



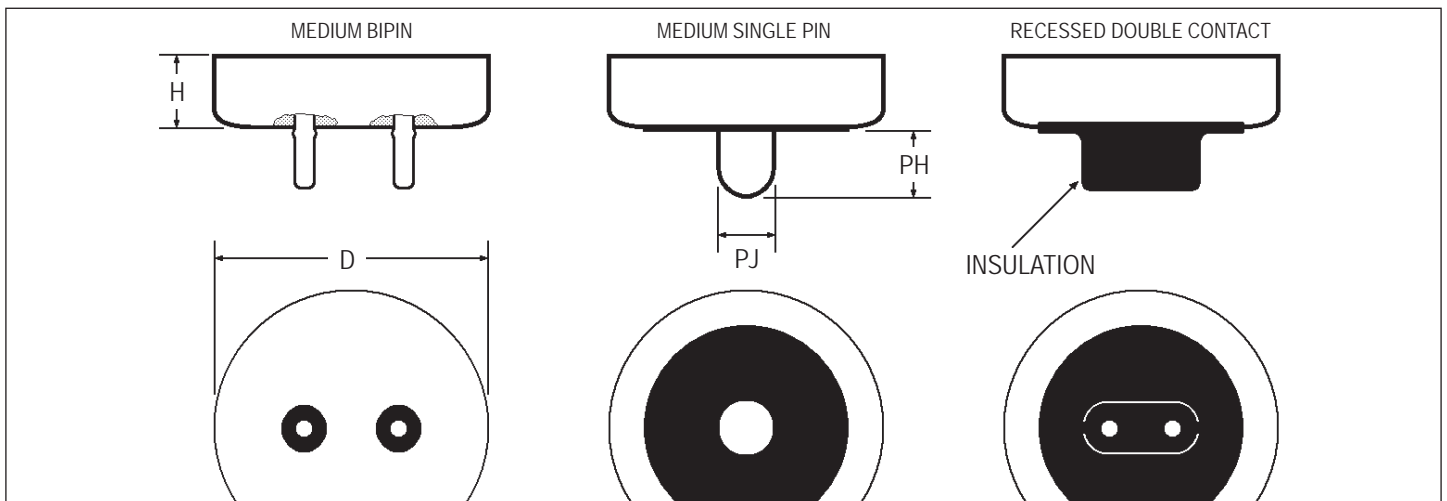
Aperture and Reflector Lamps

For scanners, facsimile machines, copiers and other imaging devices

Both reflector and aperture lamps are designed to control the direction of light. The use of aperture lamps in scanning and other applications continues to multiply with increasing emphasis on greater precision. A particular feature of fluorescent lamps is that the light output is inherently uniform along the length of the tube.

Aperture lamps are similar in construction to reflector lamps except that there is a clear window instead of phosphor coating. A reflective coating underlies the phosphor in the rest of the lamp. This results in a high brightness lamp of up to three times that of a standard fluorescent lamp. The aperture window is usually specified in angular degrees for T-4 (1/2-inch) and larger diameter lamps. However, the precision of the advanced technology permits the aperture width to be specified in thousandths of an inch on smaller diameter lamps, in windows as small as 0.008 inches. Aperture widths can also be designed to vary in size and shape along the axis of the lamp.

Fluorescent Lamp Bases

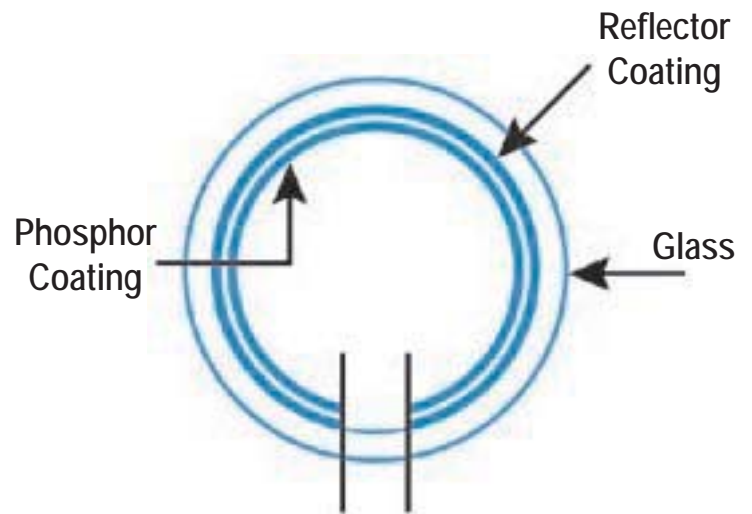


To learn more about B-I-A please visit us at our
WEB site: www.BiaGmbH.com



- **Aperture Lamp
Cross Section**

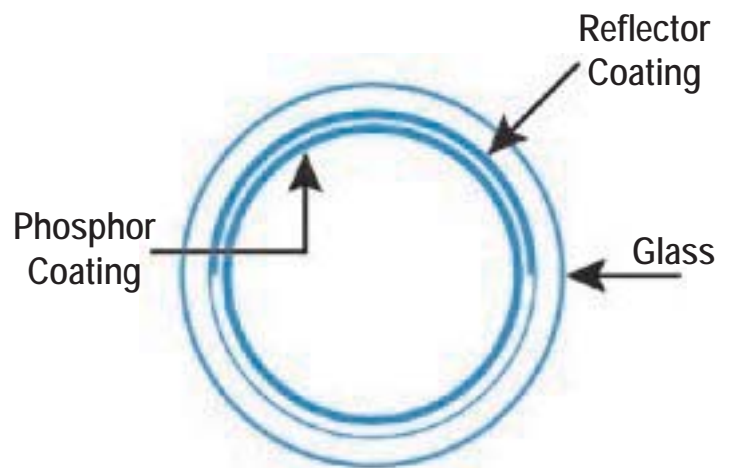
The aperture window is usually specified in angular degrees for T-4 (1/2-inch) and larger diameter lamps



Reflector lamps have an internal layer between the phosphor and the envelope glass. This coating reflects a high percentage of the visible radiation striking it. The major portion of the light is emitted through the reflector opening, which is coated only with the fluorescent phosphor along the axis of the lamp. The improvement in light output in the direction perpendicular to the reflector can be 180% of that of a reflectorless standard lamp. Reflector angles can be custom specified and manufactured to your requirements.

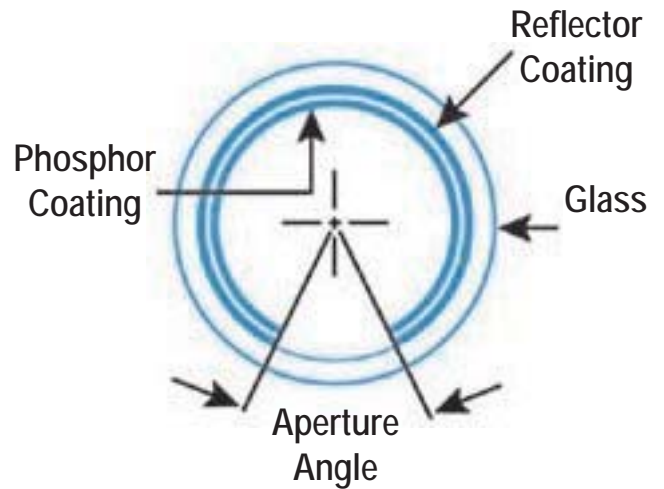
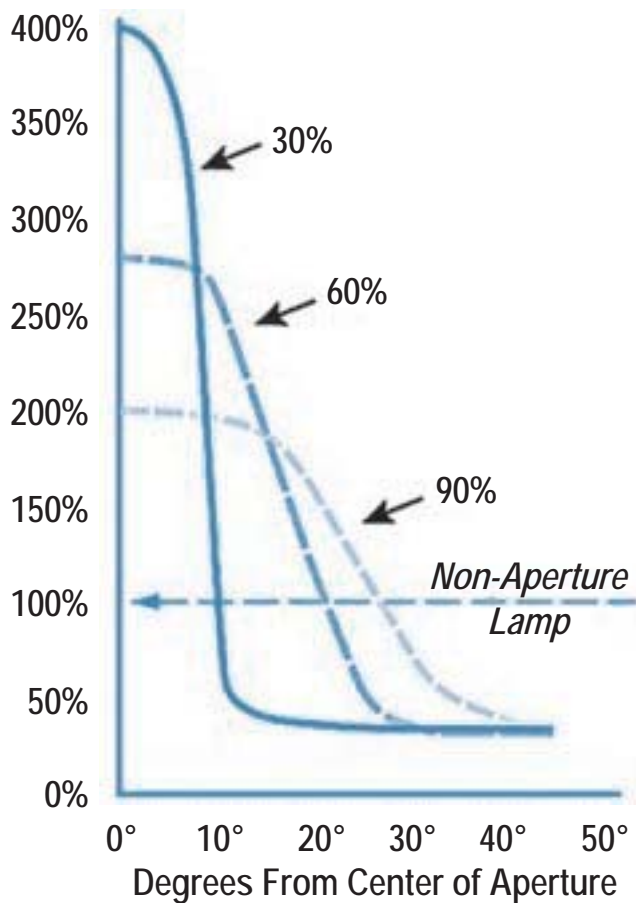
- **180° Reflector Lamp
Cross Section**

The improvement in light output in the direction perpendicular to the reflector can be 180% of that of a reflectorless standard lamp.



Both aperture and reflector lamps can be made in diameters as small as 3mm depending upon the design of the lamp. Apertures can be added to bent lamps. Readily available phosphors include: Cool White, Warm White, Daylight, Blue, Green, Red, Ultraviolet, Infrared and Tri-Band. Spectral Energy Distributions of the tri-component colors are shown on the previous page. These can be blended to produce your exact color requirements in a wide range within the visible spectrum.

- Brightness vs. Degrees from Center of Aperture



Now that you have the best lamps, why not set them apart from your competition?

Add a custom etch or special end caps. Ceramic End Caps not only improve the appearance, but also make them easier to install.

Please contact us for informations.

Technical and Performance Specifications Aperture and Reflector Lamps

Outside Diameter Range:	3.0 - 38.1mm
Length:	50mm - 2,438.4mm
Special:	Lasered or hand scraped apertures
Reflector Angle:	15° to 300°
Aperture Window:	0.001 - 1.0" (dependent on lamp diameter)
Radius Bend:	Consult factory
Shapes:	„U“, „L“, circular, towel bar, and single bend angle from 5° to 175°
Colors:	Virtually any, as required and specified by the customer
Technology:	HCFL and CCFL lamps
Operating Lifetime:	Tens of thousands of hours depending on driving current (amps)
Operating Environment:	All commercial and industrial environments

Frequently Asked Questions (FAQs)

FAQs for Small Diameter (2.0 - 8.0mm) Cold Cathode Fluorescent Lamps (CCFLs)

Q. Do small diameter fluorescent lamps get hot?

A. When a 2.6mm diameter CCFL is operated at the specified drive current of 6mA_{rms}, the ends near the electrodes will be approximately 50° C above the ambient temperature. The body will be approximately 25° to 30° C above ambient.

Q. What is the effect of lamp length or diameter on brightness?

A. Using the same drive current, the surface intensity of the smaller diameter lamp will be greater. Longer lamp lengths of the same diameter, however, have greater total light output.

Q. What are the preferred methods of mounting small diameter fluorescent lamps?

A. Any method that does not put stress on the glass envelope and/or the lead-to-glass seal on the lamp end is acceptable. Most common methods are to solder the leads (with a strain relief bend) directly into a PC board, or to secure the lamp ends with a custom silicon end cap.

Q. Can small diameter fluorescent lamps be dimmed?

A. Yes. The dimming range is predominantly a function of the inverter.

Q. What type/size wire is needed for small diameter fluorescent lamps?

A. The wire must have an insulation specified at, or above, the electrical characteristics of the lamp. Typically, small gauge 22 - 26 AWG wire is acceptable.

Q. How can I increase lamp brightness?

A. Lamp brightness may be increased by increasing the drive, or arc, current. However, increased arc current will shorten lamp life and may shift the output spectrum.

Q. Are small diameter fluorescent lamps approved to UL, CSA, TÜV, VDE or other safety standards?

A. Safety agency approvals have not been sought by the factory. Most companies obtain their own agency approval at the system level.

Q. How much mercury is contained in small diameter fluorescent lamps?

A. This varies by lamp diameter, typically 3mg for 3mm diameter to 10mg for diameters larger than 9mm.

Q. Will small diameter fluorescent lamps work at cold ambient temperatures?

A. Yes. However, the lower the temperature, the lower the light output and the higher the required starting voltage. We recommend using lamp heaters in cold ambient conditions.

Q. How long should I expect small diameter fluorescent lamps to last?

A. Typically, 5,000 to 30,000 hours is achievable when the lamp is operated within specification parameters. Lamp life is stated as the point at when the lamp provides less than 50% of its initial output.

Q. How much of the lamp's overall length is actually lit?

A. The entire length gives off illumination, except for 8 to 10mm at each end.

Q. Are special or custom fluorescent lamps (i.e., non-standard colors, shapes or sizes) available?

A. Special colors and/or lamp configurations are our specialty. However, minimum order quantities and set-up charges would likely be required.

Q. Are there any limits on lamp length for small diameter fluorescent lamps?

A. The limit is dependent upon the diameter of the lamp and the availability of an inverter to properly drive the lamp. Typically, the ranges of straight lamp lengths are from 25mm to 450mm long. Longer lengths are available in non-straight, such as U-shape or M-shape, configurations.

Frequently Asked Questions (FAQs)

FAQs for Small Diameter (2.0 - 8.0mm) Cold Cathode Fluorescent Lamp (CCFL) Inverters

Q. Can I run more than two lamps on a single inverter?

A. Yes, it is possible to run multiple lamps on a single inverter. To obtain optimum performance, however, advise the inverter manufacturer to determine if inverter modifications will be required.

Q. Can I power fluorescent lamps directly from the wall outlet?

A. No! You must use a properly matched inverter. All lamp specifications and operating characteristics are based on being driven with an appropriate inverter.

Q. Can I be shocked by the inverter or the fluorescent lamp?

A. Yes! Although current is low, the inverter output can exceed 1000 volts. Proper precautions should be observed when operating these lamps.

Q. Does the fluorescent lamp/inverter produce EMI/RFI?

A. The lamp/inverter combine to produce some RF emission. It may be necessary to shield the inverter after determining the results of system testing.

Q. How far from the lamp can I position the inverter?

A. This is greatly dependent upon the lamp/inverter combination and the proximity to a ground plane. It is best to consult with the inverter manufacturer to optimize the lamp-inverter connection.

FAQs about Custom Colors

Q. What do you mean by „Color Temperature“?

A. The color temperature of light refers to the temperature to which one would have to heat a „black body“ source to produce light of similar spectral characteristics. Color Temperature is expressed in degrees Kelvin (K). Low color temperature implies warmer (more yellow/red) light while high color temperature implies a colder (more blue) light. Moreover, the „color temperature“ of a lamp refers to how reddish, greenish or bluish the lamp appears. If the lamp appears reddish, it has a lower color temperature (e.g., 2500K-3000K) and is considered to be „warm“ in appearance. If the lamp appears to be bluish, it has a higher color temperature (e.g., 4000K-4500K) and is considered to be „cool“ in appearance.

Q. What is the best way to specify the „color“ of fluorescent lamps?

A. Fluorescent lamp „color“ is best identified through the use of coordinates on the CIE 1931 20 or 1976 UCS Chromaticity Diagrams, x, y or u', v', respectively.

Q. What is „Color Rendering Index“?

A. The Color Rendering Index, or CRI, is a term in photometry used to describe the effect of a light source on how well it renders colors. In essence, the Color Rendering Index (CRI) is a numerical system that rates the „color rendering“ ability of fluorescent light in comparison with natural daylight. If a lamp has a low color rendering index of 50, it does not render colors very well. If, however, the lamp has a color rendering index of 80 - 95, its ability to render colors is thought to be very good to excellent. A CRI of 100 is considered natural daylight and is assigned to the sun itself.

Q. What is the Color Temperature (Kelvin) of fluorescent lamps?

A. Color temperature depends upon the phosphor used to manufacture the lamps. The most common industry lamp phosphors produce the following color temperatures.

Phosphor Type Color Temperature
(Warm White) 2800° K to 3200° K
(Day Light) 6200° K to 6800° K
(Cool White) 4000° K to 4500° K

The information and recommendations contained in this document are based upon data collected by the factory, and believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. No statements or recommendations made herein are to be construed as inducements to infringe any relevant patent, now or hereafter in existence.

Request Form — Requirements Checklist

Date: _____

General Information:

Company: _____ P.O. _____

Name of Contact: _____ Tel: _____

Address: _____ Fax: _____

City/Town: _____ State: _____ Country: _____ Zip: _____

Type of Business: _____

Application:

General Display: _____

Mil Qual: _____

Avionics: _____

Instrument: _____

Industrial: _____

Prototype Forecast:

Production Forecast:

Prototype Qty: _____

First Year: _____

Delivery Needed: _____

Second Year: _____

Display and/or Light Source Info:

Edge Light: _____ Back Light: _____ Mfr: _____

Display Size: _____ Display Brightness: _____

Transmission: _____ Diffuser Transmission: _____

Lamp Dia. _____ Lamp Dwg. No. _____

Lamp Power: _____ Lamp Surface Brightness: _____

Lamp Color Coordiantes Data:

X = _____ u' = _____ T_K = _____

Y = _____ v' = _____ r = _____

Request Form — Requirements Checklist

Characteristics:

Luminance Uniformity: _____

Chromaticity Uniformity: _____

If HC, Filament Current: _____

If CC, Arc Current: _____

Arc Current: _____ Arc Voltage: _____

Fil. Heating Voltage: _____ Fil. Heating Current: _____

Environmental Temp Range: From _____ to _____

Power Supply Type: _____

Dimming Requirements: _____

Vibration Requirements: _____

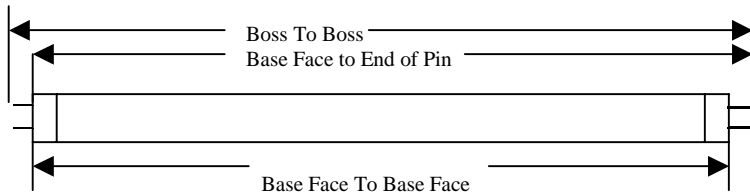
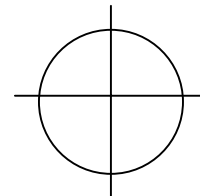
Thermal Shock Requirements: _____

Type of Specs: Military/Civil/Commercial, Etc. _____

Aperture or Reflector Information:

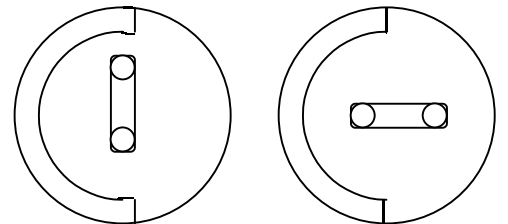
Aperture/Reflector size: _____

Draw Orientation:



Boss to Boss Dim.: _____

Pin Alignment:



Base Face to End of Pin Dim.: _____

Base Face to Base Face Dim.: _____

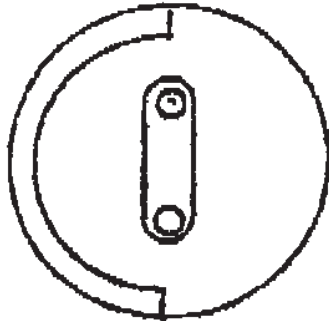
Sales Information:

OEM, Distributor or User? _____

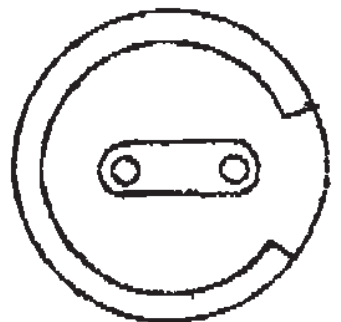
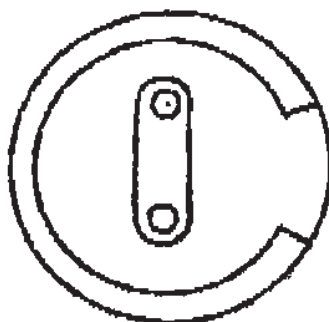
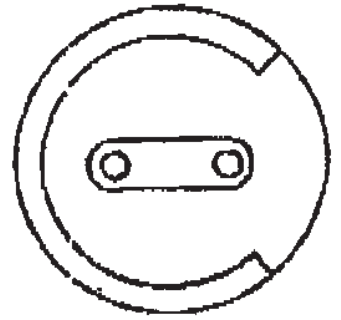
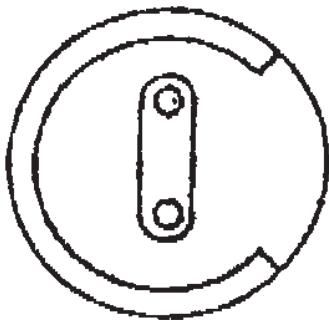
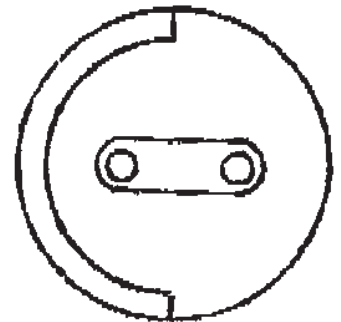
Type of Equipment Lamps will be installed into: _____

Request Form — Requirements Checklist

Inline



Perpendicular



Please Circle Your Choice

Information on the phosphor color and aperture opening size is required. In addition, please note the alignment chart above, as we would need to know the alignment of the aperture to the pins. In addition, please also note page 1 of this document to show the connectors as we would need to know that information too. Finally, we need to know the quantity required for the manufacturing as the factory does not provide spare parts.