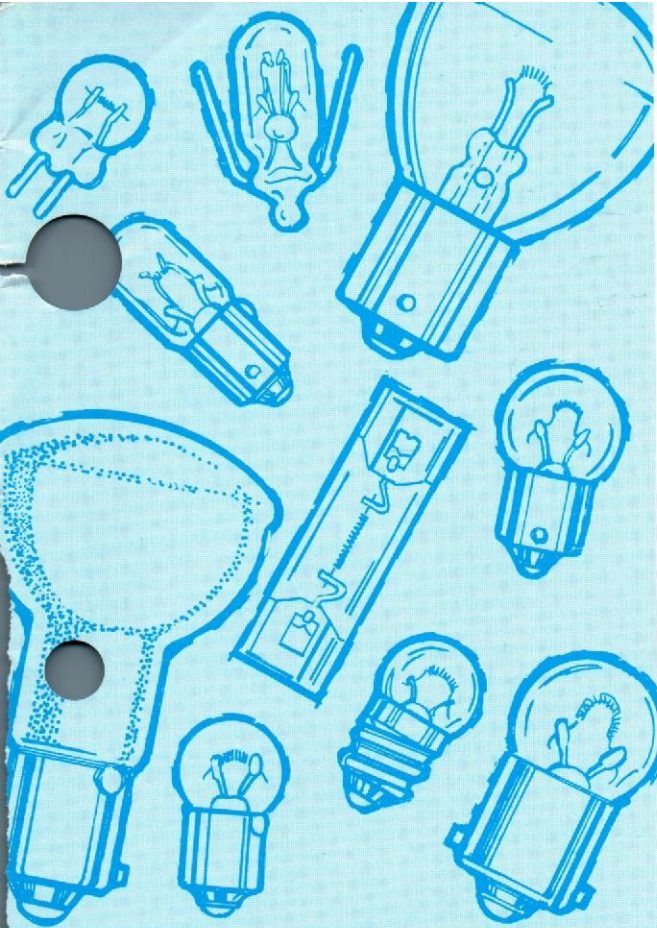


520
WEATHERLY
INDEX

Miniature Lamp
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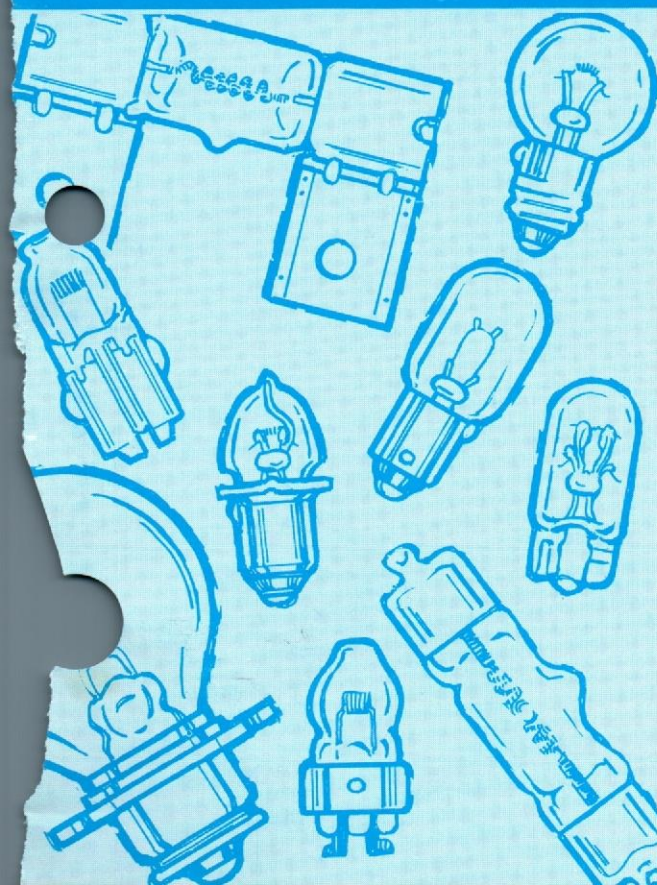


MINIATURE LAMPS

INCANDESCENT

HALOGEN

FLUORESCENT



**Other MINIATURE LAMP
PRODUCTS DEPARTMENT
CATALOGS INCLUDE:**

- Sealed Beam Lamps, 3-5211
- Sub-Miniature Lamps, 3-6016
- Wedge Base Lamps, 3-5259-R
- Halogen Cycle Lamps, 3-5257-R

MINIATURE LAMP PRODUCTS DEPARTMENT

GENERAL  **ELECTRIC**

GENERAL ELECTRIC

CATALOG OF MINIATURE LAMPS

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IMPORTANT NOTICE

The data and recommendations in this catalog, as well as any additional information our representatives may furnish, are for general information only. They should not be taken as representations or warranties as to the suitability of any lamp for any particular application or use, or as to its performance under any particular conditions of use. Possible applications and conditions of use are many, and beyond our control.

Since new information is constantly being uncovered through research and testing, it is not possible to know at any given time all information with respect to a lamp or its performance. This is particularly true of newer lamps. It is, therefore, up to the purchaser to make his own determination as to the suitability of a product for his intended use and to assume the responsibility for that determination.

When any equipment design is involved, please communicate with your General Electric Lamp Representative for latest design information.

INTRODUCTION

Most General Electric Miniature Lamps are designed for operation on low-voltage sources of power, such as battery-generator systems, dry cell or storage batteries, or transformers.

Manufacturers and designers of equipment requiring miniature lamps should select lamps of established design wherever possible for maximum economy as well as ease of replacement through regular trade channels.

Lamps are grouped in this catalog by bulb sizes. The letter refers to the shape of the bulb and the number is the approximate diameter in eighths of an inch. The diameter is also given in inches and followed by the metric equivalent (in parentheses) for convenience. The English units are the over-riding dimensions. Lamps are listed according to design volts in ascending order within the particular group.

You will find two cross-reference lists on pages 36 and 38. One groups lamps by primary applications and the other lists lamps in numerical sequence.

The Miniature Lamp Products Department of General Electric offers application engineering assistance to all customers in applying miniature lamps in product design. Contact your local GE district office which is listed on the back cover page for additional and latest technical information.

ABBREVIATIONS

A	— Amperes	Pf.	— Prefocus
Bay.	— Bayonet	Sc.	— Screw
C.P.	— Candlepower	S.C.	— Single Contact
Cand.	— Candelabra	Spec.	— Special
D.C.	— Double Contact	Term.	— Terminals
Flg.	— Flanged	V	— Volts
Index	— Indexing	W	— Watts
Min.	— Miniature		

LAMP NUMBER

Lamps are marked with General Electric identification and a trade number. The trade number is recorded with the American National Standards Institute and is uniform throughout the industry. It completely identifies a lamp and is sufficient identification for ordering purposes.

PRIMARY SERVICE

Present major usages of a lamp are shown in the primary applications column. Lamps may be and often are used in other applications, wherever their design characteristics meet the requirements.

DESIGN VOLTS

Design volts show the voltage at which a lamp is designed for rated ampere, candlepower and laboratory-life characteristics.

DESIGN AMPERES OR WATTS

Design amperes is the current flowing through a lamp when operated at its design voltage. It is subject to manufacturing tolerances. Some lamps have a watts rating rather than amperes. Wattage is obtained by multiplying the design volts by the design amperes.

CANDLEPOWER

The value shown in the candlepower column is the average initial mean-spherical-candlepower (mscp) at design voltage. It is subject to manufacturing tolerances. Mean-spherical-candlepower is the generally accepted method of rating the total light output of miniature lamps. To convert mean-spherical-candlepower to lumens, multiply by 12.57 (4π).

LIGHT CENTER LENGTH

The light center length is measured from the geometric center of the light source to a particular point of the base. This point is shown below for the base types used.

- Screw—End of bottom base contact.
- Bayonet—Top of base pins.
- S.C. or D.C. Prefocus—Bottom of indentations on prefocusing collar.
- S.C. Miniature Flanged—Top of bosses in flange.
- D.C. Index—Top of base pin nearer bottom contacts.
- Wedge—Center of notch.
- Tab—Center of hole in tab.

SC and DC PREFOCUSED BASE LAMPS

The letter "A" following the base type designates that the distance from the bottom of the collar to the bottom of the base contact (s) is $13/32$ ". For "B" bases this distance is $9/16$ ".

The few lamps identified by letter (s) in the "Base" column are special in that the collar location and/or orientation of contacts differs from the above.

MAXIMUM OVERALL LENGTH

The dimension which includes the bulb and base is designated as the overall length of the lamp. In the case of wire terminal lamps, this dimension applies only to the glass portion. The dimension figures listed here are maximum tolerances.

RATED AVERAGE LIFE

Rated average life is that obtained in closely controlled laboratory testing of lamps at their design voltage. It is not necessarily the same as service life where environmental conditions such as shock, vibration, voltage fluctuations, temperature, etc., may result in a shorter average life. For additional information on service life of lamps with extremely long life and low current design, please refer to the discussion on "Lamp Life" page 3 in the Sub-Miniature Catalog.

FIGURE NUMBER

The figure number corresponds to the lamp drawing at the extreme right of the specifications list. *The drawing shows the correct bulb and base, but not necessarily the correct filament, for the lamp listed.* Since many different filaments are used, the drawing shows only one representative filament form. For filament forms refer to page 5.

LINE NUMBER

The line number is used to help find specific lamps. It is not of any technical or ordering significance.

HEAVY DUTY LAMPS

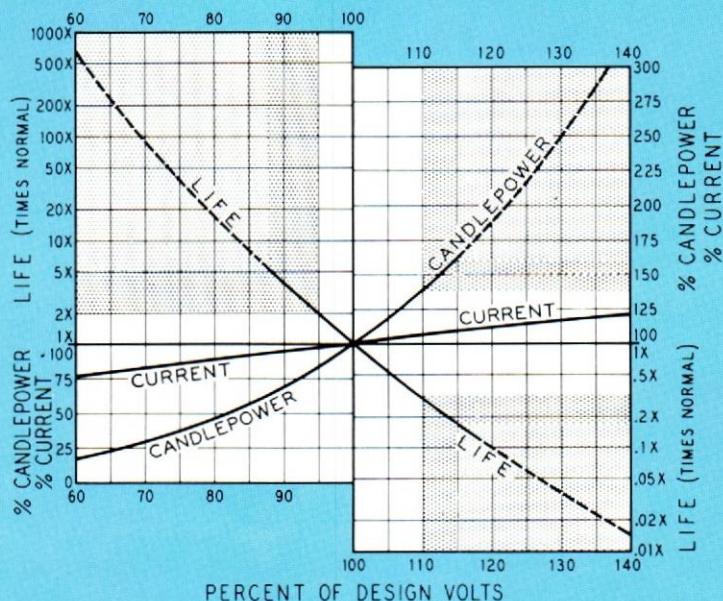
There is a General Electric heavy duty lamp for most automotive sockets. Heavy duty lamps have been designed with heavier wire and lower filament temperatures in an attempt to give longer life and more trouble-free performance. These should be used where the lamps are likely to be subjected to extra shock and vibration.

COIL THESE FACTORS

Design factors such as the limitations of—housing space, power source, shock and vibration, light output, wattage, life, and ambient temperature—should be carefully considered when selecting lamps.

Whether a lamp is used for safety, convenience, utility, sales appeal, beauty or a means of saving time, General Electric has such a lamp available.

CHART I
TYPICAL CHARACTERISTIC CURVES



THESE CURVES ARE APPROXIMATIONS ONLY

NOTE
CALCULATIONS OF CHARACTERISTICS SHOWN IN CHART I ARE APPROXIMATE ONLY BETWEEN 95% & 110% OF RATED VOLTAGE FOR LAMP TYPES WITH 5000 HOURS LIFE OR LESS. CERTAIN LAMP TYPES WILL VARY WIDELY FROM CALCULATED VALUES.

THIS CHART WILL NOT APPLY TO LAMPS WITH LIVES IN EXCESS OF 5000 HOURS.

This chart does not apply to Halogen cycle lamps. Consult nearest sales office for application information.

1 LIGHT QUANTITY, QUALITY

Where an object or surface is to be illuminated, the quantity of light required depends upon the size of the object, the brightness desired, the contrast with its background and the time available for seeing.

Where light must be projected, either a separate reflector and lamp or a reflectorized lamp may be required. Consideration should be given to beam candlepower and beam spread.

The spectral quality of color of light can be modified by external filters or coatings applied to the bulb.

2 LIGHT, LIFE AND VOLTAGE

For any particular lamp, the light output and life depend upon the voltage at which the lamp is operated. For instance, as approximations, the light output varies as the 3.6 power of the voltage and the life varies inversely as the 12th power of the voltage. Chart 1 illustrates the effect of overvoltage or undervoltage applied to a lamp on its current, life, and light (candlepower) output. Indicated values (except for long life lamps) are reasonably reliable, between 95% and 110% rated volts. Beyond that, indicated characteristics may not be realized because of the increasing influence of factors which cannot be incorporated into the chart.

The data applies only to operation on direct current or sine-wave alternating current. The data (particularly for lamp life) does not apply accurately for lamp operation on half-wave rectified voltage, semi-conductor dimming devices and constant current operation.

3 MECHANICAL STRENGTH

Low voltage, high current incandescent lamps are best suited for operation under conditions of shock and vibration. Other factors which affect strength are the resonant frequency of the lead wires, support wires, and filament form. Most radio panel lamps of 6.3 volts and under incorporate mounts whose

resonant frequency has been synchronized with that of the coiled filament to withstand shock and vibration. Where rough service conditions are encountered, screw base lamps should be avoided, since they may loosen in their sockets.

4 POWER SOURCES

In battery applications, the mean effective voltage delivered is generally higher than the average volts. Therefore, the mean effective voltage should be the design voltage of the lamp. Design voltages for flashlight lamps have been determined by extensive tests.

Filament lamp ratings are predicated on operation at constant voltage. When operated from a higher-than-rated voltage in series with a dropping resistor, the effect is the same as operating at a constant current. Since the lamp resistance changes with operating life, the voltage drop across the lamp will increase; hence, the lamp life experienced will generally be about one-half that resulting from constant-voltage operation.

When selecting a transformer or resistor, consideration should be given to lamp ampere tolerances and the regulation characteristics of the component.

5 SPACE

Tolerances of bulb diameter, light center length and overall length should be carefully considered by designers in specifying lamp housings. These tolerances and more detailed drawings are available from your local GE Miniature Lamp Sales Office.

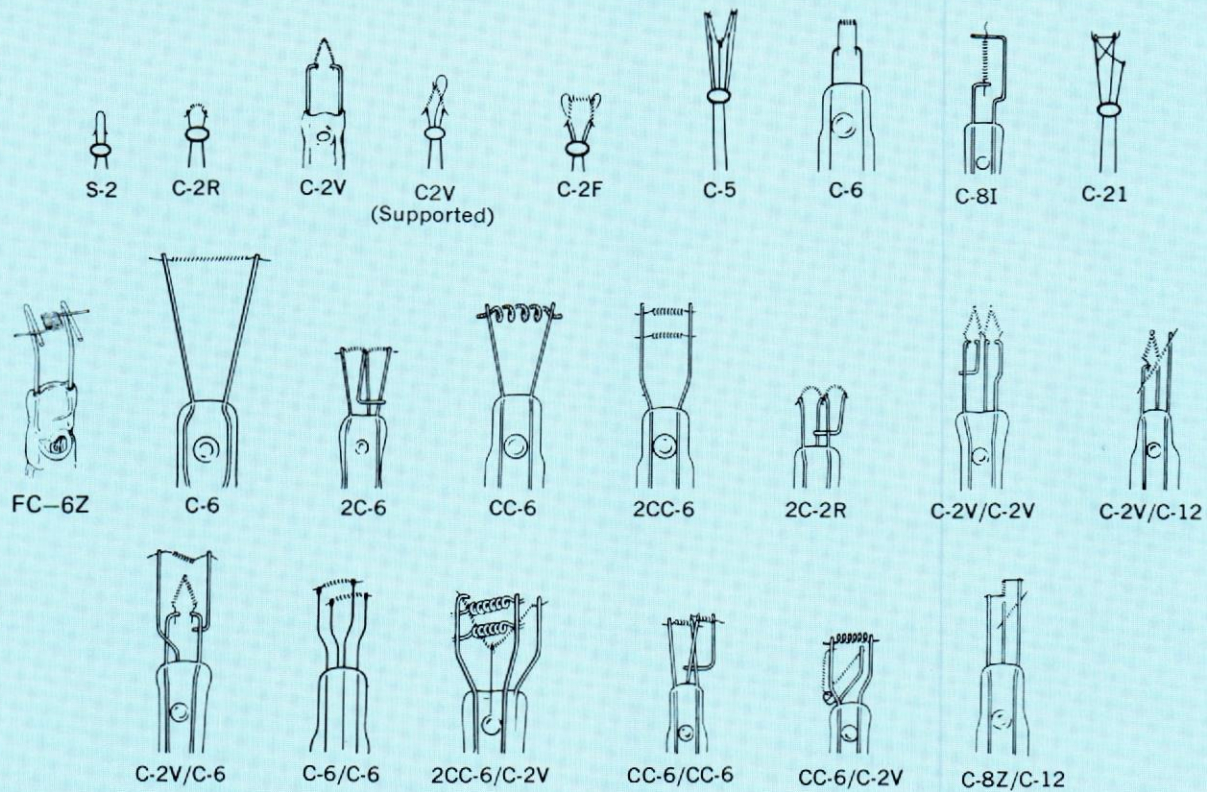
6 AMBIENT TEMPERATURE

It is well to consider the lamp housing from the standpoint of radiation, absorption and ventilation as well as extraneous heat.

Normal variations in ambient temperature do not affect the performance of miniature lamps. Above 350°F, the solder on conventional lamps may soften, deform or melt and the basing cement loosen. The new wedge base lamps can be operated in ambients up to 450°F.

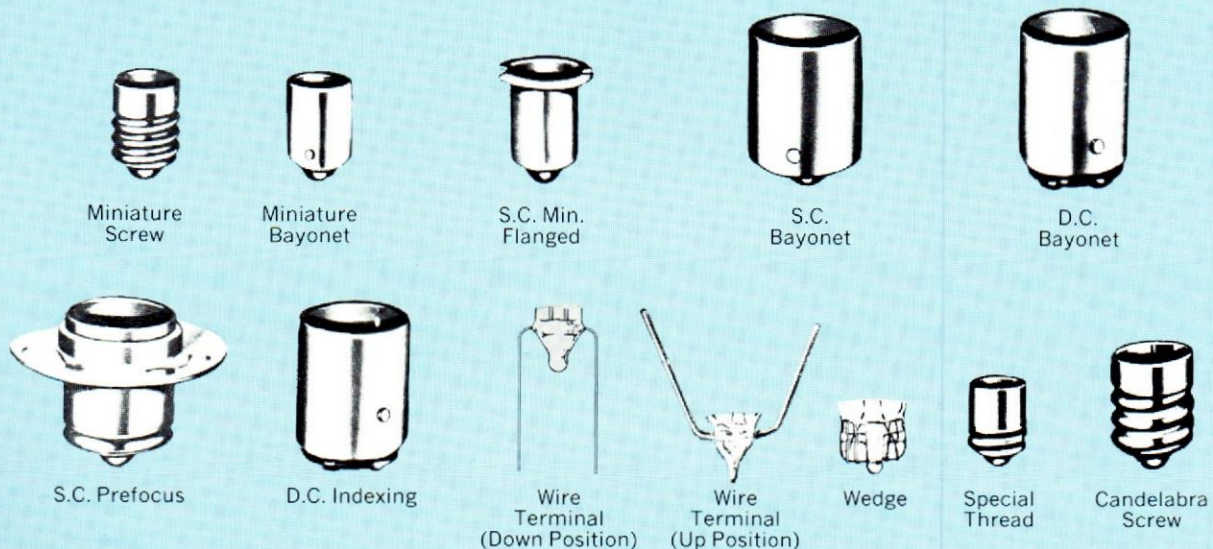
The almost universally used lamp filament material is tungsten because of its high melting point at incandescence. The filament may be straight wire, a coil or a coiled coil (indicated respectively by the letters, S, C, and CC). Coiling the filament wire effectively shortens the filament length so that smaller bulbs can be used. In addition, in gas-filled lamps, coiling the wire reduces thermal losses and increases efficiency. Filament designations consist of a prefix letter to indicate whether the wire is straight or coiled, and a number to indicate its physical configuration on the supports.

FILAMENTS



Bases provide electrical contact to the lamp and, in most cases, also support the lamp in the fixture. Bayonet types are generally preferred over screw types when vibration is present. Flanged or collared types are usually associated with requirements for filament location. Wedge base types reduce socket size and complexity.

BASES



Line No.	Lamp No.	Primary Application	Design Volts	Design Amps or Watts	Candle Power
B-3¹/₂ BULB 7⁷/₁₆ IN. (11mm) DIAMETER²					
6-1	PR8	Flashlight—2 Volt Storage Battery	1.9	.6A	.65 ²
-2	PR4	Flashlight—2C Cells	2.33	.27A	.40 ²
-3	PR5	Flashlight—2D Industrial Cells	2.35	.35A	.45 ²
-4	PR2	Flashlight—2D Cells	2.38	.50A	.80 ²
-5	PR6	Flashlight—2D Industrial Cells	2.47	.30A	.45 ²
-6	PR9	Flashlight—2D Cells	2.7	.15A	.25 ²
-7	395X	Flashlight—2D Cells Special Service	3.0	.07A	.15 ²
-8	PR3	Flashlight—3D Cells	3.57	.50A	1.50 ²
-9	PR29	Flashlight	3.6	.20A	.60 ²
-10	PR7	Flashlight—3D Industrial Cells	3.7	.30A	.90 ²
-11	PR13	Hand Lantern—4F Cells	4.75	.50A	2.20 ²
-12	PR15	Hand Lantern—8F Cells in series parallel	4.82	.50A	1.9 ²
-13	PR17	Hand Lantern—4F Cells	4.9	.30A	1.2 ²
-14	PR12	Flashlight—5D Cells	5.95	.50A	3.10 ²
-15	PR18	Flashlight—6D Cells ¹⁴	7.2	.55A	5.5 ²
-16	PR20	Flashlight—7D Cells ¹⁴	8.63	.50A	5.0 ²
-17	PR16	Auto. Hand Spotlamp	12.5	.25A	2.7 ²
B-6 BULB 3³/₄ IN. (19mm) DIAMETER²					
-18	1317	Aircraft, Emergency Lighting (Krypton gas)	6.0	.51A	3.40
-19	209	Special Service	6.5	1.78A	15
-20	210	Special Service, Emergency Ltg.	6.5	1.78A	15
-21	1003	Auto. Interior	12.8	.94A	15
-22	1004	Auto. Interior and Marine	12.8	.94A	15
-23	105	Auto Interior, Heavy Duty	12.8	1.0A	12
-24	1309	Aircraft Interior	28	.52A	15
G-3¹/₂ BULB 7⁷/₁₆ IN. (11mm) DIAMETER²					
-25	123	Flashlight 1D Cell	1.25	.30A	.10 ²
-26	131	Bicycle 1D Cell	1.3	.10A	.03 ²

² Approximate.

¹⁴ This lamp is specially designed for a particular purchaser and may not be suitable for other uses because of its excessive wattage requirements for the bulb size. Consult nearest Sales Office for application information.