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INTRODUCTION

All of the tubular arc lamps considered in this bulletin contain mercury in the discharge. Since mercury lamps of various configurations, including tubular types, are well known in the art, the tubular mercury lamp is used as the reference lamp for comparison of each type of tubular metal halide lamp.

Figure 1 gives the spectral power distribution (SPD) curve of a T5.5 (5 5/8-inch outside tube diameter) tubular mercury lamp having a 4.5-inch maximum overall length operated at a wall loading of about 100 watts per inch.

Since tubular mercury lamps have found extensive use in diazo-applications, it was natural that the first tubular metal halide lamp to be developed was a lamp designed to give extra energy in the diazo region of the spectrum. This is commonly considered to be in the 360- to 450-nanometer wavelength region; depending on the particular diazo coating used, the exact peak of sensitivity is generally between 400 and 420 nanometers. Figure 2 shows the SPD of the lamp which was found to yield optimum results in the diazo region. The SPD curve and the emission spectrum indicates that a large amount of additional energy has been concentrated in the 400- to 420-nanometer region. This added energy results from the presence of another metal in the discharge besides mercury. Since the particular metal has a relatively low vapor pressure at the lamp wall temperatures in question, its iodide is used in order to get an adequate concentration in the discharge. Comparative tests of exposure times in a number of diazo applications have consistently shown that effective energy levels for the diazo lamp are from 150 to 200 percent of the energy levels emitted by tubular mercury lamps at equal loadings.

Following the success of the diazo lamp, it was decided to develop tubular lamps which would be useful in the electrostatic copying field. The next lamp type developed, namely "green" lamps, are the results of this work. Figure 3 is the SPD curve of the green lamp. Characteristic of this lamp is its very high-intensity spectral line at 535 nanometers. Relative improvement in energy effectiveness for a narrow wavelength range or a particular wavelength (in this case 535 nanometers) is greater for this lamp than for any other lamp tested. In addition to mercury, another metal iodide is also present in this lamp; again the iodide is employed because it has a higher vapor pressure than the parent metal.

For the vast majority of photoreproduction applications, one of the three lamp types described previously may be utilized. However, there are specialized applications where energy is desired in other regions of the spectrum. Such lamps have been made for many other specific spectral requirements. The important point is that the output energy of tubular halide lamps can be adjusted to approximate a given spectral response curve between the limits of 250 and 700 nanometers. By utilizing halides, several different metals may be used either alone or in combination in an arc discharge lamp containing mercury to tailor the emission spectrum.

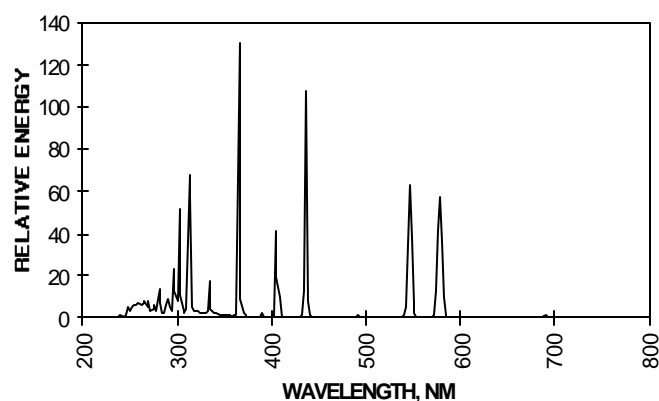


Figure 1. Energy distribution vs. wavelength; T5.5 tubular mercury arc lamp; 2.25-inch lighted length (H Series).

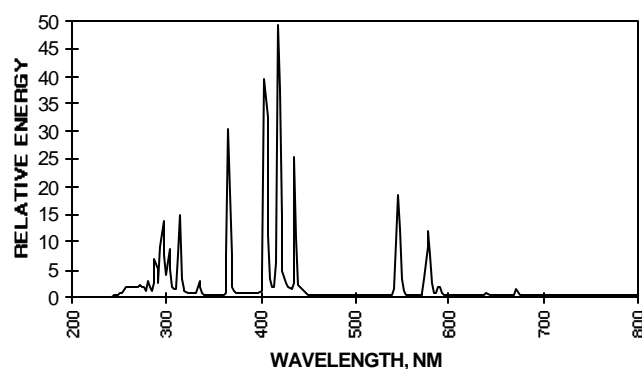


Figure 2. Energy distribution vs. wavelength; T8 diazo tubular arc lamp, 6-inch lighted length (MP Series).

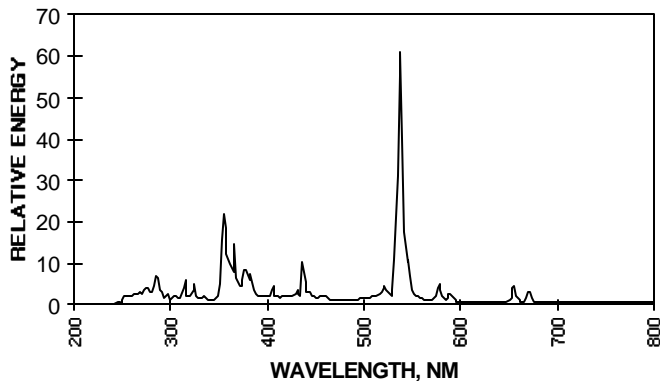


Figure 3. Energy distribution vs. wavelength; green tubular arc lamp; (MG Series)

TEMPERATURE CONSIDERATIONS

Tubular arc lamps, whether of the mercury or halide variety, are usually made of quartz tubing. A high-temperature, low-expansion glass such as quartz is required because of the relatively high operating temperatures of the lamps. For example, the recommended operating wall temperature range for all tubular arc lamps is 600° to 800°C at the center of the tube, normally the hottest point. An operating temperature at the center lower than 600°C is undesirable, since it may result in mercury or metal halide condensation. This is especially important in the halide lamps because halide condensation takes place at a higher temperature than mercury. An operating temperature in excess of 800°C at the center of the tube could result in sagging or bowing of the lamp, especially if this temperature is maintained for an extended period of time. Above 800°C, the rate of bowing per unit time increases with increasing temperature; this rate also increases if axial compressive forces are present. See Note 4 (page 8).

The quartz tubing used for these lamps is usually of a special type. The special feature of the tubing is that it transmits little or no radiation below 200 nanometers. This is the ozone-generating region and, since short wavelength radiation such as this is characteristic of many arc discharges, the potential hazards associated with ozone may be present unless the quartz used has reduced transmission in this region. If these lamps are jacketed in an outer tube which is nontransmitting below 200 nanometers, regular quartz tubing may be used. This is not common because an outer tube adds cost and could reduce lamp efficiency if the outer tube has less than 100 percent transmission in the spectral region where energy is desired. Also, an outer jacket

precludes close coupling of fixture optics with the arc tube. Since the erythral radiation region (200 to 300 nanometers) is still transmitted by the “ozone-free” quartz tubing, proper eye and skin protection must be worn if the eyes and skin could be exposed to direct or reflected radiation from the lamps.

Operating pressures of the tubular arc lamps discussed in this bulletin are in the pressure range of one to ten atmospheres at the normal design wall loadings. Lamp pressure will vary somewhat with arc length, tube diameter, wall loading (watts per inch), lamp fill, and cooling rate.

BASES--ELECTRICAL CONNECTION

Tubular/reprographic lamps are available in four base types shown (Figures 4 through 7). The recessed single-contact base is identical to that commonly used on quartz-iodine lamps, and sockets for this base type are readily available. This base type does have the disadvantage of applying axial compressive forces to the lamp. This intensifies the bowing problem if the lamp is operated at a temperature in excess of 800°C. The axial lead type base does not require special sockets, since electrical connection is made to a standard terminal. However, means for supporting the lamp must be provided and this is usually done with a simple spring clip on the ceramic at each end of the base. All base types have a temperature limitation of 350°C which is actually a limitation of the molybdenum-to-quartz seal at the lamp ends. Temperatures in excess of 350°C result in oxidation of the molybdenum foil with subsequent seal fracture. Refer to Table 1 for a listing of lamps presently available.

BALLASTING

As do all arc discharge lamps, tubular arc lamps require an auxiliary ballasting device to limit the current and provide adequate starting and sustaining voltage. Tubular mercury lamps require ballasts which are similar to those for any mercury lamp except that the required open-circuit voltage and starting characteristics must be provided for the particular lamp. Tubular metal-halide arc lamps, however, require special ballasting devices such as those used for metalarc lamps. Although similar in design to mercury lamp ballasts, these special ballasts provide extra starting voltage and the proper current and voltage wave shapes to start reliably and sustain the halide types of lamps.

A typical tubular lamp ballast circuit has a leading power factor. Therefore the input current to the ballast is no

greater during the lamp warm-up period than when the lamp has reached stabilization. This is an important advantage since many of these lamps must operate on relatively low current capacity circuits. In addition, the value of one of the capacitors can be chosen such that it can be switched in or out of the circuit, supplying half or normal current, respectively, to the lamp. Since the lamp is essentially a constant voltage device (providing bulb wall temperatures are maintained at or above the minimum required value), the lamp operating wattage may be lowered by lowering the current. The change in wattage takes place nearly instantaneously (spectral output may lag and is dependent on cooling at low power). A switch capable of withstanding the peak voltage of the ballast is necessary. There are some relatively low-cost vacuum relays (switch contacts are in a vacuum) and air relays (switch contacts are exposed) on the market which have performed reliably in this switching application.

With a proper system design, the capability of switching from half to normal power may be advantageous for the following reasons:

1. Lamps can be operated at the normal wall loadings (watts per inch) during exposure cycles for nominal output, and reduced to half wall loadings for standby operation between exposure cycles.
2. Lamps typically have better life performance at lower wattage than a normal power.
3. Power consumption and heat dissipation can be reduced.

LAMP LIFE AND MAINTENANCE

Life and maintenance of tubular halide lamps depend a great deal on the following:

1. Tube diameter; 2. lighted length; 3. specific metal halide(s) used; 4. operating wattage; 5. standby wattage and the specific normal power-half power time cycle if switching is employed; 6. number of starts; 7. tube temperature profile along length of lamp; 8. maximum tube and seal operating temperature; 9. cleanliness of the lamp environment; 10. ballast voltage and current crest factors.

Tests indicate the interdependence of the various factors affecting lamp life and maintenance. Life of 300 to 1000 hours with maintenance of up to 80% can be obtained depending on operating conditions as stated above.

Tubular mercury and metal halide lamps are available with arc lengths ranging from 1 to 6 inches, in tube diameters from T4 (4/8 inch) to T8 (1 inch). Wall loading about 60 watts per inch to 890 watts per inch have been achieved, and are available on special types. In comparison, fluorescent lamps have a practical maximum loading level of about five watts per inch. It is readily apparent that in specific instances one tubular mercury or metal-halide arc lamp could replace many fluorescent lamps and provide higher exposure speeds. The result of the substitution would be less hardware (sockets, reflectors, wiring) to buy and maintain. Tubular arc lamps also have the inherent advantage a small arc diameter which facilitates efficient reflector design.

Radiant energy sources for photoreproduction or other photochemical processes can now be selected from a new family of arc lamps having the capability of high-energy loadings per unit length and high efficiencies. These and other new lamps can be made to maximize the energy output within a wavelength range approximating the spectral response characteristics of particular emulsions, films, plates or chemicals.

APPLICATIONS

Quartz tubular arc lamps are for reprographic and photochemical uses including the following: platemaking, printed circuit etching, chemical milling, photoengraving, photo-rotogravure, plastics polymerization, water purification, bactericidal-germicidal, photocopying, microfilm and microfiche duplication and projection. They will give their best performance only when the light sensitive material is suitably matched to the spectral energy output of the lamp.

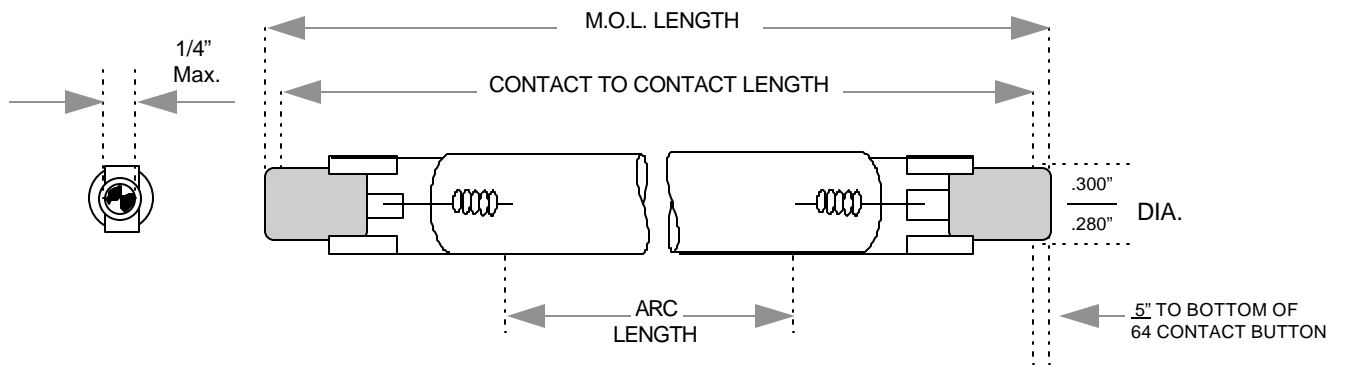


Figure 4 . Base RSC - Recessed single contact base.

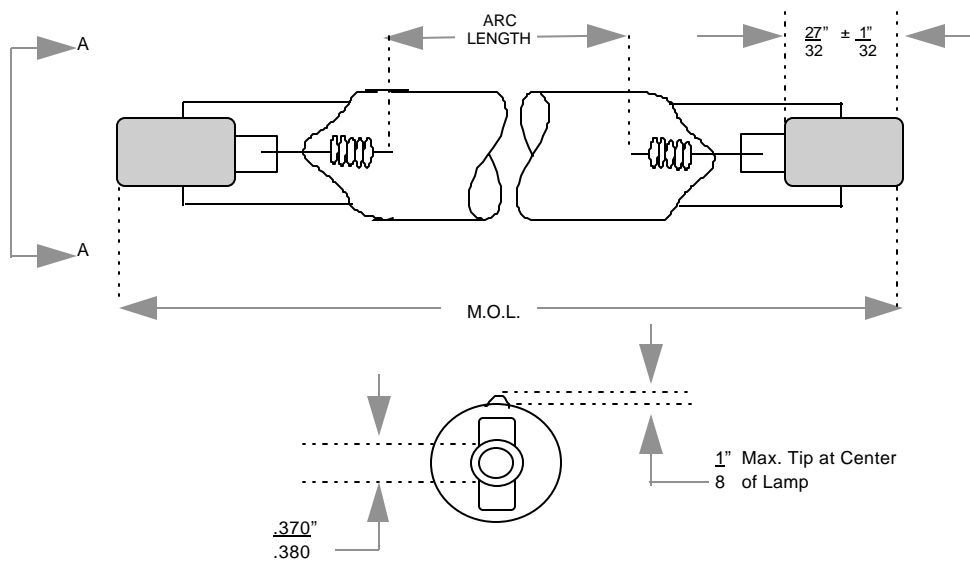


Figure 5 . Base J - Cylindrical nickel plated copper base.

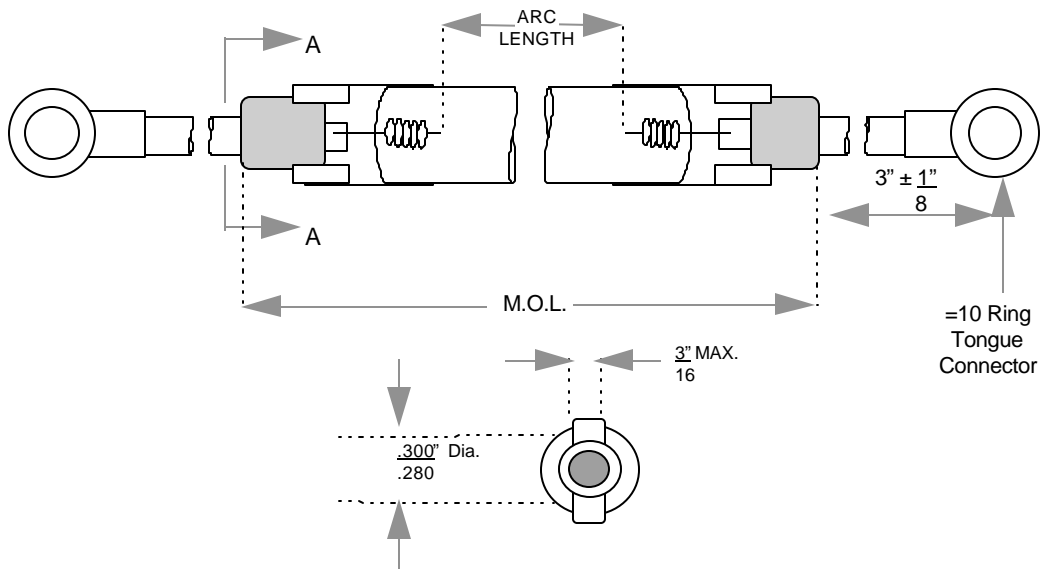


Figure 6. Base Q - Axial lead/ceramic support base.

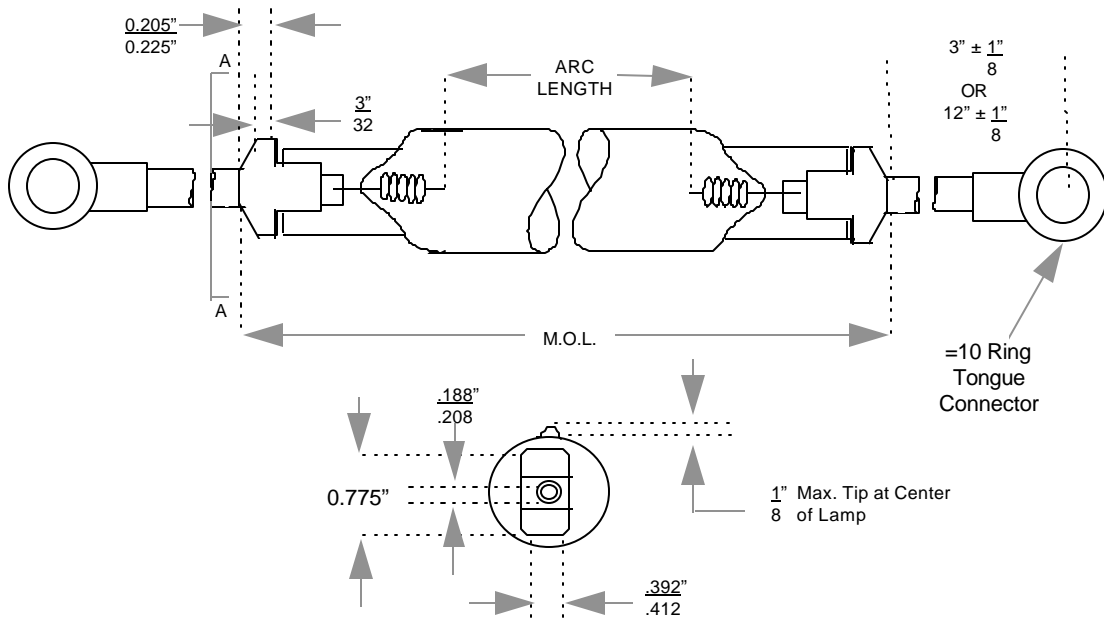


Figure 7. Base R - Axial lead base.

REFERENCE NOTES:

1. **Special Lamps**

Other lamps with lighted lengths from 1 to 24 inches, power up to 5000 watts and other spectral regions of principal emission, may be obtained on a minimum order basis by special request. Contact your local Sylvania Sales Representative for information.

2. **Bulb Types**

Tubular bulbs are designated by T as a part of the lamp designation. The number following the T designation represents the nominal diameter in eighths of an inch at the largest section on the bulb.

3. **Base Type**

RSC. Recessed single contact base. For use where seal temperature does not exceed 350°C.

Q. Axial lead with ceramic support. Lead is 3 inches long, insulated, and has a #10 ring connector. For use where seal temperature does not exceed 350°C.

J. Cylindrical nickel plated copper base. For use where seal temperature does not exceed 350°C.

R. Axial lead with *rectangular* ceramic support. Lead is 12 inches long, insulated and has a ring tongue connector. For use where seal temperature does not exceed 350°C.

4. **Tube Wall Temperature**

Recommended operating wall temperature range for all tubular arc lamps is 600° to 800°C at the center of the tube, normally the hottest point. For optimum performance including life, light output, and maintained light output with life, 650° to 750° is considered best. Cooling may be required to maintain temperature within specified range. Air interlock vane switches should be employed in the cooling circuit to protect against blower failure.

5. **Burning Position**

Tubular arc lamps should be operated in a horizontal position with exhaust tip up, to insure efficiency of operation.

TABLE 1. OSRAM SYLVANIA REPROGRAPHIC LAMPS

Watts	Bulb	Base	NAED Code	Ordering Abbreviation	Lamp Volts	Pkg. Qty.	Arc Length	M.O.L.	Primary Line(s) of Emission (nm)
400	BT-37	Mog	65911	MP400BT37/HOR/MOG ☐	130	6	Note 2	11 1/2	417
400	T-5 1/2	RSC	66576	MP400T5.5/1.5RSC	135	10	1 3/8	3 3/4	417
400	T-5 1/2	J	66621	MP400T5.5/1.5J	135	10	1 3/8	4 1/2	417
400	T-5 1/2	Q	66577	MP400T5.5/1.5Q/3 ☐	135	10	1 3/8	3 3/4	417
400	T-16	Mog	65912	MP400T16/HOR/MOG	130	6	Note 2	11	417
500	BT-37	Mog	65928	MP500BT37/HOR/MOG ☐	135	6	Note 2	11 1/2	417
500	T-16	Mog	65914	MP500T16/HOR/MOG	135	6	Note 2	11	417
750	BT-37	Mog	69361	MP750BT37/HOR/MOG ☐	230	6	Note 2	11 1/2	417
800	T-4	RSC	66616	MP800T4/6RSC ☐	465	10	6	8 3/16	417
800	T-4	Q	66617	MP800T4/6Q/3 ☐	465	10	6	8 3/16	417
1000	T-8	J	66575	MG1000T8/1J	105	10	1 1/8	4 1/2	535
1000	T-8	J	66563	MP1000T8/1J	105	10	1 1/8	4 1/2	417
1200	T-51/2	J	66573	MP1200T5.5/6J	500	10	6	9	417
2000	T-8	J	66561	MP2000T8/4J ☐	200	10	3 5/8	7 1/8	417
2000	T-8	R	66564	MP2000T8/4R/3 ☐	200	10	3 5/8	6 5/8	417
3000	T-8	J	66587	MP3000T8/4J ☐	250	10	3 7/8	7 3/4	417
3000	T-8	J	66562	MP3000T8/6J	350	10	5 3/4	9 3/8	417
3000	T-8	R	66579	MP3000T8/6R/3 ☐	350	10	5 3/4	8 3/4	417
3000	T-8	R	66614	MP3000T8/6R/12	350	10	5 3/4	8 3/4	417

Note: 1. All MP Series Lamps have output in the "purple" range from 360-450 nm. Also available are lamps with principal emission in the following ranges and series:

- a. MG Series (Green) 500-550 NM
 2. Light center length = 7"
- ☐ Product to be discontinued when inventory is depleted.

TABLE 2. OSRAM SYLVANIA PHOTOCHEMICAL LAMPS

Watts	Bulb	Base	NAED Code	Ordering Abbreviation	Lamp Volts	Pkg. Qty.	Arc Length	M.O.L.	Primary Line(s) of Emission (nm)
250	T-5 1/2	RSC	66590	H250T5.5/2RSC	130	10	2 1/4	4 1/2	*
250	T-14 1/2	MED	65941	H250T14.5/U/MED ☐	130	6	**	9	*
1440	T-4	RSC	66625	H1440T4/24RSC ☐	1200	10	24	26 3/16	*
1500	T-4	RSC	66622	H1500T4/12RSC ☐	500	10	1 3/4	14 3/4	*

* Primary Line(s) of Emission (nm): 365, 305, 436, 546, 578.

** Light center length = 5 1/2".

☐ Product to be discontinued when inventory is depleted.

JACKETED LAMP ORDERING ABBREVIATION KEY

Type of fill

MP

Wattage

400

Bulb Size

BT 37

Operating Position

HOR

Base Type

MOG

UNJACKETED LAMP ORDERING ABBREVIATION KEY

Type of fill

MP

Wattage

3000

Bulb Size

T8

Lighted Length

6

Base Type

R

Lead Length

3

JACKETED REPROGRAPHIC/PHOTOCHEMICAL LAMP**WARNING**

This product conforms to USA Federal Standard 21 CFR 1040.30.

The high intensity discharge (HID) lamp is constructed of an outer glass bulb with an internal arc-tube made of quartz. HID arc-tubes operate at high pressure (up to 50 p.s.i.) and at very high temperatures and can unexpectedly rupture due to internal causes or external factors such as a ballast failure or misapplication. An arc-tube rupture can burst and shatter the outer glass bulb resulting in the discharge of glass fragments and extremely hot quartz particles (as high as 1832°F, 1000°C). IN THE EVENT OF SUCH RUPTURE, THERE IS A RISK OF PERSONAL INJURY, PROPERTY DAMAGE, BURNS AND FIRE.

TO REDUCE THE RISK OF PERSONAL INJURY AND PROPERTY DAMAGE RESULTING FROM AN ARC TUBE RUPTURE, THIS LAMP MUST BE OPERATED IN A SUITABLY ENCLOSED FIXTURE AND THE "PROPER CARE AND MAINTENANCE" INSTRUCTIONS BELOW MUST BE FOLLOWED.

A suitably enclosed fixture is designed to prevent hot lamp fragments (up to 1832°F, 1000°C) from exiting the unit in the event of an arc-tube rupture. If you do not know whether your fixture can safely withstand an arc-tube rupture, contact your fixture manufacturer.

ULTRAVIOLET RADIATION EXPOSURE:

WARNING: THIS LAMP CAN CAUSE SERIOUS SKIN BURN AND EYE INFLAMMATION FROM SHORTWAVE ULTRAVIOLET RADIATION IF THE OUTER ENVELOPE OF THE LAMP IS BROKEN OR PUNCTURED, DO NOT USE WHERE PEOPLE WILL REMAIN FOR MORE THAN A FEW MINUTES UNLESS ADEQUATE SHIELDING OR OTHER SAFETY PRECAUTIONS ARE USED.

ELECTRICAL SHOCK AND BURN HAZARD: Do not remove or insert lamp while power is on. If outer glass bulb is broken, shut off power immediately and remove lamp after it is cooled.

INSTALLATION AND OPERATION INSTRUCTIONS:

1. To ensure electrical contact, screw lamp firmly but not forcibly into socket. Excessive force may cause outer glass bulb to break.
2. To avoid damaging a lamp, never install it into an ordinary household socket.

PROPER CARE AND MAINTENANCE: To reduce the possibility of an arc tube rupture and premature lamp failure:

1. OPERATE WITH COMPATIBLE BALLAST (including capacitor and ignitor) AND FIXTURE ONLY.
2. Turn lamp off for a minimum of fifteen minutes at least once a week.
3. Do not expose operating lamp to moisture.
4. Replace lamp if outer glass bulb is scratched, cracked or damaged in any way.
5. Electrically insulate any metal support in contact with the outer glass bulb to avoid glass decomposition.

OPERATING POSITION:

This lamp must be operated within 15° of the horizontal position.

UNJACKETED REPROGRAPHIC/PHOTOCHEMICAL LAMP**WARNING**

This high intensity discharge (HID) lamp is constructed of an arc-tube made of quartz. HID lamp arc-tubes operate at high pressure (up to 50 p.s.i.) and at very high temperatures can unexpectedly rupture due to internal causes or external factors such as a ballast failure or misapplication. An arc-tube rupture can result in the discharge of extremely hot quartz particles (as high as 1832°F, 1000°C). IN THE EVENT OF SUCH RUPTURE, THERE IS A RISK OF PERSONAL INJURY, PROPERTY DAMAGE, BURNS AND FIRE.

TO REDUCE THE RISK OF PERSONAL INJURY AND PROPERTY DAMAGE RESULTING FROM AN ARC TUBE RUPTURE, THIS LAMP MUST BE OPERATED IN A SUITABLY ENCLOSED FIXTURE AND THE "PROPER CARE AND MAINTENANCE" INSTRUCTIONS BELOW MUST BE FOLLOWED.

A suitably enclosed fixture is designed to prevent hot lamp fragments (up to 1832°F, 1000°C) from exiting the unit in the event of an arc-tube rupture. If you do not know whether your fixture can safely withstand an arc-tube rupture, contact your fixture manufacturer.

ULTRAVIOLET RADIATION EXPOSURE:

WARNING: THIS LAMP CAN CAUSE SERIOUS SKIN BURN AND EYE INFLAMMATION FROM SHORTWAVE ULTRAVIOLET RADIATION. KEEP OUT OF DIRECT OR INDIRECT LIGHT DURING OPERATION UNLESS APPROPRIATE EYE AND SKIN PROTECTION IS WORN. A POWER INTERLOCK DEVICE IS RECOMMENDED TO AUTOMATICALLY TURN OFF THE LAMP IF THE FIXTURE ASSEMBLY IS OPENED.

Due to ultraviolet hazard, this lamp is to be used **ONLY** in equipment specifically designed for use with this lamp and recommended for its use by the equipment manufacturer.

ELECTRICAL SHOCK AND BURN HAZARD: Do not remove or insert lamp while power is on. Allow lamp to cool before removing.

INSTALLATION AND OPERATION INSTRUCTIONS: Do not remove lamp from package until ready for use and then handle only with clean cotton gloves. If lamp is handled, fingerprints, grease or oils may be removed from the bulb by washing with distilled water or alcohol. This will remove materials which cause whitish spotting (devitrification) and premature lamp failure. Dry lamp carefully with cotton or clean cloth.

1. Install lamp without undue pressure.
2. Ensure that lamp electrical connections are secure and nothing is touching bulb.
3. To obtain satisfactory performance, the seal/base temperature must not exceed 350°C and the bulb wall temperature, as measured center, must be maintained between 600° and 700°C.
4. If cooling is required to maintain the seal/base and the bulb wall temperatures of item 3, air interlock vane switches are recommended to protect against fan-motor failure.
5. All seal gaskets and wire insulation must be shielded from the UV radiation produced by this lamp.
6. Fixture wiring must have temperature rating of 250°C and a minimum voltage rating of 600V RMS for lamps of less than 1000 watts and 1500 RMS for lamps of 1000 watts or greater.

PROPER CARE AND MAINTENANCE: To reduce the possibility of an arc tube rupture and premature lamp failure:

1. OPERATE WITH COMPATIBLE BALLAST (including capacitor and ignitor) AND FIXTURE ONLY.
2. Turn lamp off for a minimum of fifteen minutes at least once a week.
3. Do not expose operating lamp to moisture.
4. Replace lamp if outer glass bulb is scratched, cracked or damaged in any way.

OPERATING POSITION:

For maximum performance, this lamp must be operated within 15° of horizontal, with the arc-tube tip up.

Location	Sales Offices (TO OBTAIN SALES AND TECHNICAL INFORMATION)	Zip Code	Location	Distribution Centers	Zip Code
Atlanta, GA	5169 Pelican Drive 770-996-9450 Fax: 770-996-7244	30349	Allentown, PA	7485 Industrial Blvd., Box 476 Allentown, PA	18106
Boston, MA (Danvers)	100 Endicott Street, Danvers, MA 508-750-2016 Fax: 508-750-2008	01923	Atlanta, GA	5169 Pelican Drive 770-996-9450 Fax: 770-996-7244	30349
Buffalo, NY	77 Broadway 716-852-4556 Fax: 716-852-4919	14203	Boston, MA (Danvers)	105 Andover Street Danvers, MA	09123
Charlotte, NC	2201 Coronation Blvd., Suite #155 704-845-8200 Fax: 704-845-8038	28227	Chicago, IL (Elk Grove Village)	800 Devon Avenue Elk Grove Village, IL	60007
Chicago, IL (Elk Grove Village)	800 Devon Ave., Elk Grove Village, IL 847-593-3400 Fax: 847-593-3448	60007	Columbus, OH	3950 Venture Ct. Columbus, OH	43228
Dallas, TX (Carrollton)	2040 McKenzie Dr., Carrollton, TX 212-247-7800 Fax: 214-247-4364	75006-5018	Dallas, TX (Carrollton)	2040 McKenzie Drive Carrollton, TX	75006-5018
Detroit, MI (Dearborn)	3200 Greenfield Road, Suite 240, Dearborn, MI 313-593-3335 Fax: 313-593-3763	48120	Ontario, CA	1651 South Archibald Ave. Ontario, CA	91761
Denver, CO	1401 17th Street, Ste. 440, Denver, CO 303-295-3898 Fax: 303-295-3755	80202	Seattle, WA	750 South Michigan Street Seattle, WA	98108
Los Angeles, CA (Orange)	500 N. State College Blvd., Suite #1400 P. O. Box 14154, Orange, CA 714-978-2101 Fax: 714-978-0137	92613-1554	<div style="border: 1px solid black; padding: 10px;"> <p>For Orders and General Information, Call -- OSRAM SYLVANIA INC. National Customer Support Center 18725 N. Union Street Westfield, IN 46074</p> <p>Industrial & Commercial Phone: 1-800-255-5042 Fax: 1-800-255-5043</p> <p>Specialty Lamps/Markets Phone: 1-800-762-7191 Fax: 1-800-762-7192</p> <p>National Accounts: Industrial & Commercial Phone: 1-800-562-4671</p> </div>		
Minneapolis, MN	Interchange West Bldg., 435 Ford Rd., Suite #1025, Minneapolis, MN 612-544-8924 Fax: 612-544-6158	55426			
Philadelphia, PA (Malvern)	101 Lindenwood Drive, Suite #450 Malvern, PA 610-640-3300 Fax: 610-640-3320	19355			
St. Louis, MO	12412 Powerscourt Drive, Suite #150 314-821-8390 Fax: 314-821-4979	63131			
San Francisco, CA (Cupertino)	20245 Stevens Creek Blvd., Suite #100 Cupertino, CA 408-255-9077 Fax: 408-255-9878	95014			
Seattle, WA	750 South Michigan Street 206-762-4070 Fax: 206-763-2158	98018			
Tampa, FL	9417 Princess Palm Dr., Suite #715 813-623-3600 Fax: 813-626-3208	33619			
Teaneck, NJ	Glenpointe Ctr., West 2nd Fl. 500 Frank Burr Blvd. 201-928-2100 Fax: 201-928-2107	07666			

