-6	105	1004
5	28.00	0.52	15.00	300	C-2R	1309	104
6	28.00	0.52	15.00	300	C-2R	*	
7	28.00	0.56	16.00	2,000	CC-6	1308	





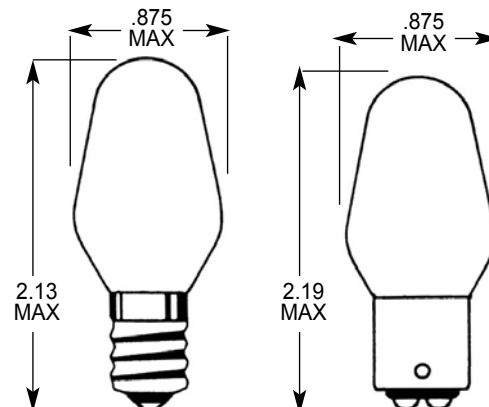
Miniature Lamps

Incandesececent • Neon • European

C-7 MINIATURE LAMPS

CERAMIC OR TRANSPARENT COLORS
CUSTOM COLORS AVAILABLE ON SPECIAL ORDER
DOUBLE COATED COLORS, WEATHER RESISTANT
7C7 CLEAR AND TRANSPARENT COLORS ARE
AVAILABLE IN BLINKING.

CHRISTMAS LIGHTS / NIGHT LIGHTS / SIGN LIGHTS / INDICATOR LIGHTS



LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	FINISH	CANDELABRA SCREW BASE	DOUBLE CONTACT BAYONET BASE
1	120.0	.033	4	4,000	C-3A	CLEAR	4C7-120V-CS	
2	120.0	.033	4	4,000	C-3A	WHITE	4C7-120V-CS-W	
3								
4	120.0	.058	7	3,500	C-3A	CLEAR	7C7-120V-CS	7C7-120V-DC
5	120.0	.058	7	3,500	C-3A	FROSTED	7C7-120V-CS-F	
6	130.0	.058	7	3,500	C-3A	WHITE	7C7-120V-CS-W	
7								
8	120.0	.058	7	3,500	C-3A	CERAMIC-RED	7C7-120V-CS-CR	
9	120.0	.058	7	3,500	C-3A	CERAMIC-GREEN	7C7-120V-CS-CG	
10	120.0	.058	7	3,500	C-3A	CERAMIC-YELLOW	7C7-120V-CS-CY	
11	120.0	.058	7	3,500	C-3A	CERAMIC-ORANGE	7C7-120V-CS-CO	
12	120.0	.058	7	3,500	C-3A	CERAMIC-BLUE	7C7-120V-CS-CB	
13	120.0	.058	7	3,500	C-3A	CERAMIC-PINK	7C7-120V-CS-CP	
14								
15	130.0	.054	7	4,500	C-3A	CLEAR	7C7-130V-CS	7C7-130V-DC
16	130.0	.054	7	4,500	C-3A	FROSTED	7C7-130V-CS-F	
17	130.0	.054	7	4,500	C-3A	WHITE	7C7-130V-CS-W	
18								
19	130.0	.054	7	4,500	C-3A	TRANSPARENT-RED	7C7-130V-CS-TR	
20	130.0	.054	7	4,500	C-3A	TRANSPARENT-GREEN	7C7-130V-CS-TG	
21	130.0	.054	7	4,500	C-3A	TRANSPARENT-YELLOW	7C7-130V-CS-TY	
22	130.0	.054	7	4,500	C-3A	TRANSPARENT-PINK	7C7-130V-CS-TP	
23	130.0	.054	7	4,500	C-3A	TRANSPARENT-BLUE	7C7-130V-CS-TB	
24	130.0	.054	7	4,500	C-3A	TRANSPARENT-AMBER	7C7-130V-CS-TA	
25	130.0	.054	7	4,500	C-3A	TRANSPARENT-VIOLET	7C7-130V-CS-TV	
26								
27	130.0	.054	7	4,500	C-3A	PASTEL - PINK	7C7-130V-CS-PP	
28	130.0	.054	7	4,500	C-3A	PASTEL - GREEN	7C7-130V-CS-PG	
29	130.0	.054	7	4,500	C-3A	PASTEL - BLUE	7C7-130V-CS-PB	
30	130.0	.054	7	4,500	C-3A	PASTEL - YELLOW	7C7-130V-CS-PY	
31								
32	120.0	.077	10	3,000	C-3A	CLEAR	10C7-120V-CS	10C7-120V-DC
33	130.0	.077	10	4,000	C-3A	CLEAR	10C7-130V-CS	10C7-130V-DC
34	130.0	.120	15	3,500	C-5A	CLEAR	15C7-130V-CS	
35	230.0	.077	10	3,000	C-3A	CLEAR	10C7-230V-CS	10C7-230V-DC



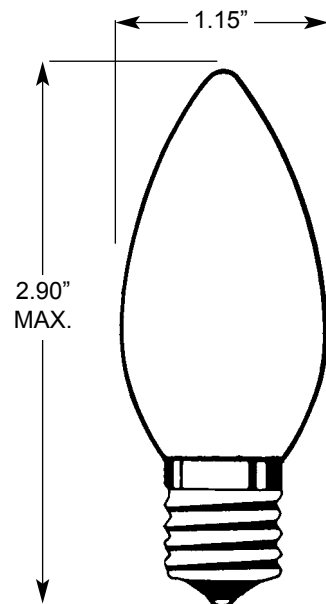
Miniature Lamps

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C-9

MINIATURE LAMPS

CERAMIC OR TRANSPARENT COLORS
DOUBLE COATED COLORS, WEATHER RESISTANT
CHRISTMAS / HOLIDAY LIGHTING



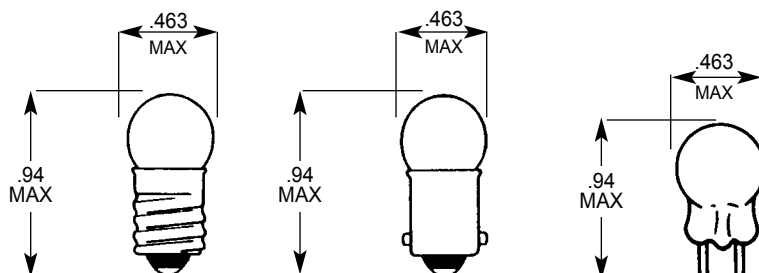
LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	FINISH	INTERMEDIATE SCREW BASE
1	120.0	.058	7	3,500	C-5A	CLEAR	7C9-120V-INT
2	120.0	.058	7	3,500	C-5A	FROSTED	7C9-120V-FR
3	120.0	.058	7	3,500	C-5A	WHITE	7C9-120V-W
4							
5	130.0	.053	7	5,000	C-5A	TRANSPARENT-RED	7C9-130V-TR
6	130.0	.053	7	5,000	C-5A	TRANSPARENT-GREEN	7C9-130V-TG
7	130.0	.053	7	5,000	C-5A	TRANSPARENT-YELLOW	7C9-130V-TY
8	130.0	.053	7	5,000	C-5A	TRANSPARENT-PINK	7C9-130V-TP
9	130.0	.053	7	5,000	C-5A	TRANSPARENT-BLUE	7C9-130V-TB
10	130.0	.053	7	5,000	C-5A	TRANSPARENT-AMBER	7C9-130V-TA
11							
12	120.0	.058	7	3,500	C-5A	CERAMIC-RED	7C9-120V-CR
13	120.0	.058	7	3,500	C-5A	CERAMIC-GREEN	7C9-120V-CG
14	120.0	.058	7	3,500	C-5A	CERAMIC-YELLOW	7C9-120V-CY
15	120.0	.058	7	3,500	C-5A	CERAMIC-ORANGE	7C9-120V-CO
16	120.0	.058	7	3,500	C-5A	CERAMIC-BLUE	7C9-120V-CB
17	120.0	.058	7	3,500	C-5A	CERAMIC-PINK	7C9-120V-CP
18							
19	120.0	.058	7	3,000	C-5A-F (FLASHER)	CLEAR	7C9-120V-INT-T (TWINKLE LIGHT)



Miniature Lamps

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G-3¹/₂ MINIATURE LAMPS



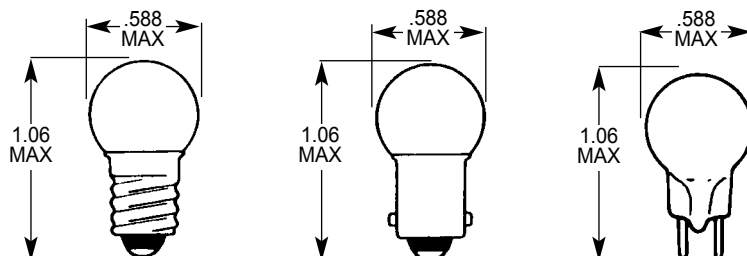
NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE SCREW BASE	MINIATURE BAYONET BASE	GLASS 2-PIN BASE
1	1.25	0.30	0.10	10	S-2	123		
2	1.30	0.10	0.03	50	S-2	131		
3	1.35	0.06	0.02	50	S-2	359		
4	1.40	0.10	0.12	200	S-2	132		
5	1.50	0.20	0.12	30	S-2	458		
6	2.00	0.50	0.70	15	C-2R	138		
7	2.10	0.50	0.70	15	C-2R	100		
8	2.33	0.27	0.42	10	C-2R	233		
9	2.47	0.30	0.50	15	C-2R	14	354	
10	2.50	0.50	0.50	3,000	C-6	245		10
11	3.00	0.07	0.15	50	S-2	352X		
12	3.69	0.50	1.60	15	C-2R	365		
13	3.70	0.30	0.98	15	C-2R	13		
14	3.80	0.43	1.60	1	C-2R	1438		
15	6.30	0.25	0.50	5,000	C-6			25
16	6.30	0.15	0.35	5,000	C-6		130	12
17	6.30	0.25	0.65	5,000	C-6			612
18								
19	6.30	0.25	0.50	5,000	C-2V		219	
20	6.30	0.25	0.55	2,000	C-2R	134		
21	6.30	0.15	0.32	2,000	C-2R	133		
22	7.50	0.22	1.00	1,000	C-2R	50	51	
23	12.00	0.20	1.70	250	C-2V	1446		
24	14.00	0.20	2.00	250	C-2V	1449	363	
25	14.40	0.10	0.90	1,000	C-6			19
26	14.40	0.12	1.00	3,000	C-2V		53X (LONG LIFE)	
27	14.40	0.12	0.50	2,500	C-2F		250	
28								
29	14.40	0.12	1.00	1,000	C-2V		53	
30	14.40	0.135	0.70	2,000	C-2V		1445	
31	14.40	0.10	0.75	1,000	C-2V	52		
32	18.00	0.15	1.50	250	C-2V	1447		
33	24.00	0.035	0.23	3,000	C-2F	1448	1450	
34	28.00	0.17	3.50	500	C-2F		356	
35	28.00	0.80	(2.24w)	5,000	C-2F		265	



Miniature Lamps

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G-4^{1/2} MINIATURE LAMPS

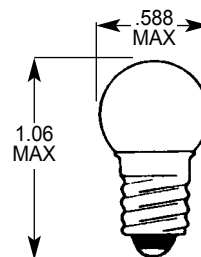


LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE SCREW BASE	MINIATURE BAYONET BASE	GLASS 2-PIN BASE
1	1.25	0.60	0.20	75	S-2		423	
2	1.25	0.60	0.20	200	S-2	136		
3	4.90	0.30	1.40	30	C-2R	27		
4	5.00	0.50	2.30	15	C-2R	425		
5	5.00	0.50	2.30	15	C-2R		427	
6	5.10	0.15	0.60	200	C-2R	502	503	
7	6.00	0.04	0.10	500	C-6	1483	1406	
8	6.00	0.50	3.70	3	C-2R		607	
9	6.00	0.45	2.20	100	C-2R	1482		
10								
11	6.15	0.30	2.00	15	C-2R	31		
12	6.15	0.50	3.40	15	C-2R	605		
13								
14	6.50	0.50	1.90	500	C-2R		455	
15	7.00	0.40	2.00	500	C-6			15
16	7.00	0.41	2.00	500	C-2R		55	
17	8.00	0.25	1.60	250	C-2R	426		
18	12.50	0.25	3.5	1,000	C-2V	428 (KRYPTON)		
19	14.00	0.23	2.00	500	C-2R		57	20
20	14.00	0.25	2.70	150	C-2V	430	431	
21	14.00	0.27	2.00	1,500	C-2F		1895	
22	18.00	0.25	3.50	250	C-2V	432	433	
23	28.00	0.17	2.00	5,000	C-2F		456	

G-4^{1/2} FIBER OPTIC LAMPS (KRYPTON)

FOR USE IN FIBER-OPTIC DISPLAY PRODUCTS

KRYPTON
Gas Filled Lamps



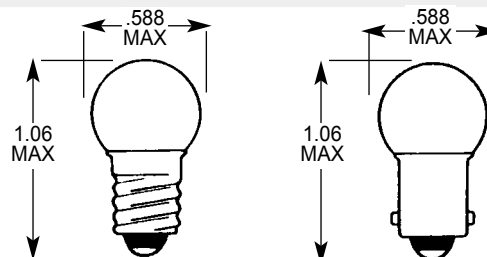
LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	MINIATURE SCREW BASE
24	12.5	.25	8	200	C-2R	N12V8WMS



Miniature Lamps

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G-4^{1/2} MINIATURE FLASHER LAMPS

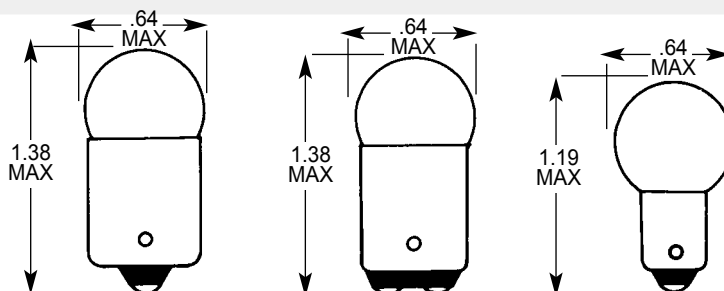


LINE NO.	VOLTS	AMPS	MSCP	LIFE	MINIATURE SCREW BASE	MINIATURE BAYONET BASE
1	1.25	0.25	0.09	15	401-FLASHER	
2	2.60	0.30	0.43	50	406-FLASHER	
3	4.90	0.30	1.20	50	407-FLASHER	408-FLASHER
4	6.50	0.50	1.90	500	405-FLASHER	455-FLASHER
5	14.00	0.27	1.60	500	258-FLASHER	257-FLASHER

Norman Flasher lamps are constructed using a bi-metal strip attached to one of the electrodes, inside the envelope, to provide the flashing. Heat radiated by the filament causes the bi-metal to bend away from the

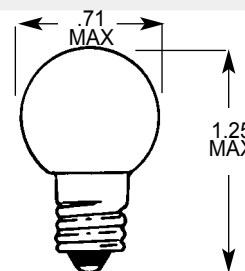
lead wire, breaking the circuit. On cooling, the bi-metal recovers to its original position and makes contact to light the lamp again. Flash rate is approximately 40-160 flashes per minute.

G-5 MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	Single Contact Bayonet Base	Double Contact Bayonet Base	Miniature Bayonet Base
6	2.50	1.00	1.75	20	C-6	1315		
7	13.00	0.37	3.00	1,000	C-2V		78	
8	20.00	0.25	4.20	250	C-2V			1458
9	22.00	0.25	3.80	250	C-2F			1464
10	28.00	0.17	3.00	500	C-2F	301	302	

G-5^{1/2} MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE SCREW BASE
11	2.50	0.80	1.30	150	C-2R	35
12	2.50	1.00	2.00	75	C-2R	248

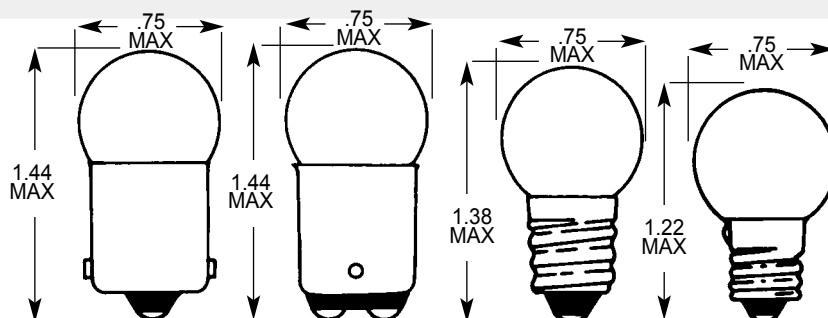


Miniature Lamps

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G-6 MINIATURE LAMPS

* Specifications for Second Filament



LINE NO.	VOLTS	AMPS	MSCP (W)	LIFE	FILAMENT	Single Contact Bayonet	Double Contact Bayonet	Candelabra Screw	Miniature Screw
1	3.45	0.84	2.0	250	C-2R	61			
2	4.00	1.75	(7.0)	100	C-2R		80 (11-170)		
3	5.80	1.10	8.1	50	C-2R				157
4	5.80	1.10	7.9	50	C-2R				153
5	6.50	1.02	6.0	500	C-2R	81	82	81K	
6	7.00	0.63	3.0	1,000	C-2R	63	64	63K	
7	12.00	0.26	2.3	250	C-2V			1471	
8	13.00	0.53	6.0	750	C-2R			89K	
9	13.00	0.58	6.0	750	C-2R	89	90		
10	13.50	0.59	4.0	5,000	C-2R		68		
11									
12	13.50	0.59	4.0	5,000	C-2R	1155			
	13.50	0.59	4.0	5,000	C-2R	*			
13	13.50	0.41	4.0	1,500	C-2R			67K	
14	13.50	0.59	4.0	5,000	C-2R	67			
15	13.50	0.69	4.0	5,000	C-2V	97	1178 (96)		
16	13.50	0.74	(10)	750	C-2R	R10W			
17	14.00	0.63	6.0	1,000	C-2R	631	632		
	14.00	0.63	6.0	1,000	C-2R	*	*		
18									
19	22.00	0.18	3.0	200	C-2V	71	72	71K	
20	24.00	0.18	2.8	1,000	C-2F	509		509K	
21	28.00	0.23	3.0	2,000	C-2V	1251	1252		
	28.00	0.23	3.0	2,000	C-2V	*	*		
22	28.00	0.30	6.0	500	C-2F	303	304		
23	28.00	0.37	6.0	1,000	C-2V	623	624		
	28.00	0.37	6.0	1,000	C-2V	*	*		
24	32.00	0.16	4.0	200	C-2F			1224K	
25	34.00	0.16	3.8	275	C-2F	1223	1224		
26	45.00	0.20	5.2	1,500	C-2F		536		
27	120.00	0.042	(5.0)	2,500	C-5A			5G6-120V-CS	



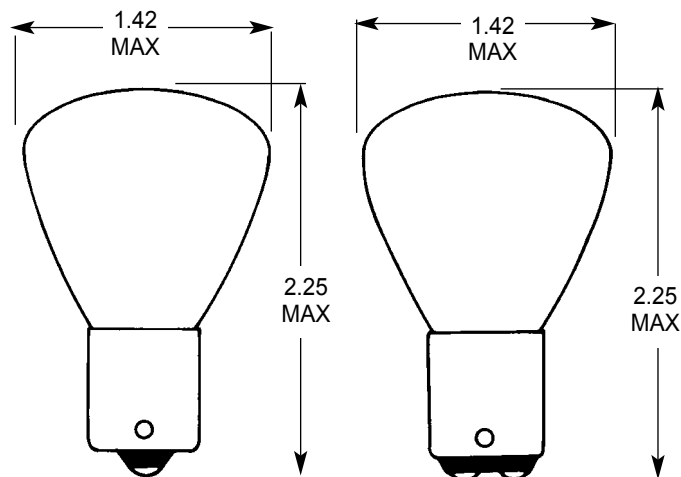
Miniature Lamps

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RP-11 MINIATURE LAMPS

HIGH INTENSITY

* Specifications for Second Filament



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SINGLE CONTACT BAYONET BASE	DOUBLE CONTACT BAYONET BASE
1							
2	5.50	6.25	50	100	C-2V	1183	1184
3	6.20	3.87	32	125	C-2V		1000
4	6.20	3.87	32	125	C-2V		*
5	6.20	3.91	32	200	C-2R	1133	1134
6	6.20	3.91	32	200	C-2V	1621	
7	12.50	1.98	32	400	C-2R	1143	1144
8	12.50	3.00	50	300	C-2V	1195	1196
9	12.50	3.00	50	300	C-2R	1293	
10	26.00	2.70	90	50	2C-2R	1047	
11	32.00	0.74	32	100	C-2V		1054
12	32.00	1.15	50	100	C-5		1056
13	40.00	0.92	50	100	C-5		1062
14	44.00	0.47	21	150	C-13		1150



Miniature Lamps

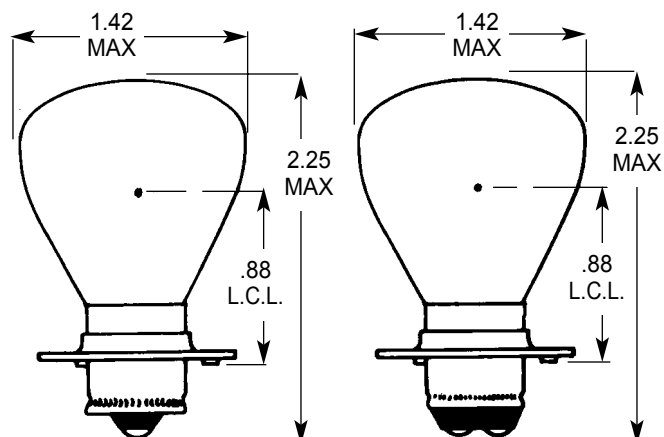
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RP-11

MINIATURE PREFOCUS LAMPS

HIGH INTENSITY

* Specifications for Second Filament



LINE NO.	VOLTS	AMPS	MSCP (WATTS)	LIFE	FILAMENT	SINGLE CONTACT PREFOCUS BASE	DOUBLE CONTACT PREFOCUS BASE
1							
2	4.50	1.25	5.70	75	C-6	1021	
3	5.90	4.66	32.00	400	C-6		2331
4	6.20	4.49	32.00	400	C-6		*
5	5.90	4.66	32.00	400	C-6		2338
6	6.20	4.49	32.00	400	C-6		*
7	5.90	6.53	50.00	200	C-2V		2530
8	6.20	4.23	32.00	200	C-2V		*
9	5.90	6.36	50.00	200	C-6	1501	
10	5.90	6.53	50.00	200	C-2V	1503	
11							
12	6.00	2.35	19.00	75	C-6	1025	
13	6.10	4.10	32.00	125	C-6	1209	
14	6.20	4.23	32.00	200	C-2V		2330
15	6.20	4.23	32.00	200	C-2V		*
16	6.20	4.10	32.00	200	C-6	1321	
17	6.20	4.13	32.00	200	C-2V	1323	
18	6.20	4.13	32.00	200	C-2V	1325	
19	12.50	3.00	50.00	300	C-2V	1507	
20							
21	12.50	2.23	32.00	300	C-2V		2336
22	12.50	2.10	32.00	300	C-2R		*
23	12.80	2.08	32.00	300	C-2V	1327	
24							
25	28.00	1.07	(30WATT)	200	CC-2V	30RP11/SCP	



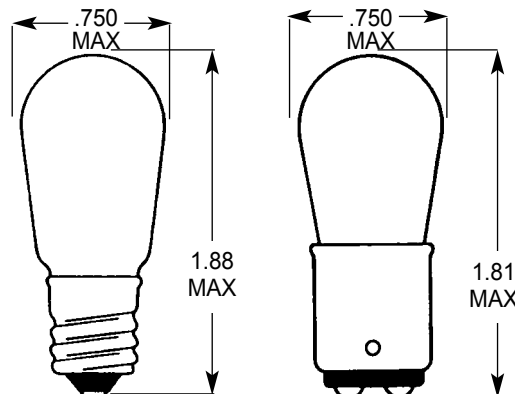
Miniature Lamps

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S-6 MINIATURE LAMPS

HIGH GRADE FILAMENT WIRE

ALL LAMP BASES ARE PLATED BRASS
AND CORROSION RESISTANT



LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	FINISH	CANDELABRA SCREW BASE	DOUBLE CONTACT BAYONET BASE
1								
2	6.0	1.000	6	3,500	C-6	CLEAR	6S6-6V-CS	6S6-6V-DC
3	12.0	0.500	6	3,500	C-2V	CLEAR	6S6-12V-CS	6S6-12V-DC
4	18.0	0.330	6	3,500	C-2V	CLEAR	6S6-18V-CS	6S6-18V-DC
5	24.0	0.250	6	3,500	C-2V	CLEAR	6S6-24V-CS	6S6-24V-DC
6	30.0	0.200	6	3,500	C-2V	CLEAR	6S6-30V-CS	6S6-30V-DC
7	32.0	0.190	6	3,500	C-3A	CLEAR	6S6-32V-CS	6S6-32V-DC
8	48.0	0.125	6	3,500	C-3A	CLEAR	6S6-48V-CS	6S6-48V-DC
9	60.0	0.100	6	3,500	C-3A	CLEAR	6S6-60V-CS	6S6-60V-DC
10	75.0	0.080	6	3,500	C-3A	CLEAR	6S6-75V-CS	6S6-75V-DC
11	80.0	0.075	6	3,500	C-3A	CLEAR	6S6-80V-CS	6S6-80V-DC
12								
13	120.0	0.050	3	3,500	C-3A	CLEAR	3S6-120V-CS	3S6-120V-DC
14	120.0	0.030	6	3,500	C-3A	CLEAR	6S6-120V-CS	6S6-120V-DC
15	120.0	0.080	10	3,500	C-3A	CLEAR	10S6-120V-CS	10S6-120V-DC
16								
17	130.0	0.020	3	4,000	C-5A	CLEAR	3S6-130V-CS	3S6-130V-DC
18	130.0	0.050	6	4,000	C-3A	CLEAR	6S6-130V-CS	6S6-130V-DC
19								
20	130.0	0.050	6	4,000	C-3A	WHITE	6S6-130V-CS-W	6S6-130V-DC-W
21	130.0	0.050	6	4,000	C-3A	TRANSPARENT RED	6S6-130V-CS-TR	6S6-130V-DC-TR
22	130.0	0.050	6	4,000	C-3A	CERAMIC RED	6S6-130V-CS-CR	6S6-130V-DC-CR
23	130.0	0.050	6	4,000	C-3A	TRANSPARENT BLUE	6S6-130V-CS-TB	6S6-130V-DC-TB
24	130.0	0.050	6	4,000	C-3A	CERAMIC BLUE	6S6-130V-CS-CB	6S6-130V-DC-CB
25								
26	130.0	0.220	25	3,000	C-5A	CLEAR	25S6-130V-CS	—
27								
28	135.0	0.044	6	4,000	C-5A	CLEAR	6S6-135V-CS	6S6-135V-DC
29	145.0	0.040	6	5,000	C-5A	CLEAR	6S6-145V-CS	6S6-145V-DC
30	155.0	0.040	6	6,000	C-5A	CLEAR	6S6-155V-CS	6S6-155V-DC
31								
32	230.0	0.026	6	3,500	C-7A	CLEAR	6S6-230V-CS	
33								
34	230.0	0.040	10	3,000	C-7A	CLEAR	10S6-230V-CS	10S6-230V-DC
35	250.0	0.040	10	3,000	C-7A	CLEAR	10S6-250V-CS	10S6-250V-DC

S-6 LAMP TYPES LISTED ABOVE ARE USED IN A WIDE VARIETY OF INDUSTRIAL APPLICATIONS. NORMAN MANUFACTURED S-6 LAMPS OFFER THE HIGHEST QUALITY CONSTRUCTION AND DEPENDABILITY OF ANY S-6 ON THE MARKET TODAY.

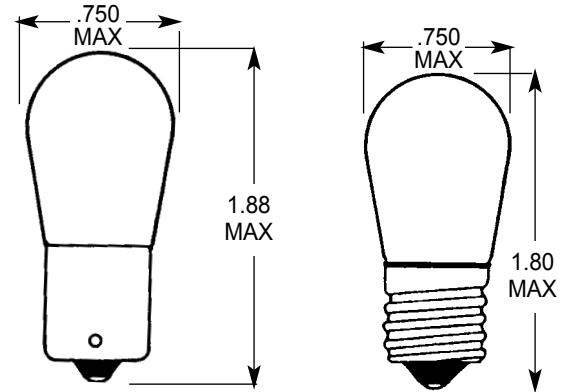


Miniature Lamps

Incandescence • Neon • European

S-6 MINIATURE LAMPS

LONG-LIFE



LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	SINGLE CONTACT BAYONET BASE	INTERMEDIATE SCREW BASE
1	120.0	0.025	3	4,000	C-7A	3S6-120V-SCB	
2	120.0	0.050	6	4,000	C-7A	6S6-120V-SCB	6S6-120V-INT
3	120.0	0.083	10	3,500	C-7A	10S6-120V-SCB	10S6-120V-INT
4	145.0	0.050	6	3,500	C-7A	6S6-145V-SCB	6S6-145V-INT
5	155.0	0.038	6	4,000	C-7A	6S6-155V-SCB	—
6	250.0	0.040	10	3,000	C-7A	—	10S6-250V-INT
7	130.0	0.190	25	2,000	C-7A	25S6-130V-SCB	25S6-130V-INT



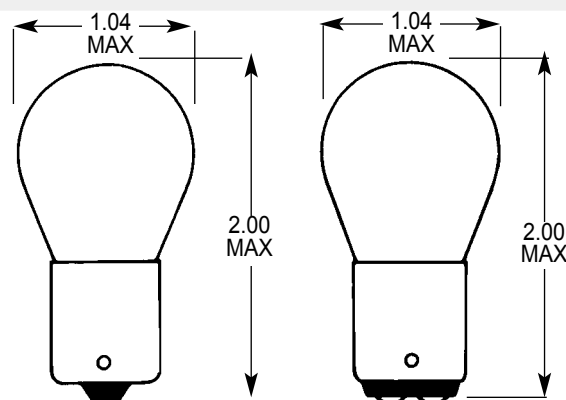


Miniature Lamps

Incandescence • Neon • European

S-8 MINIATURE LAMPS

*Specifications for second filament



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SINGLE CONTACT BAYONET BASE	DOUBLE CONTACT BAYONET BASE
1							
2	2.50	1.50	3.20	15	S-2		1492
3	4.00	2.00	8.80	100	C-2R		1584
4	4.00	0.80	2.50	300	C-2R	1459	
5	5.00	0.60	3.00	20	C-2R	1651	
6	5.40	1.90	10.00	1,000	C-6		1612
7	6.00	5.00	36.00	250	C-6		1594
8	6.00	1.50	13.00	50	C-6	1613	
9	6.00	4.10	32.00	400	C-6	1680 X	
10	6.00	4.10	32.00	300	C-6	1680	
11							
12	6.40	2.63	21.00	200	C-6	1129	1130
13	6.40	2.63	21.00	200	C-6	1605	1158
	7.00	0.75	3.00	1,000	C-6		*
14	6.40	2.69	21.00	200	C-2V		1608
15	6.40	2.80	21.00	200	C-2V		1618
16	6.40	3.00	23.00	500	C-2R		6
17	6.50	2.75	23.00	100	C-6		1497
18	6.50	2.75	23.00	200	C-6		1493
19	6.70	1.90	15.00	500	C-6	1619	
20	8.00	2.00	21.00	500	C-6		1648
21	6.80	1.91	15.00	300	C-6	87	88
22	12.50	3.00	50.00	300	C-2R	1295	
23	12.80	1.04	15.00	700	C-6	93	94
24	12.80	1.35	22.00	500	CC-6	1161	
25	12.80	1.44	21.00	1,000	C-6	1141	1142
26	12.80	1.52	26.00	400	C-2R	1777	
27	12.80	1.80	32.00	200	C-6	1073	1076
28	12.80	2.10	32.00	1,200	C-6	1156	
29	12.80	2.25	32.00	1,200	C-6	199	
30							
31	12.80	1.26	21.00	300	C-2R		1005
	12.80	1.26	21.00	300	C-6		*
32	12.80	1.34	21.00	300	C-6		1176
	14.00	0.59	6.00	1,500	C-6		*
33	12.80	1.34	21.00	500	C-2R		1152
34	14.00	0.51	4.00	5,000	C-6	1095	

S-8 CONTINUED ON NEXT PAGE



Miniature Lamps

Incandescence • Neon • European

S-8 continued						28 Volts & Higher	
LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SINGLE CONTACT BAYONET BASE	DOUBLE CONTACT BAYONET BASE
1							
2	28.00	0.42	10.00	500	C-2V		1696
3	28.00	0.51	15.00	300	C-2V	305	306
4	28.00	0.51	15.00	300	C-2V	305-FROSTED	
5	28.00	0.51	15.00	300	C-2V	305-RED	
6	28.00	0.51	15.00	300	C-2V	305-TF	
7							
8	28.00	0.61	15.00	1,000	C-2R	1691	1692
9	28.00	0.61	15.00	1,000	C-2R	*	*
10	28.00	0.61	15.00	1,000	C-2R	1691-FROSTED	1692-FROSTED
11	28.00	0.61	15.00	1,000	C-2R	*	*
12	28.00	0.61	15.00	1,000	C-2R	1591	
13							
14	28.00	0.64	17.00	2,000	CC-8I	2232	
15	28.00	0.64	17.00	2,000	CC-8I	2232-FROSTED	
16	28.00	0.64	17.00	2,000	CC-8I	2232-TF	
17							
18	28.00	0.67	21.00	300	C-2V	307	308
19	28.00	0.67	21.00	300	C-2V	307-FROSTED	308-FROSTED
20	28.00	0.67	21.00	300	C-2V	307-RED	308-RED
21	28.00	0.67	21.00	300	C-2V	307-TF	308-TF
22							
23	28.00	0.71	21.00	400	C-2V	1203	1204
24	28.00	0.76	21.00	1,000	CC-6	1563	
25							
26	28.00	0.77	21.00	2,000	CC-8I	2233	
27	28.00	0.77	21.00	2,000	CC-8I	2233-FROSTED	
28	28.00	0.77	21.00	2,000	CC-8I	2233-TF	
29							
30	28.00	0.80	21.00	1,000	C-2V	1665	
31	28.00	0.80	21.00	1,000	C-2V	1665-FROSTED	
32							
33	28.00	0.90	32.00	300	C-2V	315	
34	28.00	0.90	32.00	300	C-2V	315-FROSTED	
35							
36	28.00	1.02	32.00	500	C-6	1683	1638
37	28.00	1.02	32.00	500	C-6	*	*
38	28.00	0.68	21.00	300	CC-6		1666
39	28.00	0.68	21.00	300	CC-6		*
40	30.00	0.90	19.00	5,000	CC-2V		1080
41	34.00	0.45	15.00	275	CC-2V		1228
42	36.00	0.72	32.00	300	CC-6	SP-7	
43	38.00	0.29	8.00	300	CC-6	SP-14	
44	40.00	0.38	15.00	400	C-2V		1229
45	40.00	0.53	14.00	3,800	CC-2V (SUPPORTED)		895
46	44.00	0.17	6.00	200	C-7A	109	110
47	45.50	0.22	7.60	1,000	CC-2V (SUPPORTED)		1676
48	48.00	0.52	.25	300	CC-2V (SUPPORTED)	SP-8	

- **FROSTED:** INSIDE FROSTED TO PROVIDE DIFFUSED LIGHT SOURCE.
- **RED:** EXTERNAL RED COLOR COATING MEETING FAA "AVIATION RED" SPECIFICATIONS.
- **TF:** EXTERNAL RUBBERIZED "TUFF-COATING"® FOR SHATTER-PROOF APPLICATIONS.



Miniature Lamps

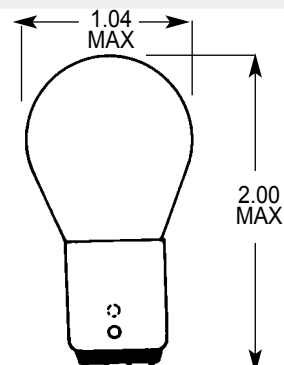
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S-8

MINIATURE LAMPS (D. C. Indexing Base)

THESE LAMPS ARE AVAILABLE IN NATURAL AMBER "NA".
SPECIFY "NA" AFTER THE LAMP NUMBER WHEN ORDERING.

*Specifications for second filament



LINE NO.	VOLTS	AMPS	MSCP	LIFE	*FILAMENT	DOUBLE CONTACT INDEX BASE
5						
6	6.4	2.63	21.0	200	C-6	1154
7	7.0	0.75	3.0	1,000	C-6	*
8	12.8	1.34	21.0	300	C-6	1016
9	14.0	0.59	6.0	1,500	C-6	*
10	12.8	1.44	21.0	1,000	C-6	1035
11	14.0	0.59	3.0	5,000	C-6	*
12	12.8	1.80	32.0	200	C-6	1034
13	14.0	0.59	3.0	5,000	C-6	*
14	12.8	2.10	32.0	1,200	C-6	1157
15	14.0	0.59	3.0	5,000	C-6	*
16	12.8	2.25	32.0	1,200	C-6	198
17	14.0	0.59	3.0	5,000	C-6	*
18	12.8	2.10	32.0	1,200	C-6	2057
19	14.0	0.48	2.0	5,000	C-6	*
20	28.0	0.93	32.0	400	CC-6	1662
21	28.0	0.34	6.0	1,000	C-2V (SUPPORTED)	*



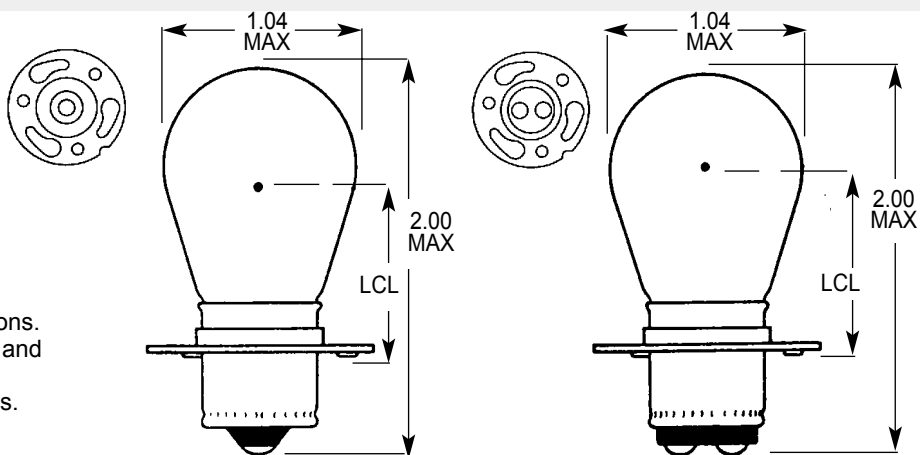
Miniature Lamps

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S-8 MINIATURE PREFOCUS LAMPS

"X" after part number denotes the following:

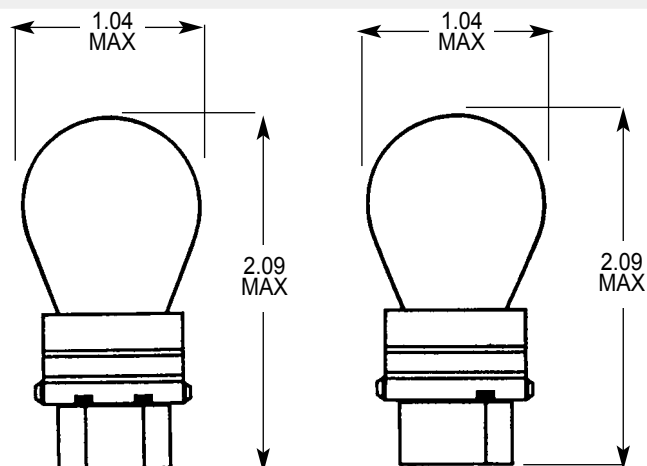
1. Entire lamp selected for minimum imperfections.
2. Lamp selected for exact filament positioning and brightness.
3. Lamp top selected for minimum imperfections.
4. Silver Contacts.



LINE NO.	VOLTS	AMPS	MSCP	LIFE	*FILAMENT	Single Contact Prefocus Base		Double Contact Prefocus Base	
						.88	LCL → 1.00	1.00	LCL → 1.25
1	5.1	1.75	4.8	1,000	C-2V			1565	
2	6.0	5.00	36.0	250	C-6	1615			
3	6.0	4.50	30.0	500	C-2R				1468
4	6.0	4.50	30.0	500	C-2R			1096	
5	6.5	2.75	23.0	100	FC-6Z				1649
6	6.5	2.75	23.0	100	C-6			1630	
7	6.5	2.75	23.0	100	C-6				1460X
8	6.5	2.75	23.0	100	C-6				1460
9	6.5	2.75	23.0	100	C-6			1631X	
10	20.0	1.00	24.0	200	CC-6				1634

S-8 SPECIAL AUTOMOTIVE WEDGE LAMPS

NA = NATURAL AMBER COLOR
ALSO AVAILABLE IN RED



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	D. F. WEDGE	S. F. WEDGE
11	12.0	2.00	21	1,500	C-6		3155
12	12.0	2.10	32	1,500	C-6		3156
13	12.0	2.10	32	1,500	C-6		3156NA
14	12.0	2.10/.48	32/2	1,500	C-6	3057	
15	12.0	2.10/.48	32/2	1,500	C-6	3057NA	
16	12.0	2.10/.48	32/3	1,500	C-6	3157	
17	12.0	2.10/.48	32/3	1,500	C-6	3157NA	

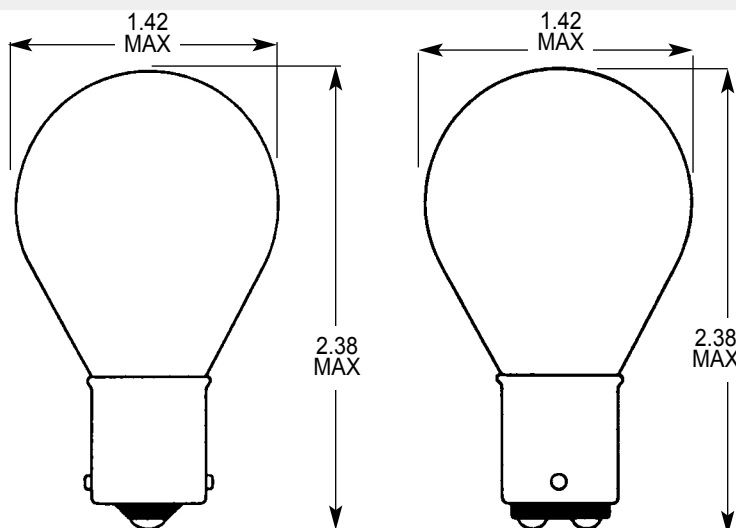


Miniature Lamps

Incandescence • Neon • European

S-11 MINIATURE LAMPS

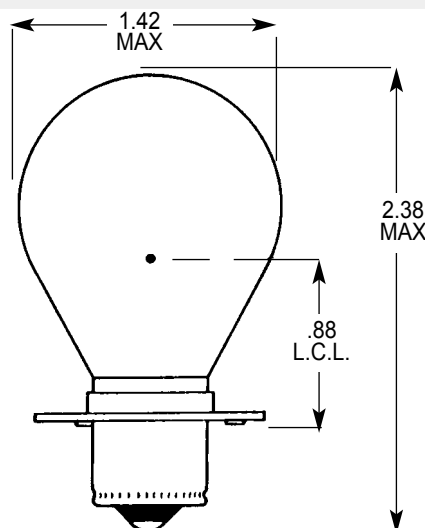
HIGH INTENSITY, SPECIAL APPLICATIONS



LINE NO.	VOLTS	AMPS	(WATTS) MSCP	LIFE HOURS	FILAMENT	SINGLE CONTACT BAYONET BASE	DOUBLE CONTACT BAYONET BASE
1	6.20	4.50	32.0	400	C-6	1723	1724
2	10.0	1.80	(18W)	1,000	CC-6	18S11-10V-SCB (18S11/1SC)	
3	10.0	2.50	(25W)	1,000	CC-6	25S11-10V-SCB (25S11/4SC)	
4	13.5	1.26	(17W)	1,000	CC-6	17S11-13.5V-SCB (17S11SC)	
5	28.00	0.90	32.0	300	CC-6	309	310
6	28.00	1.29	50.0	300	CC-6	311	312
7	28.00	1.29	50.0	300	CC-6	311-RED	312-RED
8	28.00	1.29	44.0	1,000	CC-6	3011	
9	32.00	0.98	(30W)	1,000	CC-2V		30S11-32V-DC
10	64.00	0.48	(30W)	1,000	CC-2V		30S11-64V-DC
11	75.00	0.20	(15W)	1,000	CC-2V		15S11-75V-DC
12	75.00	0.40	(30W)	1,000	CC-2V		30S11-75V-DC
13	120.00	0.08	(10W)	2,500	CC-5A	10S11-120V-SCB	

S-11 MINIATURE PREFOCUS LAMPS

HIGH INTENSITY



LINE NO.	VOLTS	AMPS	MSCP	LIFE HOURS	FILAMENT	SINGLE CONTACT PREFOCUS BASE
14	6.10	4.10	32.0	100	CC-6	1763
15	6.30	6.60	47.0	60	CC-6	1731



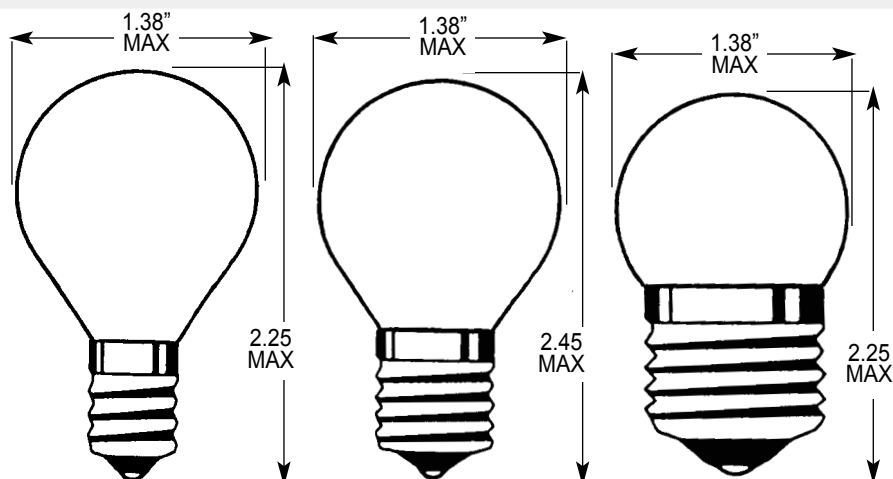
Miniature Lamps

Incandescenc • Neon • European

S-11 MINIATURE LAMPS

IF= Inside Frosted

CR = Ceramic Red TR = Transparent Red
CG = Ceramic Green TG = Transparent Green
CY = Ceramic Yellow TY = Transparent Yellow
CB = Ceramic Blue TB = Transparent Blue
CO = Ceramic Orange TA = Transparent Amber
CW = Ceramic White



LINE NO.	VOLTS	WATTS	LIFE @ 120 VOLTS	FILAMENT	CANDELABRA E-12 SCREW BASE	INTERMEDIATE E-17 SCREW BASE	MEDIUM E-27 SCREW BASE
1	28.0	25	3,500	CC-6	25S11-28V-CS		
2	130.0	10	4,500	C-5A	10S11-130V-CS	10S11N-130V-INT	
3	130.0	10	4,500	C-5A	10S11-130V-CS-IF	10S11N-130V-INT-IF	
4							
5	130.0	10	4,500	C-5A	10S11-130V-CR	10S11N-130V-INT-CR	
6	130.0	10	4,500	C-5A	10S11-130V-CG	10S11N-130V-INT-CG	
7	130.0	10	4,500	C-5A	10S11-130V-CY	10S11N-130V-INT-CY	
8	130.0	10	4,500	C-5A	10S11-130V-CB	10S11N-130V-INT-CB	
9	130.0	10	4,500	C-5A	10S11-130V-CO	10S11N-130V-INT-CO	
10	130.0	10	4,500	C-5A	10S11-130V-CW	10S11N-130V-INT-CW	
11							
12	130.0	10	4,500	C-5A	10S11-130V-TR	10S11N-130V-INT-TR	
13	130.0	10	4,500	C-5A	10S11-130V-TG	10S11N-130V-INT-TG	
14	130.0	10	4,500	C-5A	10S11-130V-TY	10S11N-130V-INT-TY	
15	130.0	10	4,500	C-5A	10S11-130V-TB	10S11N-130V-INT-TB	
16	130.0	10	4,500	C-5A	10S11-130V-TA	10S11N-130V-INT-TA	
17							
18	130.0	15	4,500	C-5A	15S11-130V-CS	15S11N-130V-INT	15S11-130V-MED
19	130.0	20	3,500	C-5A	15S11-130V-CS-IF	15S11N-130V-INT	20S11-130V-MED
20	130.0	25	3,500	C-5A		25S11N-130V-INT	25S11-130V-MED
21	130.0	25	3,500	C-5A		25S11N-130V-INT-IF	
22	120.0	25	3,500	C-5A	25S11-120V-CS		
23	120.0	25	3,500	C-5A	25S11-120V-CS-IF		
24	120.0	30	3,500	C-5A	30S11-130V-CS	30S11N-130V-INT	30S11-130V-MED
25	130.0	40	3,500	C-2F	40S11-130V-CS	40S11N-130V-INT	40S11-130V-MED
26	130.0	40	3,500	C-2F	40S11-135V-CS	40S11N-130V-INT-IF	
27	130.0	60	2,500	C-2F	60S11-130V-CS	60S11N-130V-INT	60S11-130V-MED
28	130.0	7.5	4,500	C-3A	7.5S11-130V-CS		7.5S11-130V-MED
29	130.0	7.5	4,500	C-3A			7.5S11-130V-CR
30	130.0	7.5	4,500	C-3A			7.5S11-130V-CG
31	130.0	7.5	4,500	C-3A			7.5S11-130V-CY
32	130.0	7.5	4,500	C-3A			7.5S11-130V-CB
33	130.0	7.5	4,500	C-3A			7.5S11-130V-CO
34	130.0	7.5	4,500	C-3A			7.5S11-130V-CW
35							
36	130.0	7.5	4,500	C-3A			7.5S11-130V-TR
37	130.0	7.5	4,500	C-3A			7.5S11-130V-TG
38	130.0	7.5	4,500	C-3A			7.5S11-130V-TY
39	130.0	7.5	4,500	C-3A			7.5S11-130V-TB
40	130.0	7.5	4,500	C-3A			7.5S11-130V-TA



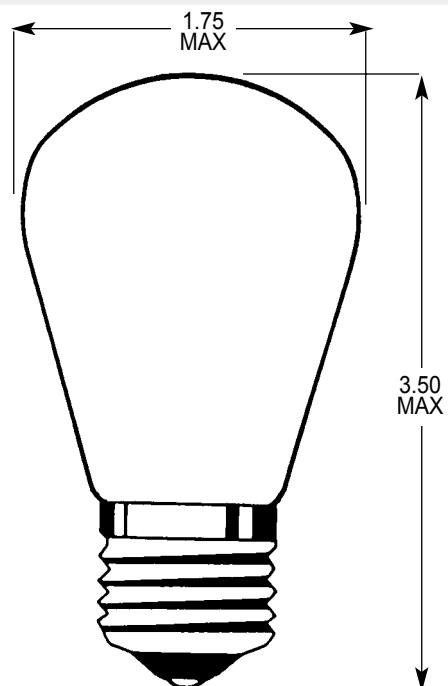
S-14 SIGN AND MARQUEE LAMPS

11 WATTS
130 VOLT – LONG LIFE FILAMENTS
5 FILAMENT SUPPORTS / ROUGH SERVICE DESIGN
BRASS BASES, CORROSION RESISTANT
NON-CRACKING / NON-FADING COLORS

TRUE S-14 SIZE & SHAPE LAMP

CUSTOM VOLTAGES AVAILABLE: 34V AND 230V

LONG LIFE: 8,000 ~ 10,000 HOURS



LINE NO.	VOLTS	WATTS	LIFE HOURS @ 120 VOLTS	FILAMENT	FINISH	MEDIUM E-27 SCREW BASE
1	130.0	11	8,000-10,000	C-9/RS	CLEAR	11S14-130V-MED
2	130.0	11	8,000-10,000	C-9/RS	FROSTED	11S14-130V-IF
3	130.0	11	8,000-10,000	C-9/RS	WHITE	11S14-130V-WHT
4						
5	130.0	11	8,000-10,000	C-9/RS	CERAMIC-RED	11S14-130V-CR
6	130.0	11	8,000-10,000	C-9/RS	CERAMIC-GREEN	11S14-130V-CG
7	130.0	11	8,000-10,000	C-9/RS	CERAMIC-YELLOW	11S14-130V-CY
8	130.0	11	8,000-10,000	C-9/RS	CERAMIC-BLUE	11S14-130V-CB
9	130.0	11	8,000-10,000	C-9/RS	CERAMIC-PINK	11S14-130V-CP
10	130.0	11	8,000-10,000	C-9/RS	CERAMIC-ORANGE	11S14-130V-CO
11						
12	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-RED	11S14-130V-TR
13	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-GREEN	11S14-130V-TG
14	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-YELLOW	11S14-130V-TY
15	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-BLUE	11S14-130V-TB
16	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-PINK	11S14-130V-TP
17	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-AMBER	11S14-130V-TA
18	130.0	11	8,000-10,000	C-9/RS	TRANSPARENT-PURPLE	11S14-130V-PURP
19						
20	230.0	11	3,500	CC-9	CLEAR	11S14-230V-MED
21	34.0	11	3,500	C-9	CLEAR	11S14-34V-MED

S-14 LAMPS LISTED ABOVE ARE MANUFACTURED TO EXACTING A.N.S.I. SPECIFICATIONS AS CALLED OUT FOR SIZE, SHAPE, COLOR, FILAMENT AND LIFE HOURS. NORMAN MANUFACTURES THE S-14 SERIES TO PROVIDE QUALITY AND DURABILITY WHICH FAR EXCEEDS THAT OF BRANDS PRODUCED IN CHINA AND SOUTH AMERICA. SAMPLES AVAILABLE ON REQUEST.

NOTE: S-14 LAMP LISTED ABOVE IS AVAILABLE IN A LONG LIFE, ENERGY SAVING VERSION.
(40,000 LIFE HOURS, 5 WATTS POWER CONSUMPTION.)

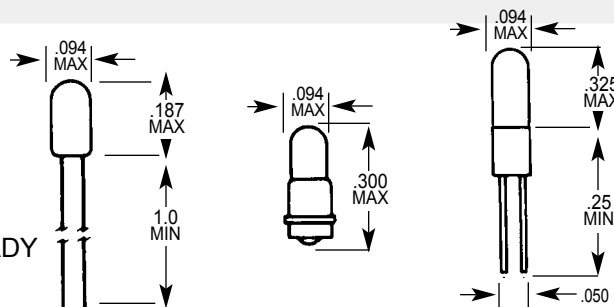


Miniature Lamps

Incandescence • Neon • European

T-3/4 MICRO-MINIATURE LAMPS

ALL WIRE TERMINAL LAMPS ARE TINNED AND SOLDER READY

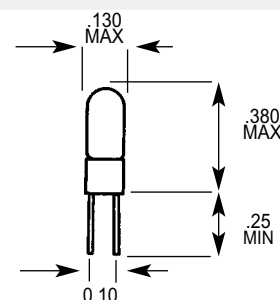


LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	WIRE TERMINAL	MICRO-MIDGET FLANGED BASE	BI-PIN BASE
1								
2	1.15	.090	.003	5,000	C-2R	8712	7120	7110
3	1.5	.015	.002	10,000	C-2R	7100	3810	7810
4	1.5	.015	.010	5,000	C-2R	7101	3811	7811
5	2.5	.110	.001	10,000	C-2R	8534	7121	7111
6	4.5	.022	.018	5,000	C-2R	3102		
7	4.5	.021	.017	5,000	C-2R	30		
8	5.0	.020	.020	10,000	C-2R	3411	3412	3413
9	5.0	.015	.020	1,000	C-2R	8537	8538	7538
10	5.0	.021	.034	10,000	C-2R	2	7122	7112
11								
12	5.0	.060	.030	100,000	C-2R	6803	8587	7113
13	5.0	.060	.050	100,000	C-2R	6833	8913	7114
14	5.0	.060	.150	3,000	C-2R	6153	6183	7115
15	5.0	.075	.090	25,000	C-2R	7133	8828	7116
16	5.0	.080	.150	15,000	C-2R	8666	8383	7117
17	5.0	.115	.150	40,000	C-2R	7153	8270	7118
18	5.0	.115	.200	5,000	C-2R	7102	7123	7119

T-1 SUB-MINIATURE LAMPS

SPECIAL BI-PIN BASE

* Pin Spacing: (.10") 2.54mm



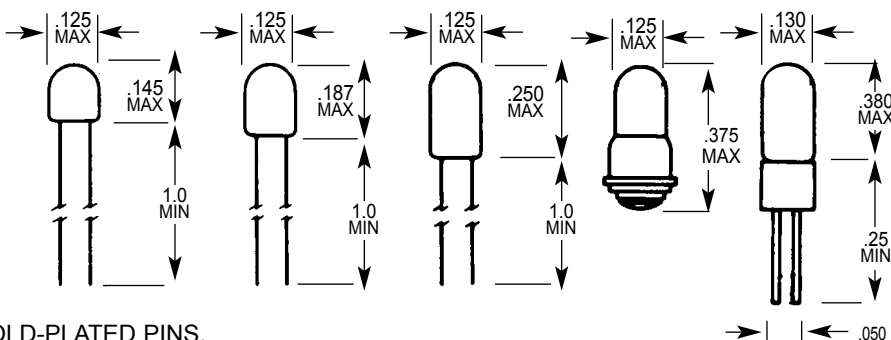
LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SPECIAL* BI-PIN BASE
19	5.0	.060	.050	100,000	C-2R	7683-100
20	5.0	.060	.150	5,000	C-2R	7265-100
21	5.0	.075	.090	25,000	C-2R	7714-100
22	5.0	.115	.150	40,000	C-2R	7715-100
23	12.0	.060	.150	16,000	C-2F	8097-100
24	18.0	.026	.150	16,000	C-2F	8099-100
25	28.00	.024	.150	16,000	CC-2F	7839-100



Miniature Lamps

Incandescence • Neon • European

T-1 SUB-MINIATURE LAMPS



*BI-PIN LAMPS ARE MANUFACTURED WITH GOLD-PLATED PINS.

LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	Wire Terminal			Sub-Midget Flanged Base	Bi-Pin*
						Short .145	Intermediate .187	Standard .250		
1	1.25	.012	.004	1,000	C-6			8798	7244	7252
2	1.35	.220	.020	25,000	C-2R			8910	7245	7253
3	1.50	.010	.002	10,000	C-6			7200	7225	3225
4	1.50	.015	.010	5,000	C-2R			7201	7226	7254
5	1.50	.075	.030	16,000	C-2R			7203	8102	7255
6	2.50	.015	.001	10,000	C-2R			8601	7246	7256
7	2.50	.100	.100	10,000	C-2R			8732	7247	7732
8	2.50	.320	.210	5,000	C-2R			8711	7248	7257
9	3.00	.008	.001	16,000	C-2R			8846	7249	7258
10	3.00	.008	.010	16,000	C-2R			7204	7228	7204P
11	3.00	.0125	.001	16,000	C-2R			2128	679	7259
12	3.00	.015	.020	5,000	C-2R			7205	7229	3229
13	3.00	.060	.030	100,000	C-2R			7207	7231	7260
14	3.00	.120	.150	16,000	C-2R			7208	7232	7261
15	5.00	.015	.020	10,000	C-2V			7209	7233	7209P
16	5.00	.017	.005	10,000	C-2R			8602	8605	7262
17	5.00	.021	.034	10,000	C-2R	2022	3022	6022	8022	7022
18	5.00	.030	.030	75,000	C-2R			7210	7234	7263
19	5.00	.045	.040	10,000	C-2R			8729	7250	7264
20	5.00	.060	.030	100,000	C-2R	6802	6801	680	682	7680
21	5.00	.060	.050	100,000	C-2R	6832	6831	683	685	7683
22	5.00	.060	.150	5,000	C-2R	6152	6151	6150	6180	7265
23	5.00	.075	.090	25,000	C-2R	7132	7131	713	714	7714
24	5.00	.080	.160	3,000	C-2R	6212	6211	7211	7235	7266
25	5.00	.115	.150	40,000	C-2R	7152	7151	715	718	7715
26	5.00	.115	.200	5,000	C-2R	7212	3211	7213	7236	7267
27	5.00	.125	.220	5,000	C-2R	8175	8179	7216	7239	7268
28	5.00	.145	.160	10,000	C-2R			8096	7251	7269
29	10.00	.027	.100	10,000	C-2F			7218	7240	8095
30	12.00	.060	.150	16,000	C-2F			7219	32	8097
31	14.00	.065	.150	16,000	C-2F			8111	8112	8098
32	18.00	.026	.150	16,000	C-2F			7220	7241	8099
33	24.00	.025	.130	25,000	C-2F			124F	124P	
34	28.00	.024	.150	16,000	CC-2F	7009		6838	6839	7839
35	28.00	.016	.072	2,500	CC-2F				3335	

NOTE: ALL WIRE TERMINAL LAMPS LISTED ABOVE ARE SUPPLIED IN SOLDER-READY CONDITION.

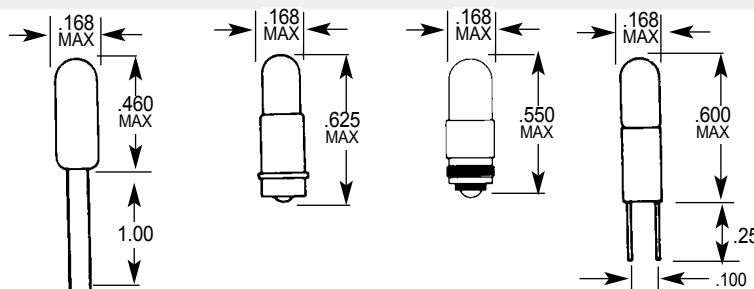


Miniature Lamps

Incandescence • Neon • European

T-1 1/4 SUB-MINIATURE LAMPS

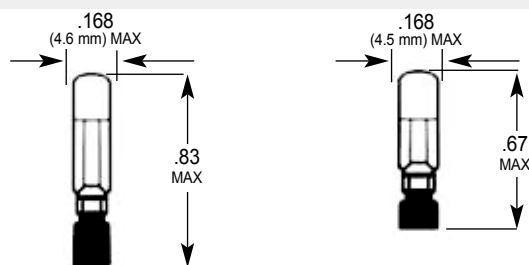
WIRE TERMINAL LAMPS ARE TINNED
AND SOLDER READY



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	Wire Terminal	Special Midget Flanged Base	Special Midget Screw Base	Special Bi-Pin Base
1	1.30	.030	0.006	3,000	S-2	2135	7302	7303	7306
2	1.35	.060	0.006	500	C-2R	8631	8636	8641	7636
3	2.50	.400	0.550	30	C-2R	8655	8656	329	7307
4	3.00	.190	0.250	350	C-2R	324	8637	325	7637
5	4.50	.285	1.050	100	C-2R	8816	7305	673	7308
6	5.00	.060	0.030	100,000	C-2R	580	3582	3580	7580
7	5.00	.060	0.050	100,000	C-2R	583	3585	3583	7683
8	5.00	.115	0.150	40,000	C-2R	515	3518	3515	7515
9	6.00	.040	0.030	1,000	C-2V	8661	8660	8662	7660
10	6.00	.060	0.130	3,000	C-2R	2114	8541	371	7309
11	6.00	.200	0.630	1,000	C-2R	634	8628	8645	7628
12	6.30	.200	0.550	5,000	C-2R	8610	8551	8552	7310
13	10.00	.014	0.004	10,000	C-2F	8608	8609	8606	7311
14	14.00	.080	0.500	1,000	C-2F	8640	8646	8644	7646
15	28.00	.040	0.320	1,000	C-2F	8627	8632 = 737	8635	7632

T-1 1/4 MINIATURE LAMPS

EUROPEAN "LILIPUT" LAMPS



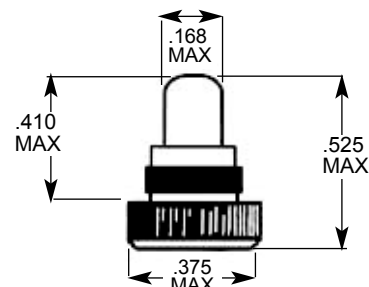
LINE NO.	VOLTS	AMPS	LUMENS	LIFE	FILAMENT	SLIDE BASE T4.6 LILIPUT	SLIDE BASE T4.5 LILIPUT
16	6.0	.02	0.30	5,000	C-2V	T4.6-6V-20MA	T4.5-6V-20MA
17	6.0	.04	0.60	5,000	C-2V	T4.6-6V-40MA	T4.5-6V-40MA
18	6.0	.05	1.10	5,000	C-2V	T4.6-6V-50MA	T4.5-6V-50MA
19	12.0	.02	0.40	5,000	C-2V	T4.6-12V-20MA	T4.5-12V-20MA
20	12.0	.04	1.20	5,000	C-2V	T4.6-12V-40MA	T4.5-12V-40MA
21	12.0	.05	2.00	5,000	C-2V	T4.6-12V-50MA	T4.5-12V-50MA
22	24.0	.02	0.80	5,000	C-2F	T4.6-24V-20MA	T4.5-24V-20MA
23	24.0	.04	3.00	5,000	C-2F	T4.6-24V-40MA	T4.5-24V-40MA
24	24.0	.05	4.10	5,000	C-2F	T4.6-24V-50MA	T4.5-24V-50MA
25							
26	28.0	.02	2.00	5,000	C-2F	T4.6-28V-20MA	T4.5-28V-20MA
27	28.0	.04	4.10	5,000	C-2F	T4.6-28V-40MA	T4.5-28V-40MA
28	28.0	.05	4.90	5,000	C-2F	T4.6-28V-50MA	T4.5-28V-50MA
29	48.0	.02	1.60	5,000	CC-2F	T4.6-48V-20MA	T4.5-48V-20MA
30	48.0	.04	4.50	5,000	CC-2F	T4.6-48V-40MA	T4.5-48V-40MA
31	48.0	.05	5.20	5,000	CC-2F	T4.6-48V-50MA	T4.5-48V-50MA
32	60.0	.02	2.00	5,000	CC-2F	T4.6-60V-20MA	T4.5-60V-20MA
33	60.0	.04	4.00	5,000	CC-2F	T4.6-60V-40MA	T4.5-60V-40MA
34	60.0	.05	7.00	5,000	CC-2F	T4.6-60V-50MA	T4.5-60V-50MA



T-1 1/4

SPECIAL "KNURLED" SCREW

MANUFACTURED TO MILITARY SPECIFICATIONS
SOLID BRASS BASE



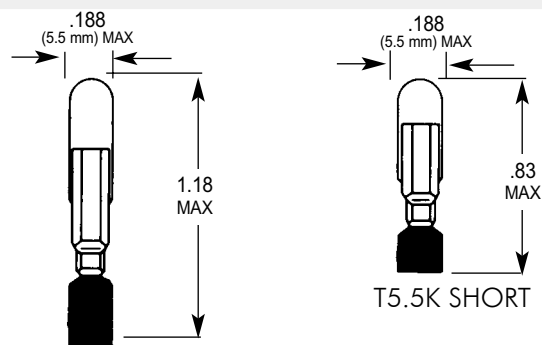
LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	KNURLED SCREW BASE
1	28.0	.040	.320	1,000	C-2F	8623
2	28.0	.040	.320	1,000	C-2F	8623 RED *

* MANUFACTURED IN COATED RED CONFORMING TO LATEST MIL.-SPEC. STANDARD FOR "AVIATION RED" LAMPS.

T-1 1/2

MINIATURE LAMPS

EUROPEAN "LILIPUT" LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	SLIDE BASE T5.5 LILIPUT	SLIDE BASE T5.5K SHORT LILIPUT
3	6.0	.02	0.30	5,000	C-2V	T5.5-6V-20MA	T5.5K-6V-20MA
4	6.0	.04	0.60	5,000	C-2V	T5.5-6V-40MA	T5.5K-6V-40MA
5	6.0	.05	1.10	5,000	C-2V	T5.5-6V-50MA	T5.5K-6V-50MA
6	12.0	.02	0.40	5,000	C-2V	T5.5-12V-20MA	T5.5K-12V-20MA
7	12.0	.04	1.20	5,000	C-2V	T5.5-12V-40MA	T5.5K-12V-40MA
8	12.0	.05	2.00	5,000	C-2V	T5.5-12V-50MA	T5.5K-12V-50MA
9	12.0	.10	3.10	5,000	C-2V	T5.5-12V-100MA	—
10	24.0	.020	.80	5,000	C-2F	T5.5-24V-20MA	T5.5K-24V-20MA
11	24.0	.04	3.00	5,000	C-2F	T5.5-24V-40MA	T5.5K-24V-40MA
12	24.0	.054	.10	5,000	C-2F	T5.5-24V-50MA	T5.5K-24V-50MA
13							
14	28.0	.02	2.00	5,000	C-2F	T5.5-28V-20MA	T5.5K-28V-20MA
15	28.0	.04	4.10	5,000	C-2F	T5.5-28V-40MA	T5.5K-28V-40MA
16	28.0	.05	4.90	5,000	C-2F	T5.5-28V-50MA	T5.5K-28V-50MA
17	48.0	.02	1.60	5,000	CC-2F	T5.5-48V-20MA	T5.5K-48V-20MA
18	48.0	.04	4.50	5,000	CC-2F	T5.5-48V-40MA	T5.5K-48V-40MA
19	48.0	.05	5.20	5,000	CC-2F	T5.5-48V-50MA	T5.5K-48V-50MA
20	60.0	.02	2.00	5,000	CC-2F	T5.5-60V-20MA	T5.5K-60V-20MA
21	60.0	.04	4.00	5,000	CC-2F	T5.5-60V-40MA	T5.5K-60V-40MA
22	60.0	.05	7.00	5,000	CC-2F	T5.5-60V-50MA	T5.5K-60V-50MA



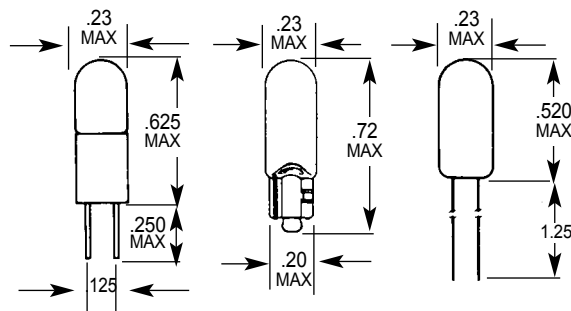
Miniature Lamps

Incandescence • Neon • European

T-1 3/4

SUB-MINIATURE LAMPS

Wire Terminal Lamps are tin plated for solder-ready applications.
Bi-Pin Lamps are manufactured with gold plated pins.



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	BI-PIN BASE	WEDGE BASE	WIRE TERMINAL
1	1.30	.050	.020	50	S-2			2184
2	1.35	.060	.010N	500	C-2R	7931		1728
3	2.00	.060	.020	5,000	C-2R			2119
4	2.50	.200	.220	500	C-2R	7968		1783
5	2.50	.350	.210	10,000	C-2R	7868		2169
6	2.70	.060	.040	6,000	C-2R	7838		1738
7	4.50	.120	.050	25,000	C-2V	7359		2171
8	5.00	.017	.018N	8,000	C-2R	7950		3950
9	5.00	.060	.050	100,000	C-2R	7361		2200
10	5.00	.060	.030	100,000	C-2R	7360		8805
11	5.00	.115	.150	40,000	C-2R	7362	56	2203
12	5.00	.190	.450	1,000	C-2R	7363		8784
13	6.00	.036	.014	40,000	C-2V			2191
14	6.00	.040	.030	10,000	C-2V	7945		1730
15	6.00	.200	.600	1,000	C-2R	7328	79	1784
16	6.00	.200	.100	50,000	C-2F	7364		8664
17	6.00	.220	.630	3,000	C-2R	7365		
18	6.30	.040	.020N	50,000	C-2V	7380		2180
19	6.30	.040	.030	20,000	C-2V		84	2179
20	6.30	.075	.220	500	C-2R	7377		1739
21	6.30	.150	.450	3,000	C-2R	7368		8350
22	6.30	.200	.400	50,000	C-2F	7381	86	2181
23	6.30	.200	.550	3,000	C-2R	7349		2112
24	10.00	.010	.006	50,000	C-2F			2149
25	10.00	.014	.002N	10,000	C-2F	7344		1869
26	10.00	.040	.080	5,000	C-2F	7367		2107
27	11.00	.022	.030	10,000	C-2F	7369		8946
28	14.00	.040	.130	5,000	C-2F		18	
29	12.00	.040	.120	10,000	C-2F	7371		2174
30	14.00	.080	.300	40,000	C-2F		73	2382X
31	14.00	.080	.300	50,000	C-2F	7382		2182
32	14.00	.080	.500	1,500	C-2F	7330	37	1705
33	14.00	.100	.500	10,000	C-2F	7373		2162
34								
35	14.00	.100	.500	10,000	C-2F		70	
36	18.00	.040	.150	10,000	C-2F	7370		2102
37	14.00	0.16	.700	1,500	C-2F		74	
38	22.00	.040	.300	2,000	C-2F	7459		8425
39	24.00	.050	.500	2,000	C-2F	7001		2176
40	28.00	.040	.340	7,000	C-2F	7327		1764
41	28.00	.040	.300	25,000	C-2F	7387	85	2187
42	28.00	.040	.340	4,000	C-2F			1762
43	28.00	.040	.340	4,000	C-2F			2148
44	28.00	.040	.200	50,000	C-2F	7374		2185
45	28.00	.060	.340	25,000	C-2F	7876		1764LSV
46	28.00	.065	.650	5,000	C-2F	7376	17	8361
47	48.00	.025	.200	5,000	CC-2F			6748

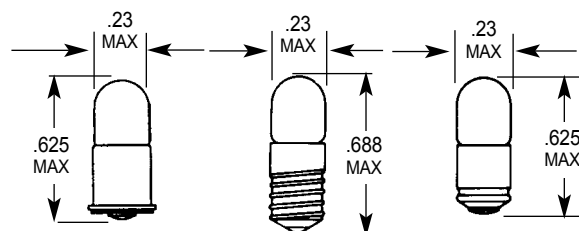


Miniature Lamps

Incandescence • Neon • European

T-1 3/4 SUB-MINIATURE LAMPS

*QPL - 6363 CERTIFIED BY THE DEPARTMENT OF DEFENSE.



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	* Midget Flanged Base	Midget Screw Base	Midget Grooved Base
1								
2	1.35	.060	.010N	500	C-2R	331	8669	698
3	2.47	.300	.450	30	C-2R	251		
4	2.50	.200	.220	500	C-2R	368	1769	8699
5	2.50	.350	.210	10,000	C-2R	268	7312	266
6	2.50	.400	.550	30	C-2R	343	8671	8703
7	2.70	.060	.040	6,000	C-2R	338	8693	8704
8	3.00	.015	.003N	10,000	C-6	375	7313	390
9	3.00	.030	.020N	1,800	C-6	7329	7314	7343
10	4.50	.120	.050	25,000	C-2V	7331	7315	7345
11								
12	5.00	.017	.018N	8,000	C-2R	8950	2950	6950
13	5.00	.060	.050	100,000	C-2R	7333	7318	7347
14	5.00	.060	.150	5,000	C-2R	3150 (M6363/8-1)	3153	3152
15	5.00	.060	.030	100,000	C-2R	7332	7316	7346
16	5.00	.115	.150	40,000	C-2R	7335	7319	7348
17	5.00	.190	.450	1,000	C-2R	7334	7317	7350
18	6.00	.040	.030	10,000	C-2V	345	342	8705
19	6.00	.200	.600	1,000	C-2R	328 (M6363/8-2)	1768	337
20	6.00	.200	.100	50,000	C-2F	7336	8687	8706
21								
22								
23	6.30	.040	.020N	50,000	C-2V	380	7320	7351
24	6.30	.075	.220	500	C-2R	377	1775	8708
25	6.30	.150	.450	3,000	C-2R	350	7321	7352
26	6.30	.200	.400	50,000	C-2F	381 (M6363/8-3)	378	379
27	6.30	.200	.550	3,000	C-2R	349	7323	398
28	10.00	.014	.002N	10,000	C-2F	344	8691	709
29	10.00	.040	.080	3,000	C-2F	367	389	397
30	10.00	.040	.080	5,000	C-2F	367X		
31								
32	11.00	.022	.030	10,000	C-2F	7338	7325	7353
33	12.00	.040	.120	10,000	C-2F	394	7326	7354
34	14.00	.080	.300	50,000	C-2F	382	8362	
35	14.00	.080	.500	1,500	C-2F	330	373	336
36	14.00	.080	.300	40,000	C-2F			386
37	14.00	.100	.500	10,000	C-2F		8162	
38	14.00	.100	.500	10,000	C-2F	8918 (M6363/8-4)		393
39	18.00	.040	.150	10,000	C-2F	370	8536	346
40	22.00	.040	.300	2,000	C-2F	459	8437	457
41								
42	24.00	.050	.500	2,000	C-2F	8176	8178	8177
43	28.00	.024	.150	16,000	C-2F	6034		
44	28.00	.040	.340	7,000	C-2F	327 (M6363/8-5)	335	334
45	28.00	.040	.300	25,000	C-2F	387 (M6363/8-7)	399	388
46	28.00	.040	.200	50,000	C-2F	385 (M6363/8-6)	8384	7355
47	28.00	.060	.340	25,000	C-2F	376	335LSV	334LSV
48	28.00	.065	.650	5,000	C-2F	7341	8369	7356
49	48.00	.025	.200	5,000	CC-2F	6848	—	—
50	60.00	.020	.250	5,000	CC-2F	—	—	6201



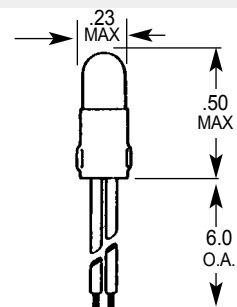
Miniature Lamps

Incandescence • Neon • European

T-1 3/4 “FLYING LEAD” WIRE LAMPS

6" INSULATED WIRE LEADS, STRIPPED AND TINNED.
LONG LIFE

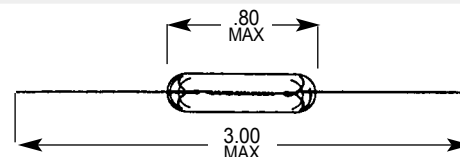
Color lens caps available (See below)



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	WIRE TERMINAL
1	6.0	0.20	0.40	50,000	C-2R	2181-6
2	12.0	0.08	0.30	50,000	C-2F	2182-6
3	28.0	0.04	0.30	50,000	C-2F	2187-6

T-1 3/4 MINIATURE “AXIAL LEAD” LAMPS

BEAD SEALED AT BOTH ENDS, 360° LIGHT VIEWING

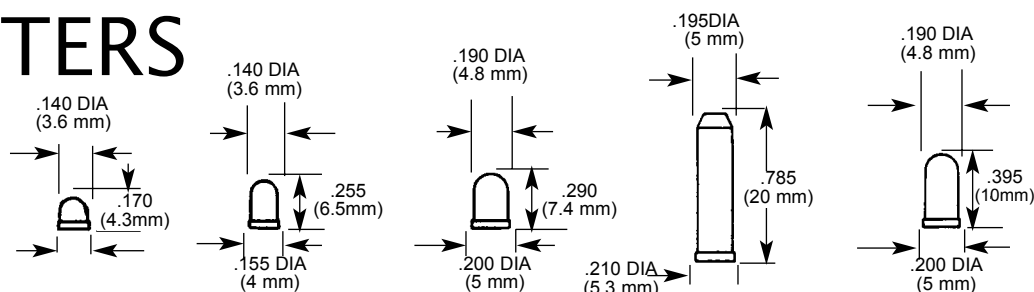


LINE NO.	VOLTS	AMPS	WATTS	LIFE	CROSS REFERENCE	AXIAL WIRE TERMINAL
4	6.0	.200	1.20	10,000	AL506	AL522-63200
5	8.0	.200	1.60	10,000	AL508	AL522-80200
6	12.0	.150	1.80	10,000	AL512	AL522-120150
7	24.0	.045	1.20	5,000	AL552	AL522-24045



COLOR FILTERS "BOOTS"

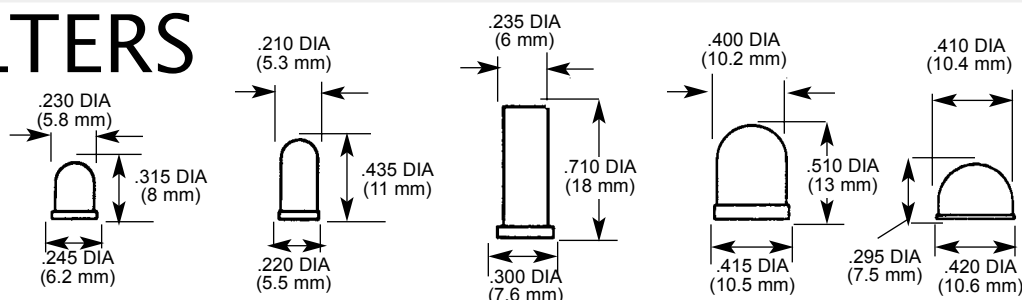
100% SILICONE COMPOSITION



LINE NO.	COLOR	T-1 STANDARD	T-1 LONG	T-1 ^{1/4} STANDARD	T-1 ^{1/4} AXIAL	T-1 ^{1/4} LONG
1	RED	85-01-1	85-02-1	85-03-1	85-04-1	85-05-1
2	GREEN	85-01-5	85-02-5	85-03-5	85-04-5	85-05-5
3	YELLOW	85-01-7	85-02-7	85-03-7	85-04-7	85-05-7
4	BLUE	85-01-6	85-02-6	85-03-6	85-04-6	85-05-6
5	WHITE	85-01-4	85-02-4	85-03-4	85-04-4	85-05-4
6	ORANGE	85-01-3	85-02-3	85-03-3	85-04-3	85-05-3

COLOR FILTERS "BOOTS"

100% SILICONE COMPOSITION



LINE NO.	COLOR	T-1 ^{3/4} STANDARD	T-1 ^{3/4} LONG	T-2 STD.	T-3 ^{1/4} STD.	G-3 ^{1/2} STD.
7	RED	85-06-1	85-07-1	85-08-1	85-09-1	85-10-1
8	GREEN	85-06-5	85-07-5	85-08-5	85-09-5	85-10-5
9	YELLOW	85-06-7	85-07-7	85-08-7	85-09-7	85-10-7
10	BLUE	85-06-6	85-07-6	85-08-6	85-09-6	85-10-6
11	WHITE	85-06-4	85-07-4	85-08-4	85-09-4	85-10-4
12	ORANGE	85-06-3	85-07-3	85-08-3	85-09-3	85-10-3

FEATURES

REUSABLE:

No need to stock colored lamps. When a lamp burns out, reuse filter on new lamp.

INTERCHANGEABLE:

Simply change color filter – not the entire lamp.

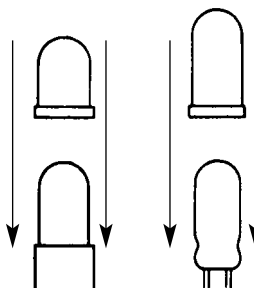
NON-BREAKABLE:

Eliminates problems with fragile glass or molded plastic filters encountered in shipping or in use.

COLOR:

Even distribution of color over entire boot surface. Non-fading colors. Can be ordered pre-installed on lamp. Custom Color Matching available.

INSTALLATION





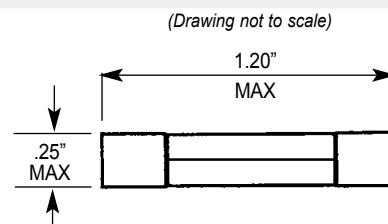
Miniature Lamps

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T-1^{3/4}

MINIATURE "FUSE" LAMPS

DOUBLE GLASS ENVELOPE (3AG SIZE)

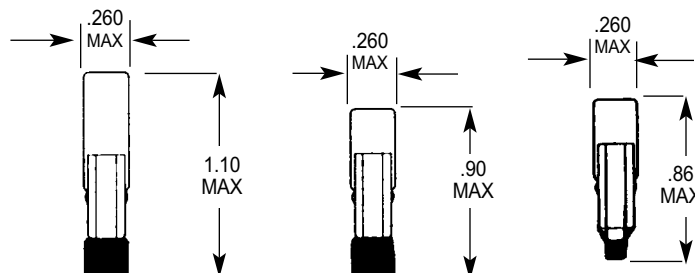


LINE NO.	VOLTS	AMPS	MSCP	LIFE	FUSE TYPE END CAPS
1	6.0	.100	.10	10,000	GF540
2	6.0	.200	.40	5,000	GF550
3	6.3	.250	.64	10,000	GF570
4	6.3	.300	.64	10,000	GF560
5					
6	8.0	.150	.40	10,000	GF660
7	8.0	.200	.56	10,000	GF650
8	8.0	.250	.64	10,000	GF670
9	8.0	.300	.90	10,000	GF680
10					
11	12.0	.100	.23	10,000	GF710
12	12.0	.150	.40	5,000	GF780
13	12.6	.300	.64	5,000	GF740
14					
15	24.0	.045	.14	1,000	GF692



T-2 MINIATURE LAMPS

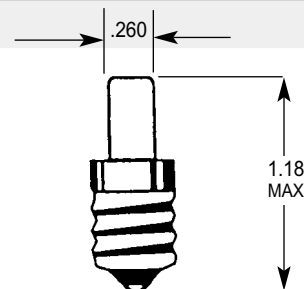
TELEPHONE SLIDE BASE
(QPL LISTED)



LINE NO.	VOLTS	AMPS	END FOOT CANDLES	LIFE	FILAMENT	ANSI #5 SLIDE BASE	ANSI #5 SLIDE BASE	ANSI #6 SLIDE BASE
1	4.0	.040	200	10,000	C-6		4ESB	
2	4.5	.200	850	10,000	C-6		2391121(I.B.M.)	
3	6.0	.040	250	5,000	C-2F		6ESB	
4	6.0	.140	500	5,000	C-2F	6PSB		
5	10.0	.017	60	5,000	C-2F		10CSB	
6	10.0	.040	450	10,000	C-2V		10ESB	
7	10.0	.036	300	10,000	C-6			51A
8	12.0	.040	650	5,000	C-2V		12ESB	
9	12.0	.170	2,000	5,000	C-2F	12PSB		
10	16.0	.017	80	5,000	C-2F		16CSB	
11	16.0	.040	800	5,000	C-2F		16ESB	
12	18.0	.040	850	5,000	C-2F		18ESB	
13	24.0	.017	100	15,000	C-2F		24CSB	
14	24.0	.040	850	8,000	C-2F		24ESB	
15	24.0	.073	3,000	10,000	C-2F	24PSB		
16	24.0	.003	500	8,000	C-2F			52A
17	28.0	.040	1,500	6,000	C-2F		28ESB	
18	28.0	.040	1,600	5,000	C-2F	28PSB		
19	35.0	.050	1,800	8,000	C-2F	35PSB		
20	48.0	.040		5,000	CC-2F		48ESB	
21	48.0	.050	1,800	10,000	C-7A	48PSB		
22	60.0	.050	2,600	5,000	C-7A	60PSB		
23	90.0	.035	1,200	10,000	CC-7A	90PSB		
24	120.0	.025	1,200	10,000	CC-7A	120PSB		
25	155.0	.025	1,200	10,000	CC-7A	155PSB		

T-2 MINIATURE LAMPS

EXCLUSIVE DESIGN



LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	CANDELABRA SCREW BASE
26	120.0	.025	3	7,500	CC-7A	120C



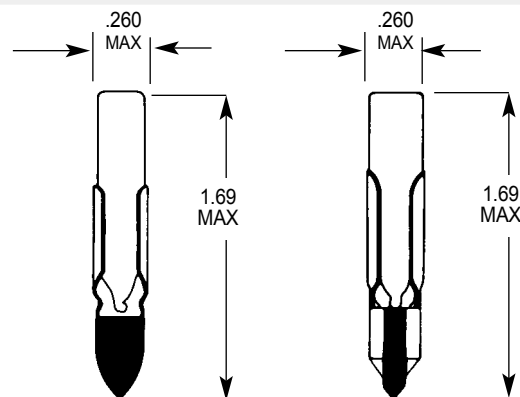
Miniature Lamps

Incandescence • Neon • European

T-2

MINIATURE LAMPS

TELEPHONE SLIDE BASE



LINE NO.	VOLTS	AMPS	END FOOT CANDLES	LIFE	FILAMENT	ANSI #1 SLIDE BASE	ANSI #2 (Sylvania #3 Slide Base) SLIDE BASE
1	4.0	.190	450	5,000	C-2V	4A-1	4A-2
2	6.0	.040	180	4,000	C-2V	6C-1	6C-2
3	6.0	.140	510	15,000	C-2V	6A-1	6A-2
4	6.0	.290	270	15,000	C-2F	6B-1	6B-2
5	8.0	.090	600	1,000	C-2F	8A-1	8A-2
6	10.0	.110	600	10,000	C-2V	10A-1	10A-2
7	12.0	.100	1,200	8,000	C-2F	12A-1	12A-2
8	12.0	.170	1,500	5,000	C-2V	12C-1	12C-2
9	16.0	.100	720	5,000	C-2F	16A-1	16A-2
10	16.0	.290	840	5,000	C-7A	16B-1	16B-2
11	18.0	.040	800	1,000	C-2F	18A-1	18A-2
12	18.0	.100	600	5,000	C-2F	18B-1	18B-2
13	20.0	.034	600	1,000	C-2V	20C-1	20C-2
14	24.0	.030	600	1,000	C-2F	24A-1	24A-2
15	24.0	.035	600	8,000	C-2F	24E-1	24E-2
16	24.0	.035	600	5,000	C-2F		24X
17	24.0	.040	1,000	4,000	C-2F	24B-1	24B-2
18	24.0	.072	1,400	6,000	C-2F	24C-1	24C-2
19	24.0	.090	1,120	7,000	C-2F	24F-1	24F-2
20	24.0	.100	1,500	5,000	C-7A	24D-1	24D-2
21	24.0	.032	350	5,000	C-2F	24EX	
22	30.0	.038	1,500	3,000	C-2F		30X
23	30.0	.072	2,000	3,000	C-7A	30A-1	30A-2
24	30.0	.100	3,000	4,000	C-7A	30B-1	30B-2
25	35.0	.040	1,000	7,500	C-2F	35A-1	35A-2
26	35.0	.072	700	5,000	C-7A	35B-1	35B-2
27	35.0	.100	750	5,000	C-7A	35C-1	35C-2
28	44.0	.070	1,250	1,000	C-7A	44A-1	44A-2
29	48.0	.021	100	20,000	C-7A	48D-1	48D-2
30	48.0	.035	425	10,000	C-7A	48C-1	48C-2
31	48.0	.072	2,000	5,000	C-7A	48A-1	48A-2
32	48.0	.100	2,200	5,000	C-7A	48B-1	48B-2
33	55.0	.050	1,400	5,000	C-7A	55C-1	55C-2
34	55.0	.100	1,800	5,000	C-7A	55B-1	55B-2
35	60.0	.050	1,600	5,000	C-7A	60A-1	60A-2

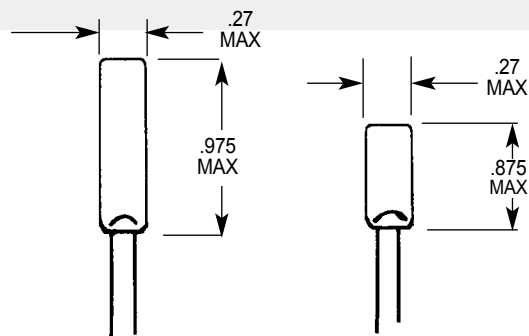


Miniature Lamps

Incandescence • Neon • European

T-2 MINIATURE LAMPS

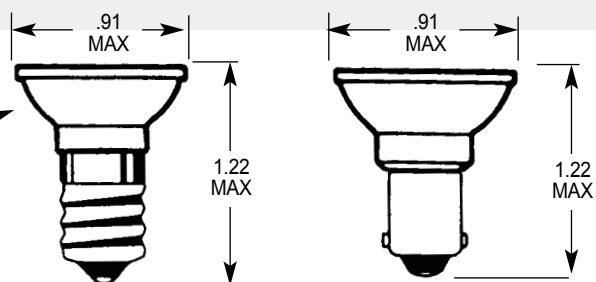
SOLDER-READY TERMINALS



LINE NO.	VOLTS	AMPS	END FOOT CANDLES	LIFE	FILAMENT	WIRE TERMINAL (LONG)	WIRE TERMINAL (SHORT)
1	4.0	.040	200	10,000	C-6		4ES
2	6.0	.140	500	5,000	C-2F	6PS	
3	6.0	.040	250	10,000	C-2V		6ES
4	10.0	.017	60	5,000	C-2V		10CS
5	10.0	.040	450	5,000	C-2V		10ES
6	12.0	.040	650	10,000	C-2V		12ES
7	12.0	.170	2,000	10,000	C-2F	12PS	
8	16.0	.017	80	5,000	C-2V		16CS
9	16.0	.040	800	5,000	C-2F		16ES
10							
11	18.0	.040	850	10,000	C-2F		18ES
12	24.0	.017	100	8,000	C-2F		24CS
13	24.0	.040	850	8,000	C-2F		24ES
14	24.0	.073	3,000	10,000	C-2F	24PS	
15	28.0	.040	1,500	8,000	C-2F		28ES
16	28.0	.040	1,600	10,000	C-2F	28PS	
17	48.0	.040	2,000	10,000	CC-2F		48ES
18	48.0	.053	1,800	5,000	C-7A	48PS	
19	60.0	.050	2,600	5,000	C-7A	60PS	
20							
21	120.0	.025	1,200	8,000	CC-7A	120PS	

T-2 ANNUNCIATOR LAMPS

ALUMINIZED REFLECTOR



LINE NO.	VOLTS	AMPS	WATTS	LIFE	CANDELABRA SCREW BASE	MINIATURE BAYONET BASE
22	6.0	.140	0.8	20,000	6RC	6RB
23	12.0	.170	2.0	12,000	12RC	12RB
24	24.0	.073	1.7	10,000	24RC	24RB
25	28.0	.040	1.1	5,000	28RC	28RB
26	48.0	.050	2.4	10,000	48RC	48RB
27	60.0	.050	3.0	7,500	60RC	60RB
28	120.0	.025	3.0	7,500	120RC (NE-120RC=NEON)	120RB

Norman Annunciator lamps are designed for use in elevator panels, pushbutton stations, indirect decorative lighting and general signalling applications where a relatively high candlepower miniature light source is necessary. A high degree of light control is made possible by a self-contained aluminized reflector.

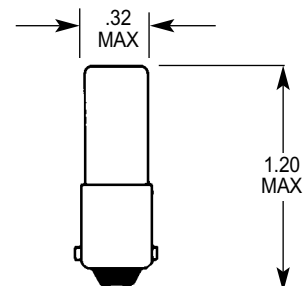


Miniature Lamps

Incandescence • Neon • European

T-2^{1/2}

MINIATURE LAMPS

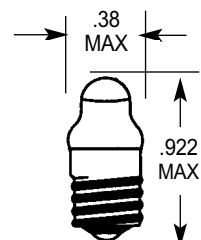
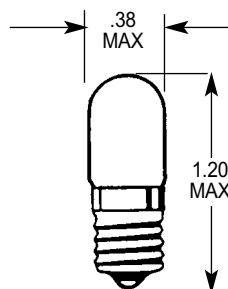


LINE NO.	VOLTS	AMPS	LUMENS	LIFE	FILAMENT	MINIATURE BAYONET BASE
1						
2	6.0	.140	0.12	20,000	C-2F	6MB
3	12.0	.170	0.35	12,000	C-2F	12MB
4	24.0	.070	0.50	10,000	C-2F	24MB
5	28.0	.040	0.29	5,000	C-2F	28MB
6	48.0	.053	0.70	5,000	C-7A	48MB
7	60.0	.050	0.73	7,500	C-7A	60MB
8	90.0	.045	0.75	10,000	CC-7A	90MB
9	120.0	.025	0.36	10,000	CC-7A	120MB
10	130.0	.030	0.70	10,000	CC-7A	130MB
11	155.0	.025	0.35	10,000	CC-7A	155MB
12	240.0	.010	0.60	10,000	CC-7A	240MB

T-3

MINIATURE LAMPS

"X" DENOTES KRYPTON GAS FILLED LAMP



GTL-3
LENS END

LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE SCREW BASE	MINIATURE SCREW BASE
13	1.20	0.22	—	5	S-2		112
14	2.25	0.25	—	5	C-2R		222
15	2.25	0.25	—	25	C-2R		222X
16	2.33	0.27	—	10	C-6		243
17	3.80	0.22	—	20	C-6		246
18							
19	14.0	0.17	1.7	250	C-2V	1474	
20	18.0	0.17	2.2	250	C-2V	1476	
21	24.0	0.17	3.3	250	C-2F	1477	

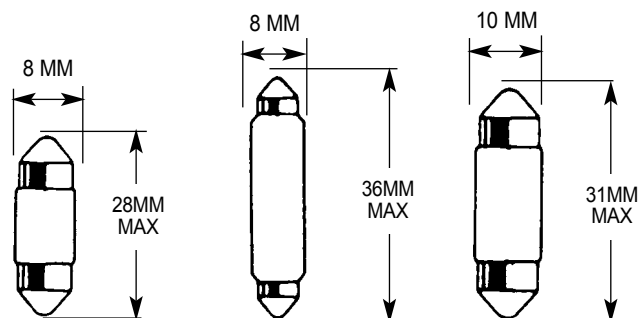


T-3

FESTOON LAMPS

(-) DENOTES NON -STOCK LAMP TYPE.
2,000 PC. MINIMUM PRODUCTION RUN ON ALL NON-STOCK
FESTOON LAMPS.

360° LIGHT VIEWING



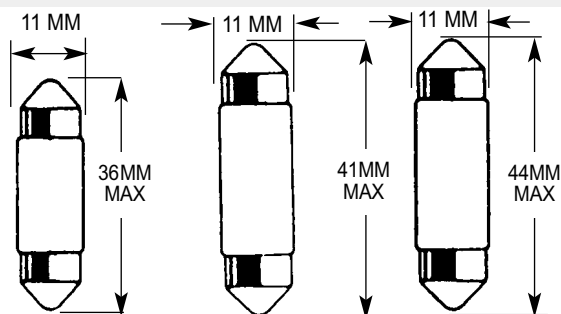
LINE NO.	VOLTS	AMPS	WATTS	LIFE	FESTOON CAP SV7-8	FESTOON CAP SV7-8	FESTOON CAP SV8.5-8
1	6.0	.500	3.0	3,500	6427	6432	—
2	6.0	.833	5.0	3,500	6425	6392	—
3							
4	12.0	.250	3.0	3,500	6428, DE3021	6434	—
5	12.0	.420	5.0	3,500	DE3022, 6429	6394	—
6	12.0	.670	8.0	3,500	—	—	210-2
7	12.0	.833	10.0	3,500	—	—	DE3175
8							
9	24.0	.125	3.0	3,000	6430, 17104	—	—
10	24.0	.208	5.0	3,000	6433	FL81, 6397	—
11	24.0	.417	10.0	3,000	—	—	—

T-3

FESTOON LAMPS

(-) DENOTES NON -STOCK LAMP TYPE.
2,000 PC. MINIMUM PRODUCTION RUN ON ALL NON-STOCK
FESTOON LAMPS.

360° LIGHT VIEWING FR = FROSTED GLASS



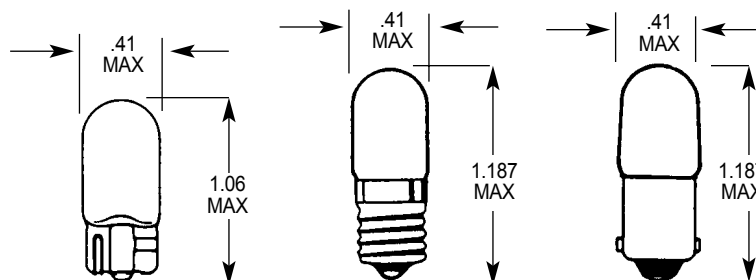
LINE NO.	VOLTS	AMPS	WATTS	LIFE	FESTOON CAP SV8.5-8	FESTOON CAP SV8.5-8	FESTOON CAP SV8.5-8
12	6.0	.833	5.0	3,500	6416	6410	—
13	6.0	1.670	10.0	3,500	—	6450	—
14							
15	12.0	.420	5.0	3,500	12844	12864	6413, 212-2
16	12.0	.670	10.0	3,500	12854	6411, 12866	211-2
17	12.0	.670	10.0	3,500	—	6411, FR	—
18	13.5	.520	7.0	3,500	—	—	214-2
19							
20	24.0	.125	3.0	3,500	—	—	6465, 213-2
21	24.0	.208	5.0	3,500	13844, 209-2,		6424, 215-2
22	24.0	.208	5.0	3,500	—		215-2FR
23	24.0	.417	10.0	3,500	—		6429, 216-2
24	24.0	.417	10.0	3,500	13854		216-2FR



Miniature Lamps

Incandescence • Neon • European

T-3¹/₄ MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	WEDGE BASE	MINIATURE SCREW BASE	MINIATURE BAYONET
1	2.0	0.06	0.04	1,000	S-2		48	49
2	2.0	0.06	0.02	1,000	C-6			1809
3	2.5	0.30	0.30	1,000	C-2R			1436
4	2.5	0.50	0.50	3,000	C-2R		41	43
5	3.2	0.16	0.20	3,000	C-2R			1490
6	3.2	0.35	0.50	3,000	C-2R		42	45
7	4.0	0.06	0.07	1,000	S-2			1804
8	4.0	0.06	0.06	2,000	C-6			1867
9	5.0	0.07	0.19	1,000	C-6			1906
10								
11	5.0	0.09	0.25	1,500	C-2R			1850
12	5.0	0.09	0.25	1,500	C-2R			1850W
13	6.0	0.125	0.43	1,500	C-2R			1949
14	6.0	0.200	0.65	5,000	C-2R			W1212
15	6.0	5W	3.40	500	C-2R	W-0605		316
16	6.3	0.015	0.50	5,000	C-2R		40	
17	6.3	0.04	0.08	500	C-6			1302
18	6.3	0.15	0.52	3,000	C-2R	447		47
19	6.3	0.15	0.38	200,000	C-2R	159		1847
20	6.3	0.25	0.90	5,000	C-2R	555		267- FLASHER
21	6.3	0.15	0.33	50,000	C-2R			755
22	6.3	0.15	0.45	3,000	C-2R			1830
23	6.3	0.25	0.65	200,000	C-2R	259		1866
24	6.3	0.25	0.90	3,000	C-2R		46	44
25	6.3	0.36	0.67	5,000	C-2R			239
26	6.3	0.36	0.67	5,000	C-2R			240
27								
28	6.3	0.40	1.50	3,000	C-2R			1810
29	6.3	0.50	2.00	2,000	C-2R			238
30	6.5	0.40	1.70	1,000	C-2R			1811
31	7.0	0.43	2.00	1,500	C-2R	147		
32	7.0	0.50	2.00	3,000	C-2R			1888
33	9.84	0.50	4.00	500	C-2R			947
34	10.0	0.13	0.85	250	C-2V	280		1408
35	12.0	0.41	5 (WATTS)	7,500	C-2V	1X (XENON)	MS-1205	MB-1205
36	13.0	0.33	3.00	1,000	C-2V	192		1816
37	14.0	0.08	0.31	50,000	C-2F	658		756
38								
39	14.0	0.15	1.50	200	C-2V			1488
40	14.0	0.20	1.40	3,000	C-2F		1487	1815
41	14.0	0.24	2.00	500	C-2F	158		1891
42	14.0	0.27	1.60	500	C-2R			256
43	14.0	0.27	2.00	1,500	C-2F	194		1889
44	14.0	0.33	3.00	7,500	C-2F	193		1898
45	14.0	0.19	1.00	4,000	C-2F	161		
46	14.0	0.33	2.00	3,000	C-2F			1893
47	14.0	0.35	3.00	1,500	C-2F	168		

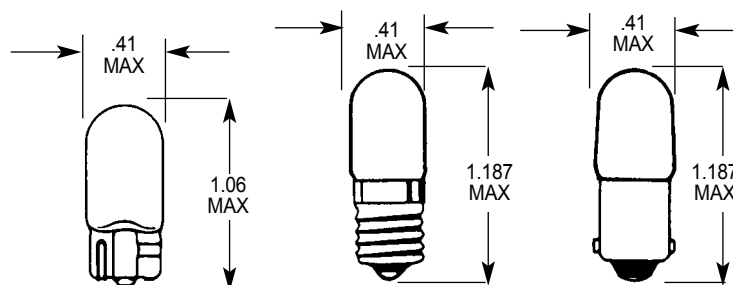
T-3¹/₄ CONTINUED ON NEXT PAGE



Miniature Lamps

Incandescence • Neon • European

T-3¹/₄ - Continued MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	WEDGE BASE	MINIATURE SCREW BASE	MINIATURE BAYONET
1	14.4	0.10	0.86	1,000	C-2V			1813
2	14.4	0.12	0.75	1,000	C-2F			1892
3	14.4	0.24	1.00	3,000	C-2F			216
4	15.5	0.24	2.20	500	C-2F			1881
5	18.0	0.15	1.80	250	C-2V		18V-MS	1826
6	24.0	0.06	0.90	20	C-2F			1437
7	24.0	0.17	3.30	250	C-2F			1818
8	24.0	0.208	5 (WATTS)	7,500	C-2F	2X (xenon)		
9	28.0	0.022	0.20	3,000	C-2F			1843
10	28.0	0.04	0.34	2,500	C-2F	585		1819
11								
12	28.0	0.06	0.62	2,500	C-2F	656		
13	28.0	0.07	1.00	1,000	C-2F			1862
14	28.0	0.07	1.00	1,000	C-2F	152 (3829)		1829
15	28.0	0.08	0.62	7,500	C-2F	657		757
16	28.0	0.10	1.60	1,000	C-2F	400		1820
17	28.0	0.17	3.50	7,000	C-2F	655	1821	313
18	28.0	0.17	3.00	1,500	C-2F	464		1864
19	28.0	0.20	3.00	7,000	C-2F			1873
20	30.0	0.15	2.80	5,000	C-2F		30V-MS	30V-MB
21	36.0	0.10	2.10	1,000	C-2F			1822
22	37.5	0.05	0.65	3,000	C-2F		1832	1828
23								
24	48.0	0.10	3.30	1,000	C-2F		1823	N3482
25	55.0	0.05	1.10	5,000	C-2F			1835
26	60.0	0.05	1.20	5,000	C-2F		60MS (750)	
27	120.0	0.025	1.50	7,000	CC-7A		120MS (977)	
28								
29	130.0	0.020	2.4 (WATTS)	7,000	CC-7A			967*
30	130.0	0.020	2.4 (WATTS)	10,000	2X-C2F			967X

*NORMAN #967 LAMP IS EQUIVALENT TO THE FOLLOWING:
967X = VIBRATION RESISTANT.

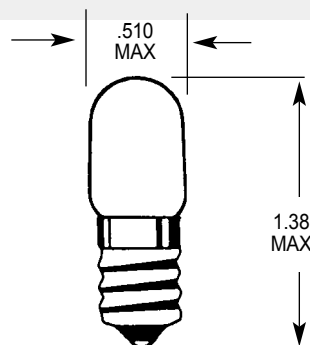
949 (ALBA)
CM8-3995 (CHICAGO MINIATURE)
B-3013 (ORBITEC)
130V2.4W (J. ROCHET)
SP105 (SPECTRO)
N967 (NORMAN)
DLICE-130V (TELEMECHINIQUE)



Miniature Lamps

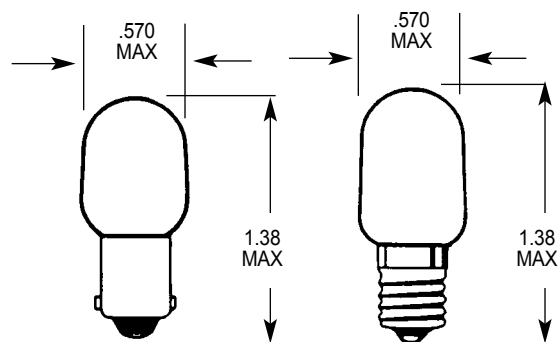
Incandescence • Neon • European

T-4 MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	CANDELABRA SCREW BASE	EQUIVALENT
1							
2	14.0	0.17	1.7	250	C-2V	1479	—
3	18.0	0.17	2.2	250	C-2V	1480	11AT4C
4	24.0	0.17	3.3	250	C-2F	1841	—
5	30.0	0.11	3.3	250	C-2F	30V-CS	IZUMI

T-4^{1/2} MINIATURE LAMPS



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	MINIATURE BAYONET BASE	MINIATURE SCREW BASE
6	6.00	1.03	6.0	1,000	C-2R	1467	
7	6.30	0.80	3.6	3,000	C-2R	1855	
8	6.30	0.90	4.2	3,000	C-2R	1886	
9	8.00	0.92	9.0	50	C-6	872	
10	9.84	0.50	4.6	200	C-2R	957	500
11	9.84	0.50	6.0	15	C-2R		965
12	12.80	0.80	8.0	1,000	C-2R	1416	
13	14.00	0.46	6.0	500	C-2R	1414	
14	28.00	0.30	6.0	500	C-2F	1495	
15							
16	28.0	0.30	8.0	300	C-2F	1495X	



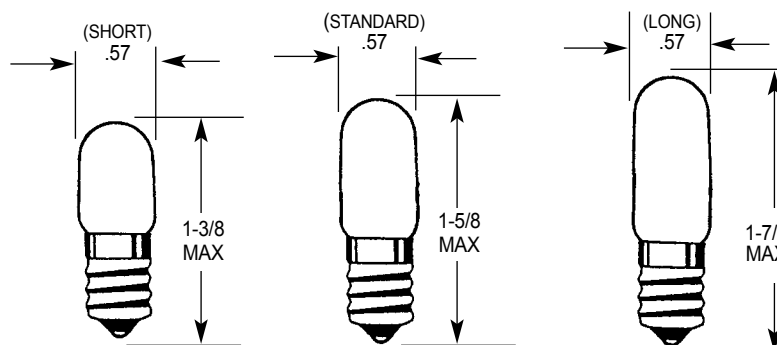
Miniature Lamps

Incandescence • Neon • European

T-4^{1/2}

MINIATURE LAMPS

ELECTRICAL SERVICE
E12, CANDELABRA SCREW BASE



LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	E12 SCREW BASE	E12 SCREW BASE	E12 SCREW BASE
1	125.0	0.03	4.0	1,500	C-7A	4T4.5-125V-CS-S	—	—
2	125.0	0.05	6.0	1,500	C-7A	6T4.5-125V-CS-S	—	—
3								
4	130.0	0.115	15.0	1,500	C-7A	—	15T4.5-130V-CS	
5								
6	130.0	0.115	15.0	1,500	C7-A	—	—	15T4.5L-130V-CS
7								
8	130.0	0.115	15.0	1,500	C7-A		15T4.5/FR (FROSTED)	
9	130.0	0.115	15.0	1,500	C7-A		15T4.5/TB (BLUE)	
10	130.0	0.115	15.0	1,500	C7-A		15T4.5/TG (GREEN)	
11	130.0	0.115	15.0	1,500	C7-A		15T4.5/TR (RED)	
12	130.0	0.115	15.0	1,500	C7-A		15T4.5/TY (YELLOW)	



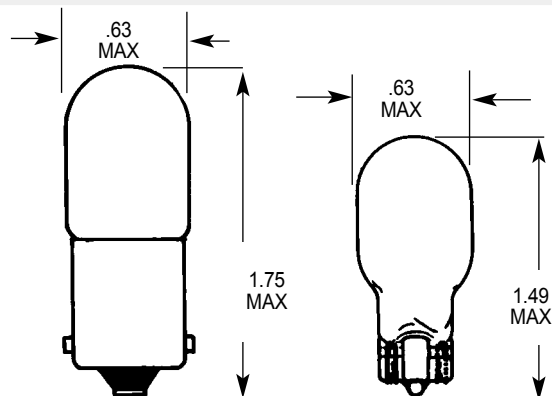
Miniature Lamps

Incandescence • Neon • European

T-5 MINIATURE LAMPS

LANDSCAPE LIGHTING
EXIT SIGN LIGHTING
SPECIAL APPLICATIONS

*UNITED STATES POSTAL DEPT. APPROVED



LINE NO.	VOLTS	AMPS	MSCP	LIFE	FILAMENT	*SINGLE CONTACT BAYONET BASE	GLASS WEDGE BASE
1							
2	3.5	2.50	6.5	2,000	C-6	1876	
3	3.5	2.50	7.5	2,000	C-6	1876X	
4	3.7	2.75	11.0	100	C-6	1434	
5	3.7	2.75	15.0	100	C-6	1874	
6	4.0	0.90	3.5	50	C-6		914
7	4.0	1.80	7.5	50	C-2R		926
8	6.0	0.90	5.0	200	C-6		939
9	6.0	1.00	6.0	200	C-2R		903
10	6.0	1.20	8.0	50	C-2R		927
11	6.0	1.50	12.0	50	C-2R		908
12	6.0	0.62	3.8	30	C-2R		909
13							
14	6.5	2.75	25.0	125	C-6	1489	
15	6.5	2.75	30.0	125	C-6	1489X	
16	6.5	2.75	25.0	100	C-6	1462	
17	12.0	0.75	11.0	50	C-2R		915
18	12.0	0.33	2.9	500	C-2R		901
19	12.8	0.55	6.5	500	C-2R		918
20	12.8	0.98	15.0	200	C-2R		922
21	12.8	1.00	12.0	1,000	C-2R		912
22	12.8	1.20	10.0	1,200	C-2F		917
23	12.8	1.40	21.0	1,000	C-2R		921
24	13.0	0.69	6.0	1,000	C-2F		906
25	13.5	0.69	4.0	5,000	C-2F		904 (LV-516)
26							
27	13.5	0.54	2.0	10,000	C-2F		916
28	28.0	0.30	6.0	500	C-2F		928



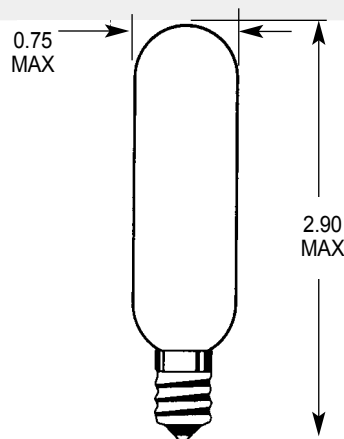
T-6

SPECIAL SERVICE LAMPS

LONG LIFE

EMERGENCY EXIT SIGN USE

EXIT



LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	CANDELABRA SCREW BASE
1	130.0	0.06	7	10,000	C-5A	7T6-130V-CS
2	130.0	0.12	15	5,000	C-7A	15T6-130V-CS
3	130.0	0.19	25	3,500	C-7A	25T6-130V-CS
4	145.0	0.10	15	10,000	C-7A	15T6-145V-CS

T-6^{1/2}

SPECIAL SERVICE LAMPS

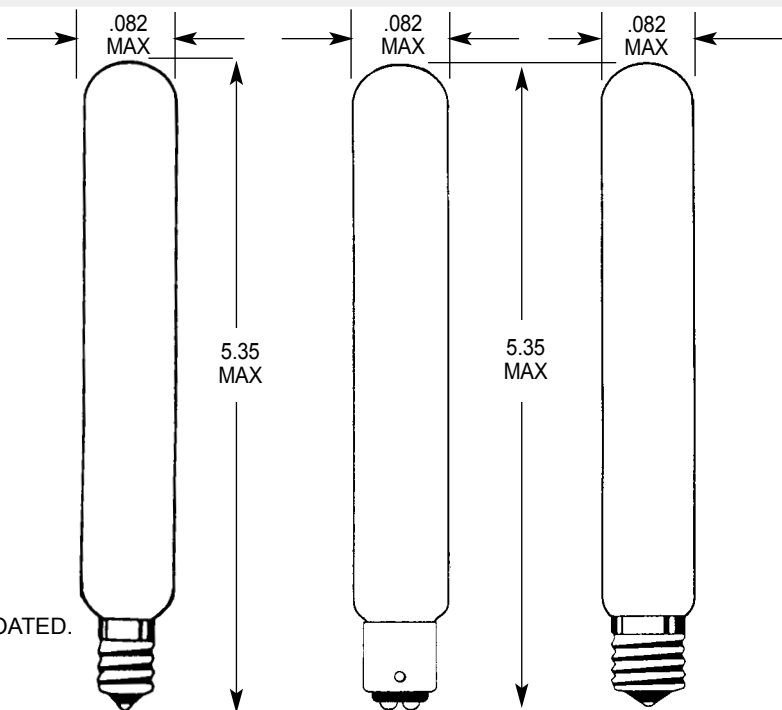
EMERGENCY EXIT SIGN USE

LONG LIFE

EXIT

THIS SECTION IS AVAILABLE IN 30,000 HOUR LONG LIFE VERSION.

C-8 LINEAR FILAMENT ON ALL T-6-1/2 LAMPS
AVAILABLE IN CLEAR OR FROSTED (F) OR (TF) TUFF-COATED.



LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	CANDELABRA SCREW BASE	DOUBLE CONTACT BAYONET BASE	INTERMEDIATE SCREW BASE
5	130.0	0.16	20	4,000	C-8	—	20T6.5-130V-DC	20T6.5N-130V-INT
6	130.0	0.16	20	4,000	C-8	—	20T6.5-130V-DCF	20T6.5N-130V-IF
7								
8	130.0	0.20	25	4,000	C-8	25T6.5-130V-CS	25T6.5-130V-DC	25T6.5N-130V-INT
9	130.0	0.20	25	4,000	C-8	—	25T6.5-130V-DCF	25T6.5N-130V-IF
10								
11	130.0	0.307	40	3,500	C-8	—	40T6.5-130V-DC	40T6.5N-130V-INT
12	220.0	0.114	25	3,500	C-8	—	—	25T6.5N-220V-INT



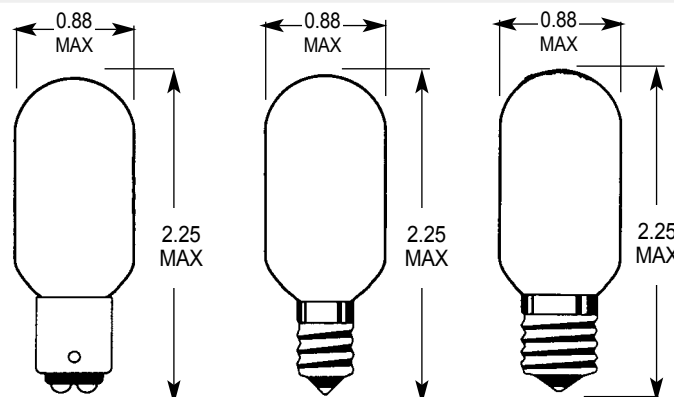
Miniature Lamps

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T-7 SPECIAL SERVICE LAMPS

LONG LIFE

AVAILABLE IN FROSTED (FR)

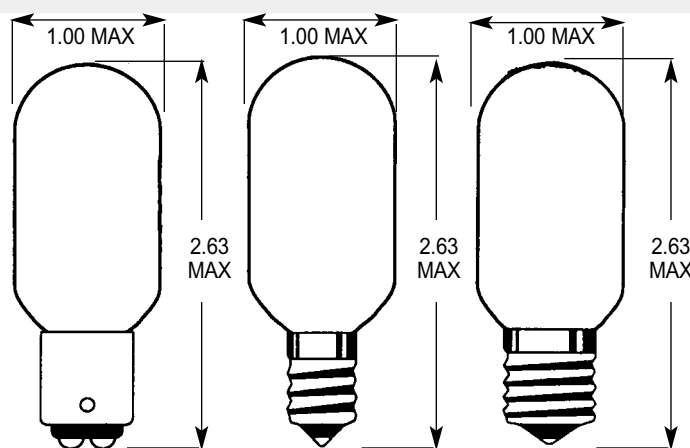


LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	DOUBLE CONTACT BAYONET BASE	CANDELABRA SCREW BASE	INTERMEDIATE SCREW BASE
1	130.0	0.12	15	3,000	C-7A	15T7-130V-DC	15T7-130V-CS	15T7N-130V-INT
2	130.0	0.15	20	3,000	C-7A	20T7-130V-DC	20T7-130V-CS	20T7N-130V-INT
3	130.0	0.19	25	3,000	C-7A	25T7-130V-DC	25T7-130V-CS	25T7N-130V-INT
4	130.0	0.24	30	3,000	C-7A	30T7-130V-DC	30T7-130V-CS	30T7N-130V-INT
5	130.0	0.31	40	2,500	C-7A	40T7-130V-DC	40T7-130V-CS	40T7N-130V-INT

T-8 SPECIAL SERVICE LAMPS

AVAILABLE IN CLEAR, FROSTED, RED

LONG LIFE



LINE NO.	VOLTS	AMPS	WATTS	LIFE @ 120 VOLTS	FILAMENT	DOUBLE CONTACT BAYONET	CANDELABRA SCREW BASE	INTERMEDIATE SCREW BASE
6	130.0	0.12	15	2,000	C-7A	15T8-130V-DC	15T8-130V-CS	15T8N-130V-INT
7	130.0	0.19	25	2,000	C-7A	25T8-130V-DC	25T8-130V-CS	25T8N-130V-INT
8	130.0	0.19	25	2,000	C-7A	25T8-130V-DCF _(FROST)		25T8N-130V-INF _(FROST)
9	130.0	0.19	25	2,000	C-7A	25T8-130V-DC-RED		
10	130.0	0.31	40	2,000	CC-2V	40T8-130V-DC	40T8-130V-CS	40T8N-130V-INT
11	130.0	0.47	60	2,000	CC-2V	60T8-130V-DC	60T8-130V-CS	60T8N-130V-INT
12								
13	230.0	0.11	25	2,000	C-7A	25T8-230V-DC		

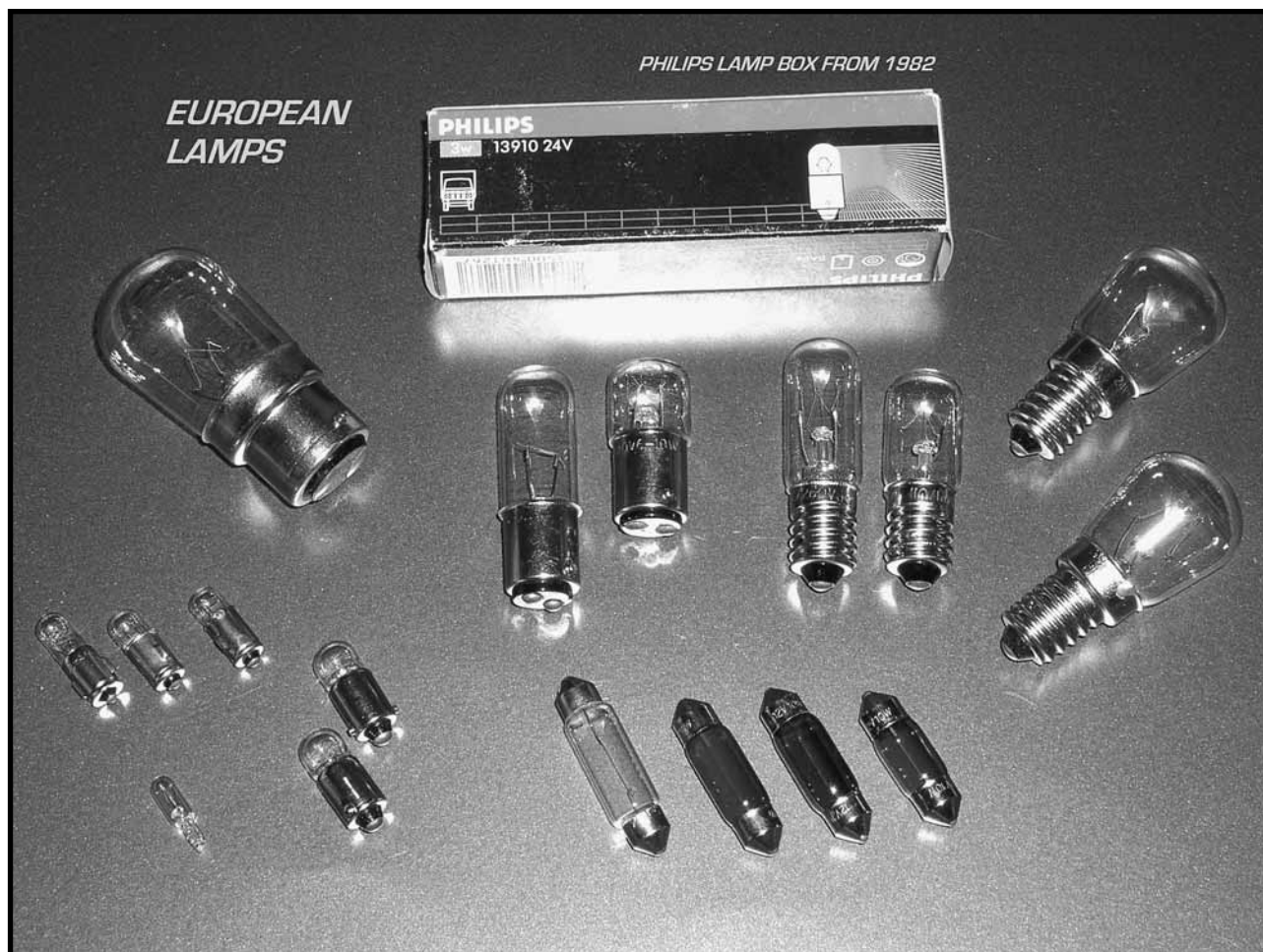


European Lamps

Norman Lamps, Inc. offers a large variety of Specialized European Miniature Lamps. These lamp types are commonly found in European industrial equipment, European medical equipment, amusement parks and gaming devices. Contact us for any European Lamp you require.

In addition to the European Lamps shown in this section, we are able to supply custom, as well as delisted equivalent lamp types. Minimum production may apply.

- BA20D BASE
- BA22D BASE
- T1-1/2 WEDGE
- TELEPHONE SLIDE
- A-19, 230V OPERATION
- FLAT TOP, T-5 TYPE
- BA5S BAYONET
- BA7S BAYONET
- BA9S BAYONET
- PYGMY SHAPE
- LILIPUT SLIDE BASE
- FESTOON
- EURO-AUTOMOTIVE
- E-14 SCREW BASE
- EUROPEAN FLUORESCENT TUBES
- J. ROCHET
- OSRAM
- SOL-REX
- IZUMI
- HELLA
- NARVA
- SIEMENS
- ALBA
- MAZDA
- PHILIPS
- TAUNUSLICHT
- TELEMACHINIQUE
- ORBITEC
- TUNGSRAM



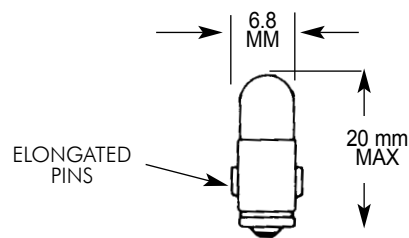


Miniature Lamps

Incandescent • Neon • European

T-2 (6.8MM)

MINIATURE LAMPS
EUROPEAN BAYONET BASE (BA7S)

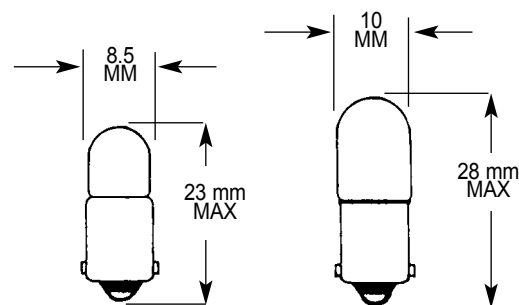


BA7S BASE

LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	CROSS REFERENCE	PART NUMBER
1	6.0	.100	0.6	200	C-2R	A-316-77	3798
2	6.0	.200	1.2	200	C-2R	A-301-77	3799
3	12.0	.167	2.0	200	C-2V	A-302-77, SE-1274	3898
4	24.0	.125	3.0	200	C-2V	A-311-77	3899
5	36.0	.050	1.8	200	C-2F	A-93-77	3800

T-2³/₄ (8.5MM) T-3¹/₄ (10MM)

MINIATURE LAMPS
EUROPEAN BAYONET BASE (BA9S)



SHORT GLASS

STANDARD GLASS

LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	CROSS REFERENCE	BA9S MINIATURE BAYONET	BA9S MINIATURE BAYONET
6	6.0	.500	3.0	200	C-2R	A-900-99	3896	
7	6.0	.330	2.0	200	C-2R	—	3895	
8	12.0	.167	2.0	200	C-2V	A-904-99	3796	
9								
10	12.0	.250	3.0	200	C-2V	—	3894	
11	24.0	.083	2.0	200	C-2V	A-931-99, 17063	3797	
12								
13	6.0	.667	4.0	5,000	C-2V	A-925-99, 238		3470
14	12.0	.333	4.0	10,000	C-2V	A-924-99, 1893		3473
15	24.0	.167	4.0	10,000	C-2V	A-946-99, 1818		3476
16	36.0	.050	2.0	5,000	C-2V	A-927-99, 1822		3459
17	48.0	.050	3.0	5,000	C-2V	A-932-99, N3482		3085
18	60.0	.050	3.0	5,000	C-2F	A-934-99, 1835		3075
19	130.0	.020	3.0	5,000	CC-7A	A-948-99, 967		3013 (967)
20	240.0	.013	3.0	5,000	CC-7A	—		3080



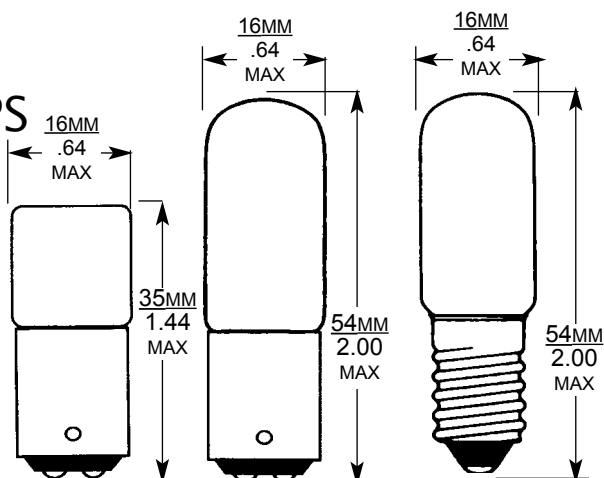
T-5

SPECIAL SERVICE EUROPEAN LAMPS

EQUAL TO:

SOL-REX
J-ROCHET
OSRAM
DR. FISCHER
IZUMI
TELEMECHNIQUE
ROCKWELL
ALLEN-BRADLEY

*AVAILABLE IN TUFF-COATED®



LINE NO.	Voltage Range VOLTS	AMPS	Watts Range WATTS	LIFE	FILAMENT	Double Contact Bayonet	Double Contact Bayonet	E-14 European Screw Base
1	24.0	.210	5	2,000	C-6	T1635B15E	T1654B15E	T1654E14E
2	48.0-60.0	.125-.167	6-10	2,000	C-3A	T1635B15Q	T1654B15Q	T1654E14Q
3	60.0	.081	5	3,000	C-3A	T1635B15K	T1654B15K	T1654E14K
4	110.0-140.0	.055-.071	6-10	3,000	C-5A	T1635B15U	T1654B15U	T1654E14U
5	130.0	.040	5	3,000	C-5A	T1635B15M	T1654B15M	T1654E14M
6	220.0-260.0	.027-.038	6-10	3,500	C-5A	T1635B15S	T1654B15Y	T1654E14Y

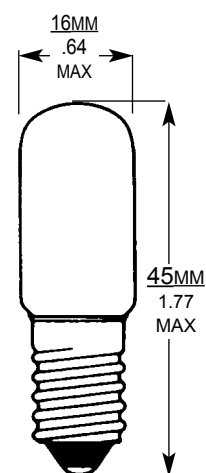
T-5

SPECIAL SERVICE EUROPEAN LAMPS

EQUAL TO:

SOL-REX
J-ROCHET
OSRAM
DR. FISCHER
IZUMI
TELEMECHNIQUE
ROCKWELL
ALLEN-BRADLEY

*AVAILABLE IN TUFF-COATED®



LINE NO.	Voltage Range VOLTS	AMPS	Watts Range WATTS	LIFE	FILAMENT	E-14 European Screw Base
7	130.0	.040	5	3,000	C-5A	T1645E14M
8	220.0-260.0V	.027-.038	6-10	3,500	C-5A	T1645E14Y



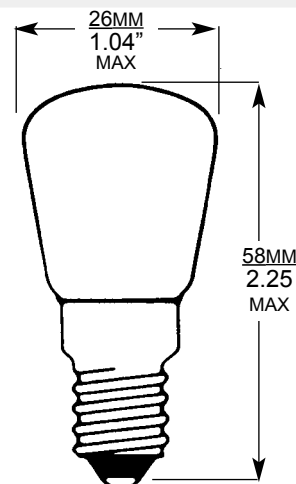
Miniature Lamps

Incandescence • Neon • European

T-8 P (PYGMY TYPE)

SPECIAL SERVICE EUROPEAN LAMPS

AVAILABLE IN TUFF-COATED®
FROSTED GLASS AVAILABLE ON SPECIAL ORDER ONLY.



LINE NO.	VOLTS	AMPS	WATTS	LIFE	FILAMENT	E-14 EUROPEAN SCREW BASE
1	24.0	.625	15	2,000	C-6	15T8-24V-E14
2						
3	120.0	.125	15	3,000	C-3A	15T8-120V-E14
4	120.0	.208	25	2,000	C-3A	25T8-120V-E14
5						
6	220-240	.066	15	3,000	C-5A	15T8-220V-E14
7	220-240	.109	25	2,000	C-5A	25T8-220V-E14
8						
9	220-240	.190	40	2,000	C-7A	40T8-220V-E14



Neon Application and Design Factors

Neon Lamp Construction and Operation

Basic Neon Lamp construction is shown below in Figure #1. It consists of the glass tube sealed at the top, thus forming the "Pip." Gas is inserted into the bulb as the seal is formed. This gas surrounds the electrodes. When proper voltage is applied to the lamp, the electrodes ionize the surrounding gas creating a plasma field. This plasma field glows, emitting visible orange light.

Based Neon Lamp Construction

Neon lamps are available in a wide variety of based configurations. As shown in Figure #2, these wire terminal neon lamps are incorporated into the base of your choice and enclosed (in some cases) by a plastic, fluted lens cap. A resistor can be attached internally in order to operate directly on line voltage (120V). Brightness level can also be increased by using a lower value resistor.

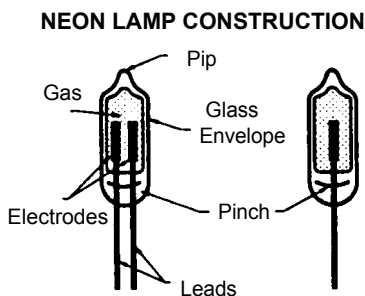


FIGURE 1

BASED NEON LAMP CONSTRUCTION

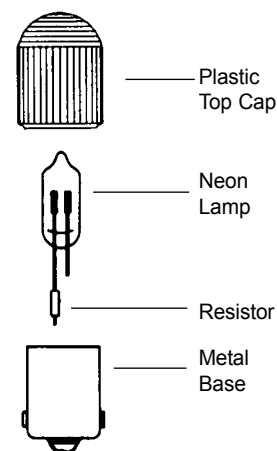


FIGURE 2





Neon Application and Design Factors

Life Expectancy of Neon Lamps

Life expectancy for neons depends on a variety of electrical and operational factors. These factors include supply voltage, resistance value and current. In general, the lower the resistance used, the lower the life hours expected and brightness increases. Conversely, increasing resistance will increase life but reduce brightness. Figure #3 shows the relationship between resistance, brightness level and life expectancy at 120.0V A.C.

Brightness Level	Resistance Value	Life Expectancy
HIGH	10K-20K	10,000 HOURS
STANDARD	35K - 47K	25,000 HOURS
LOW	100K	30,000 HOURS

FIGURE 3

Above life hours are an approximation only. Actual life hours may vary depending upon operating current and brightness maintenance required. See "Lamp Darkening" in the following column for explanation of useful life expectancy for neon lamps.

Custom Neon Lamp Assemblies

Norman can supply custom neon lamp assemblies per your specifications. Attached resistors, special lead lengths, insulated wire leads with terminals and neon arrays are just a few of the options we can supply. Contact us for great pricing.

Neon Lamp Darkening

Neon lamps do not fail abruptly at the end of their life. Instead, their light output gradually decreases due to deposits building up on the interior lamp walls. Light output decreases to an unacceptable level thus ending the neon lamp's useful life. Life expectancies listed in Figure #3 are given at 50% reduction of initial light output.

Neon Lamp Terms and Definitions

Striking Voltage

The voltage at which the neon lamp ignites is usually between 45 and 65V A.C. for standard brightness types and between 70 and 95V A.C. for high brightness types. This is sometimes call the breakdown or ignition voltage.

Maintaining Voltage

The voltage across the lamp after it has ignited. This voltage is a function of the lamp current and is usually quoted at the design current. Nominal values are 60V for standard brightness and 75V for high brightness lamps.

Extinction Voltage

The voltage at which the lamp extinguishes if the supply voltage is reduced. It is normally a few volts below the maintaining voltage.

Design Current

The current at which the lamp has been designed to operate. It will be determined by the supply voltage and the value of series resistance. Operation at lower currents can result in the glow discharge becoming unstable (i.e., flickering) and operation at higher currents can severely reduce the useful life of the lamp. It is therefore important to use only the recommended value of series resistance.

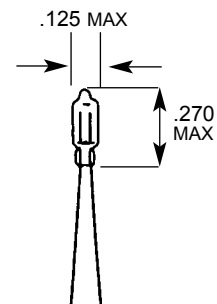
Green and Blue Emitting Neon Lamps

Any neon lamp shown in this catalog can be made to emit a green or blue color glow. In some configurations they are in stock. Call for information regarding these "fluorescent" neon lamps.

Note: Decreasing resistance to neon lamp will result in a shorter service life. See "Life Expectancy of Neons" on the following page. All neon lamps can be supplied with or without a resistor. Call for more information.



T-1 MINIATURE NEON LAMPS

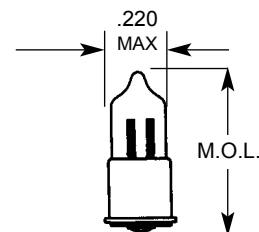


*Recommended Resistance

SOLDER-READY TERMINALS

LINE NO.	IGNITION VOLTAGE		CURRENT MA	*SERIES RESISTOR				AVERAGE USEFUL LIFE	BRIGHTNESS LEVEL	COLOR GLOW	M.O.L.	WIRE TERMINAL
	AC	DC		100-125V OHMS	W	220-250V OHMS	W					
1	65	90	0.3	100K	1/4	220K	1/3	12,000	STANDARD	ORANGE	.270	NE-1H-S
2	95	135	1.2	47K	1/4	150K	1/3	12,000	HIGH	ORANGE	.270	NE-1H
3	95	135	1.2	35K	1/4	150K	1/3	15,000	HIGH	GREEN	.270	NE-1HG

T-1 3/4 MINIATURE NEON LAMPS



*Resistor Included in Base

LINE NO.	IGNITION VOLTAGE		CURRENT MA	*SERIES RESISTOR		AVERAGE USEFUL LIFE	BRIGHTNESS LEVEL	COLOR GLOW	M.O.L.	MIL. NO.	MIDGET FLANGED BASE
	AC	DC		100-125V OHMS	W						
4	65	90	0.3	220K	1/4	15,000	STANDARD	ORANGE	.625		NE-A1G-R
5	95	135	1.2	47K	1/4	25,000	HIGH	ORANGE	.625		NE-A1H-R
6	95	135	1.2	18K	1/4	15,000	VERY HIGH	ORANGE	.625		NE-A1H-R18
7	95	135	1.2	35K	1/4	15,000	HIGH	GREEN	.625		NE-A1H-R-G
8	95	135	1.2	35K	1/4	15,000	HIGH	BLUE	.625		NE-A1H-R-B
9											
10	65	90	0.7	100K	1/4	25,000	STANDARD	ORANGE	.940	MI5098/11-001	C7A (NE-2D)
11	95	135	1.9	30K	1.4	25,000	HIGH	ORANGE	.940		C9A (NE-2J)



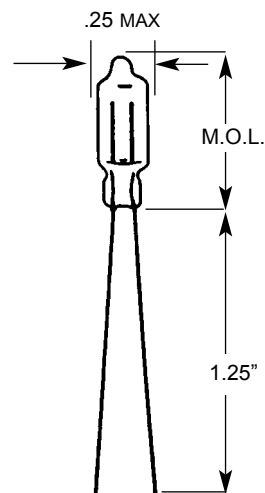
Miniature Lamps

Incandescence • Neon • European

T-2 MINIATURE NEON LAMPS

*Recommended Resistance

CUSTOM LEAD LENGTHS ARE AVAILABLE ON SPECIAL ORDER.
SOLDER-READY TERMINALS



LINE NO.	IGNITION VOLTAGE		DESIGN CURRENT MA	*SERIES RESISTOR				AVERAGE USEFUL LIFE	BRIGHTNESS LEVEL	COLOR GLOW	M.O.L.	WIRE TERMINAL
	AC	DC		100-125V		220-250V						
				OHMS	W	OHMS	W					
1	65	90	0.6	150K	1/4	540K	1/3	25,000	STANDARD	ORANGE	1.00"	A1A (NE-2)
2	65	90	0.3	220K	1/4	540K	1/3	25,000	STANDARD	ORANGE	.50"	A1B
3	95	135	1.2	47K	1/4	150K	1/3	25,000	HIGH	ORANGE	.50"	A1C
4												
5	65	90	0.7	100K	1/4	220K	1/3	25,000	STANDARD	ORANGE	.84'	A2A (NE-2A)
6	65	90	0.7	100K	1/4	220K	1/3	25,000	STANDARD	ORANGE	.75"	A2B (NE-2V)
7	95	135	1.9	30K	1/4	100K	1/3	25,000	HIGH	ORANGE	.75"	A3C (NE-2U)
8	95	135	1.4	100K	1/4	220K	1/3	25,000	HIGH	ORANGE	.84"	A5A
9												
10	95	135	1.2	68K	1/4	220K	1/3	25,000	STANDARD	ORANGE	1.00"	A6A
11	95	135	1.2	100K	1/4	220K	1/3	25,000	STANDARD	ORANGE	.75"	A7A
12	65	90	0.7	100K	1/4	220K	1/3	25,000	STANDARD	ORANGE	.75"	A9A (NE-2E)
13												
14	95	135	1.9	30K	1/4	100K	1/3	25,000	HIGH	ORANGE	.75"	C2A (NE-2H)
15	95	135	1.5	30K	1/4	100K	1/3	25,000	HIGH	ORANGE	.75"	C3A
16	95	135	1.5	30K	1/4	100K	1/3	25,000	HIGH	ORANGE	.84	C4A
17	95	135	1.5	30K	1/4	100K	1/3	25,000	HIGH	ORANGE	.84	C5A
18	95	135	1.5	22K	1/4	100K	1/3	25,000	HIGH	ORANGE	1.00	C6A
19												
20	95	135	1.2	47K	1/4	150K	1/3	15,000	HIGH	GREEN	.50"	G2B
21	95	135	1.4	35K	1/4	150K	1/3	15,000	HIGH	BLUE	.50"	B2B



T-2

MINIATURE NEON LAMPS CIRCUIT COMPONENT GLOW LAMPS

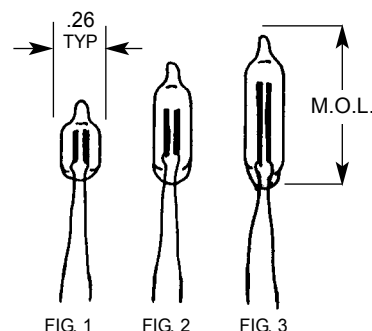


FIG. 1 FIG. 2 FIG. 3

Line No.	Initial D-C Breakdown Voltage in 5-50 Ft. C. Light	Initial D-C Maintaining Voltage at Design Current	Design Current (D-C Milli-amps)	Avg. Life for Indicated Change in Max. Breakdown or Maintaining Volts				Base	Max Overall Length (Inches)	Figure No.	Norman Part No.
				Breakdown Change	Volts Hours	Maintaining Change	Volts Hours				
1											
2	60-80	52-62	0.3	—	—	6V	7,500	1"	W.T.	1/2	1 2AA (NE-99)
3	125 max.	—	1.5	—	25,000	—	—	1"	W.T.	1/2	1 2AC
4	65-80	AVG.>50	0.3	5V	6,000	5V	6,000	2"	W.T.	3/4	2 3AD(NE-98)
5	65-80	AVG.>50	0.3	5V	6,000	5V	6,000	2"	W.T.	3/4	2 3AD-C
6	60-90	AVG.>58	0.4	5V	2,000	5V	2,000	2"	W.T.	3/4	2 3AG
7	65-93	52-62	0.4	5V	2,000	5V	2,000	2"-1 ³ / ₄ "	W.T.	3/4	2 3AG-B
8	68-76	52-62	0.4	5V	2,000	5V	2,000	2"-1 ³ / ₄ "	W.T.	3/4	2 3AG-C
9	65-73	64 max.	0.4	5V	2,000	5V	2,000	1"	W.T.	3/4	2 3AG-F
10	75-135	Avg. 70	2.0	10V	2,000	10V	2,000	2"	W.T.	3/4	2 3AH
11											
12	60-100	AVG.>59	5.0	5V	500	5V	500	1"	W.T.	3/4	2 3AJ
13	60-100	AVG. 59	5.0	5V	500	5V	500	2"	W.T.	3/4	2 3AJ-C
14	105-135	60-80	0.5	10V	3,000	10V	3,000	1"	W.T.	27/32	3 4AD
15	120-150	60-80	0.5	10V	3,000	10V	3,000	1"	W.T.	27/32	3 4AE
16	60-90	AVG. 59	0.3	5V	6,000	5V	6,000	1"	W.T.	1	3 5AB(NE-23)
17	60-80	50-65	0.3	5V	6,000	5V	6,000	1"-7 ⁷ / ₈ "	W.T.	1	3 5AB-A
18	62-72	50-60	0.3	5V	6,000	5V	6,000	1"-7 ⁷ / ₈ "	W.T.	1	3 5AB-B
19	62-72	50-60	0.3	5V	6,000	5V	6,000	1"-7 ⁷ / ₈ "	W.T.	1	3 5AB-BT
20	60-90	AVG.59	0.3	5V	6,000	5V	6,000	1"	W.T.	1	3 5AB-T
21											
22	60-90	52-65	0.3	—	—	5V	2,000	1"	W.T.	1	3 5AC (NE-68)
23	64-80	50-58	0.1	5V	2,000	5V	2,000	1"	W.T.	1	3 5AG (NE-81)
24	64-80	50-60	0.3	5V	2,000	5V	2,000	1"	W.T.	1	3 5AG-A (NE-76)
25	68-76	50-60	0.4	—	1,000	5V	2,000	1"-1 ¹ / ₂ "	W.T.	1	3 5AH (NE-83)
26	60-100	AVG.>59	5.0	5V	5,000	5V	5,000	1"	W.T.	15/16	3 5AH-A
27	60-100	AVG.>61	10.0	5V	500	5V	500	1"	W.T.	15/16	3 5AH-B
28	60-85	50-65	5.0	5V	5,000	5V	5,000	1"	W.T.	15/16	3 5AH-D
29	60-85	52-67	10.0	5V	500	5V	500	1"	W.T.	15/16	3 5AJ (NE-86)
30	75-85	55-66	5.0	5V	5,000	5V	5,000	1"	W.T.	15/16	3 5AJ-A
31											
32	75-85	57-68	10.0	5V	500	5V	500	1"-1 ³ / ₁₆ "	W.T.	15/16	3 5AJ-B
33	60-85	50-70	3.0	5V	5,000	5V	5,000	1"	W.T.	15/16	3 5AJ-A
34	55-90	AVG.>57	1.5	5V	2,000	5V	2,000	1"	W.T.	15/16	3 5AJ-B
35	55-75	45-65	1.5	5V	2,000	5V	2,000	1"	W.T.	15/16	3 5AJ-B
36	70-90	55-75	1.5	5V	2,000	5V	2,000	1"	W.T.	15/16	3 5AJ-B

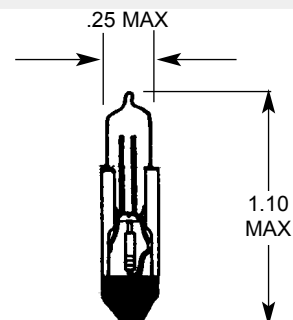


Miniature Lamps

Incandescence • Neon • European

T-2 MINIATURE NEON LAMPS

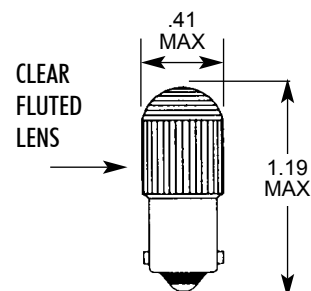
*RESISTOR INCLUDED IN BASE



LINE NO.	VOLTS	mA	*RESISTOR	LIFE	BRIGHTNESS LEVEL	GLOW	*TELEPHONE SLIDE #5
1	120.0	1.9	10K 1/4W	10,000	VERY HIGH	RED	NE-120PSB/RED
2	120.0	1.9	10K 1/4W	10,000	VERY HIGH	ORANGE	NE-120PSB/10K
3	120.0	1.9	35K 1/4W	50,000	STANDARD	ORANGE	NE-120PSB/35K
4	120.0	1.5	35K 1/4W	25,000	HIGH	GREEN	NE-120PSB-G
5	120.0	1.5	35K 1/4W	25,000	HIGH	BLUE	NE-120PSB-B

T-3¹/₄ MINIATURE NEON LAMPS

*RESISTOR INCLUDED IN BASE
AVAILABLE IN FLUTED AND NON-FLUTED, CLEAR LENS.



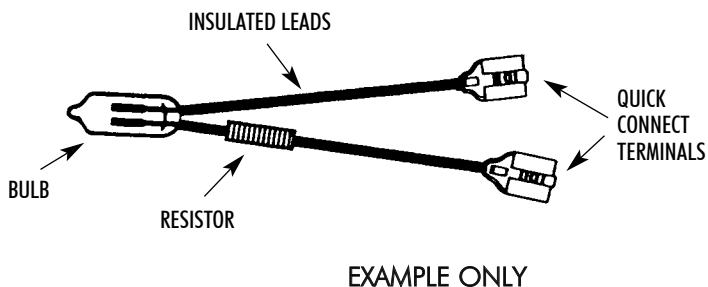
LINE NO.	VOLTS	mA	*RESISTOR	LIFE	BRIGHTNESS LEVEL	GLOW	*MINIATURE BAYONET BASE
6	120.0	0.3	220K 1/4W	25,000	STANDARD	ORANGE	NE-51/B1A
7	120.0	1.2	47K 1/4W	25,000	HIGH	ORANGE	NE-51H/B2A
8	120.0	1.2	10K 1/4W	15,000	VERY HIGH	ORANGE	NE-51H/B2A-HR
9	120.0	1.2	30K 1/4W	25,000	HIGH	GREEN	NE-51H/B2A-HG
10	120.0	1.2	30K 1/4W	25,000	HIGH	BLUE	NE-51H/B2A-HB
11	240.0	2.1	220K 1/4W	25,000	STANDARD	ORANGE	B2A-240V

NEON LAMP ASSEMBLIES

VALUE ADDED SERVICES

ATTACHED RESISTORS
ATTACHED TERMINALS
SPECIAL LEAD LENGTHS
ATTACHED INSULATORS
CALL OR SEND SPEC. SHEET FOR PRICING

(MINIMUM PRODUCTION RUN MAY APPLY)





Miniature Lamps

Incandesececent • Neon • European

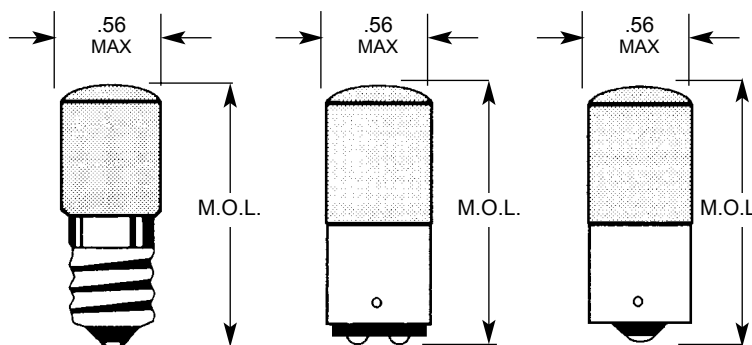
T-4^{1/2}

MINIATURE NEON LAMPS

HIGH BRIGHTNESS

*Resistor Included in Base

Fluted, plastic caps w/top lens



LINE NO.	VOLTS	mA	*RESISTOR	LIFE	M.O.L.	CANDELABRA SCREW BASE	DOUBLE CONTACT BAYONET BASE	SINGLE CONTACT BAYONET BASE
1	105-125	2.0	30K 1/4W	1,000	1.50		7AA (NE-16)	B6A (NE-21)
2	105-125	2.0	30K 1/4W	7,500	1.50		B5A (NE-17)	B8A (NE-47)
3	105-125	2.0	30K 1/4W	7,500	1.50	B7A (NE-45)	B9A (NE-48)	
4	105-125	2.0	47K 1/4W	10,000	1.53	F3A (NE-57)		
5	105-125	2.0	100K 1/4W	15,000	1.53	F4A (NE-58)		

