LightTech
LightSources

# Worldwide Suppliers of Quality UV Lamps

*Creating True Value and True Partnership*

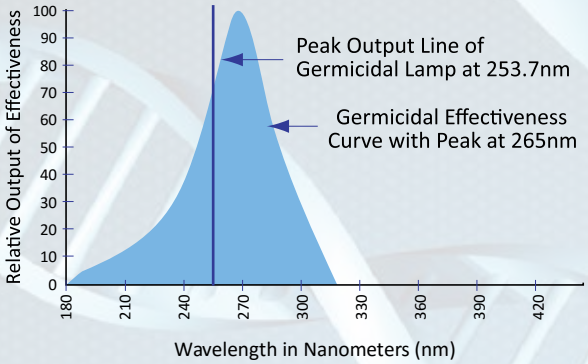
## Company Profile:

Founded in 1983, LightSources Inc. has been offering superior products and processes to our OEM customers and is the world's leading manufacturer of quartz germicidal lamps. In 1993, LightTech Lamp Technology Ltd. was started in Hungary in order to serve the growing demand for germicidal lamps and sleeves for both the European and Asian markets. The combination of our state-of-the-art manufacturing facilities, technologies, capabilities allow us to bring quality products to the market with reduced lead times and high performance. Both companies design and manufacture lamps for a wide variety of specialty lighting applications spanning multiple market segments throughout many industries. While both companies core focus remains on germicidal, low pressure, medium HID pressure, photochemical, and skin tanning applications, we also manufacture specialty lamps for LCD backlighting and compact fluorescent applications. Both companies are recognized within their respective markets for excellence in product design and manufacture. We strive to meet our customers' unique requirements for performance, quality and reliability.

## UV Action:

- LightSources & LightTech low-pressure mercury germicidal lamps are specially designed to produce UV radiation with maximum efficiency. The principal emission wavelength at 254 nm is close to the peak of the germicidal effectiveness curve at 265 nm (see spectral plot below).

**Lamp Output vs. Effectiveness**




- Our germicidal lamps are used in many critical applications such as:

  - Air purification (in-room and in-duct HVAC)
  - Food & beverage processing, packaging, and storage
  - Surface disinfection
  - Medical (hospital rooms, clinics etc.)
  - TOC reduction for ultrapure water
  - Wastewater treatment
  - Drinking water disinfection
  - Groundwater remediation

## Ozone Action:

- "VH" (or Very High ozone producing lamps) emit energy at 185 nm in addition to the 254 nm wavelength.
- The UV emission at 185nm is absorbed by oxygen in the air, producing ozone. Ozone is an extremely effective oxidizer, destroying microorganisms as well as reducing Total Organic Carbon (TOC).
- A primary advantage of the ozone generated by our UV lamps is that it can be carried through the air into places not easily reached by direct UV exposure.

## Advantages of UV Radiation:

- Environmentally friendly, no dangerous or toxic chemicals that require specialized storage or chemicals added to air and water.
- Cost effective - low initial capital costs and reduced operating costs.
- Rapid - UV radiation offers immediate treatment with no requirements for holding tanks or long retention/exposure times.
- Compatibility - UV treatment is highly compatible with other water and air treatment processes while causing no changes in taste, odor, pH values, conductivity or chemical properties of the air/water in which it is used.

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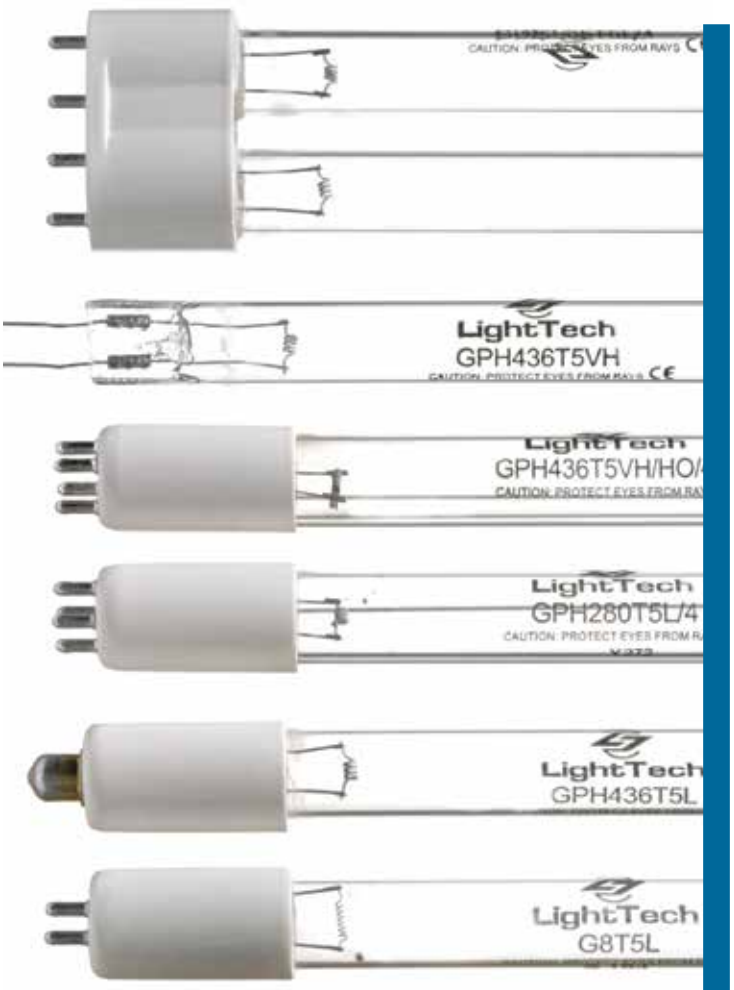




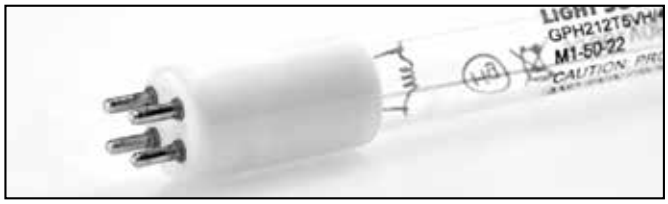

***Where Partnerships are Valued***

## Quartz Germicidal Lamps

The type of fused quartz used to make the body of the germicidal lamp determines the UV wavelengths emitted. “L” or “Low ozone” type quartz glass transmits up to 90% at the 254 nm wavelength and is typically doped with titanium oxide, which blocks the transmission of 185 nm energy. “VH” or “Very high ozone” clear fused quartz transmits both 185 nm and 254 nm wavelengths.

The 185 nm photons react with oxygen in the air to produce ozone. In applications where moderate amounts of ozone may be required, we can splice the two types of quartz glass together to form a custom “L” to “VH” ratio according to the customer’s specific requirements. When required, ozone producing lamps can also be made with synthetic quartz for an even higher output at 185 nm.

Other lamp sizes, shapes and power levels are available upon request!

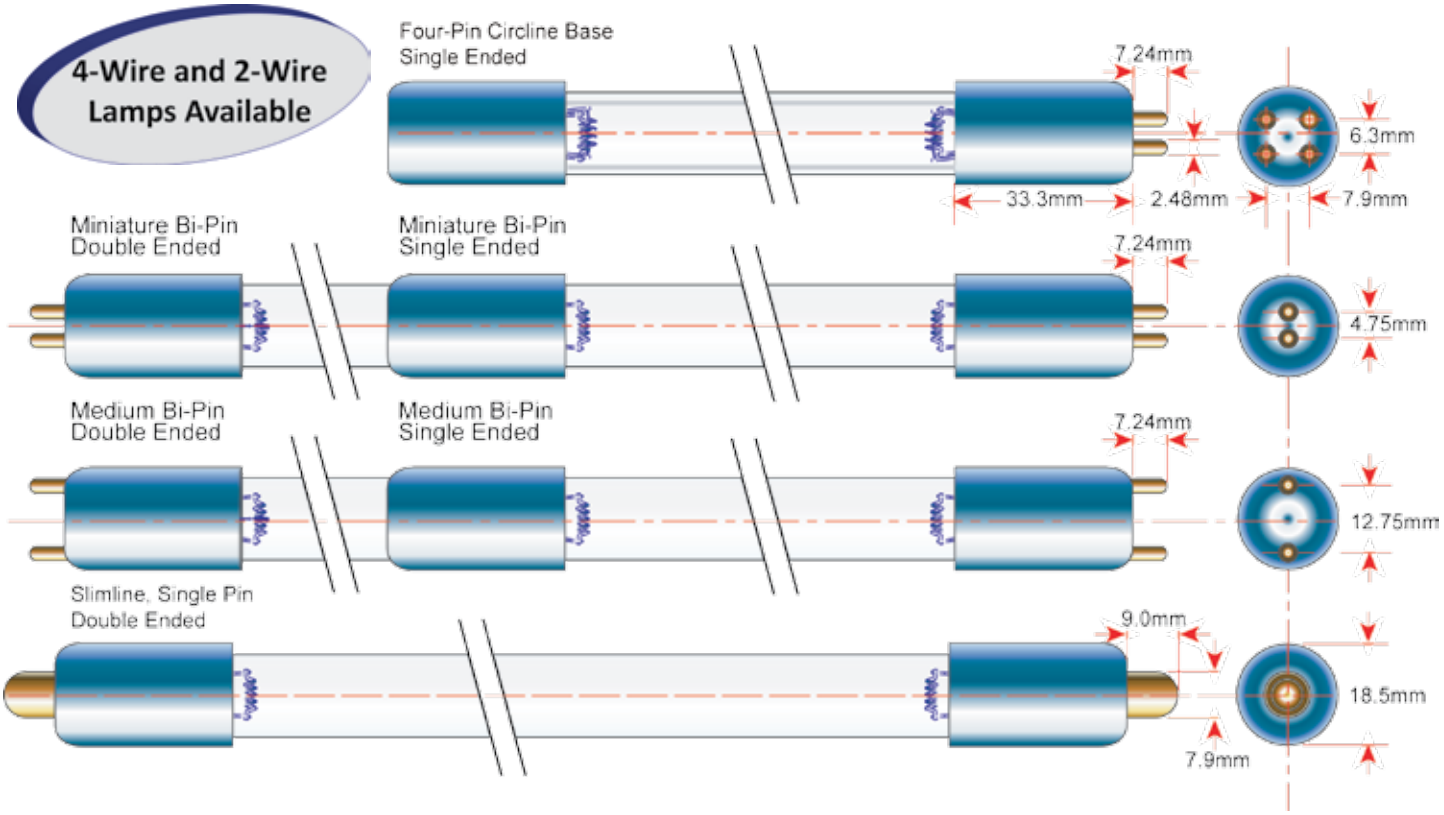



### Standard Output Quartz Germicidal Lamps[2]

| | Tube Diam. mm | Overall Length mm | Arc Length mm | Power[1] W | Current[1] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated[1,2] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Preheat start lamps - low ozone** | | | | | | | | | |
| GPH212T5L | 15 | 212 | 132 | 10 | 425 | 25 | 27 | 2.7 | 16000 |
| GPH287T5L | 15 | 287 | 207 | 14 | 425 | 34 | 40 | 4 | 16000 |
| GPH295T5L | 15 | 295 | 215 | 14 | 425 | 34 | 42 | 4.2 | 16000 |
| GPH303T5L | 15 | 303 | 223 | 15 | 425 | 35 | 43 | 4.3 | 16000 |
| GPH357T5L | 15 | 357 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GPH436T5L | 15 | 436 | 356 | 21 | 425 | 51 | 72 | 7.3 | 16000 |
| GPH793T5L | 15 | 793 | 713 | 38 | 425 | 92 | 125 | 13.5 | 16000 |
| GPH843T5L | 15 | 843 | 762 | 41 | 425 | 98 | 150 | 16 | 16000 |
| GPH1148T5L | 15 | 1148 | 1067 | 55 | 425 | 135 | 180 | 22 | 16000 |
| GPH1554T5L | 15 | 1554 | 1474 | 75 | 425 | 179 | 240 | 33 | 16000 |
| GPH1630T5L | 15 | 1630 | 1550 | 79 | 425 | 189 | 252 | 34.5 | 16000 |
| **Preheat start lamps - ozone generating** | | | | | | | | | |
| GPH212T5VH | 15 | 212 | 132 | 10 | 425 | 25 | 27 | 2.7 | 16000 |
| GPH287T5VH | 15 | 287 | 207 | 14 | 425 | 34 | 40 | 4 | 16000 |
| GPH303T5VH | 15 | 303 | 223 | 15 | 425 | 35 | 43 | 4.3 | 16000 |
| GPH357T5VH | 15 | 357 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GPH436T5VH | 15 | 436 | 356 | 21 | 425 | 51 | 72 | 7.3 | 16000 |
| GPH793T5VH | 15 | 793 | 713 | 38 | 425 | 92 | 125 | 13.5 | 16000 |
| GPH843T5VH | 15 | 843 | 762 | 41 | 425 | 98 | 150 | 16 | 16000 |
| GPH1148T5VH | 15 | 1148 | 1067 | 55 | 425 | 135 | 180 | 22 | 16000 |
| GPH1554T5VH | 15 | 1554 | 1474 | 75 | 425 | 179 | 240 | 33 | 16000 |
| GPH1630T5VH | 15 | 1630 | 1550 | 79 | 425 | 189 | 252 | 34.5 | 16000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*
***Note[2]:*** *LSI/LT Amalgam lamps are designed for operation on a preheat (a.k.a. program start) ballast only, unless otherwise noted.*

## Typical Germicidal Lamp Configurations




## Standard Output Quartz Germicidal Lamps

| | Tube Diam. mm | Overall Length mm | Arc Length mm | Power[1] W | Current[1] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Instant start lamps - low ozone** | | | | | | | | | |
| G10T5L | 15 | 357 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| G24T5L | 15 | 537 | 457 | 25 | 425 | 75 | 73 | 9.0 | 16000 |
| G36T5L | 15 | 843 | 762 | 41 | 425 | 98 | 150 | 16 | 16000 |
| G48T5L | 15 | 1148 | 1067 | 55 | 425 | 135 | 180 | 22 | 16000 |
| G64T5L | 15 | 1554 | 1474 | 75 | 425 | 179 | 240 | 33 | 16000 |
| G67T5L | 15 | 1630 | 1550 | 79 | 425 | 189 | 252 | 34.5 | 16000 |
| **Instant start lamps - ozone generating** | | | | | | | | | |
| G10T5VH | 15 | 357 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| G24T5VH | 15 | 537 | 457 | 25 | 425 | 75 | 73 | 9.0 | 16000 |
| G36T5VH | 15 | 843 | 762 | 41 | 425 | 98 | 150 | 16 | 16000 |
| G48T5VH | 15 | 1148 | 1067 | 55 | 425 | 135 | 180 | 22 | 16000 |
| G64T5VH | 15 | 1554 | 1474 | 75 | 425 | 179 | 240 | 33 | 16000 |
| G67T5VH | 15 | 1630 | 1550 | 79 | 425 | 189 | 252 | 34.5 | 16000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

## Low Pressure Amalgam Germicidal Lamps

Our companies provide the widest range of high-quality spot and pellet amalgam lamps in the industry today; both standard and custom designs. Our low pressure amalgam lamps function with equal efficiency in both horizontal and vertical operation. Amalgam lamps yield up to three times the UVC output over standard lamps of the same length. We have applied our proprietary LongLife+™ process to the amalgam line. Our special proprietary coating reduces the rate of output depreciation so often associated with higher intensity lamps. Our lamps have a useful life of up to 16,000 hours, maintaining an end-of-life UVC output up to 90% of initial output.

### Advantages:

- Amalgam lamps offer the best consistency of UV output over a broad air and water temperature range (4 – 40°C). Custom designs for higher temperature applications are available.
- Higher wattage lamps allow treatment systems to use fewer lamps compared to standard-output lamps, which reduces capital and maintenance costs of the system.

## Our Proprietary Patented Pellet Amalgam Technology

Pellet amalgam technology has major benefits over spot amalgam technology in high power applications and hot ambient environments. Pellet amalgam lamps are designed to produce higher UVC at full power, as well as providing higher UV output under dimming conditions. Pellet amalgam technology benefits include greater efficiency in any mounting orientation (horizontal or vertical) and stable operation in more extreme environments.

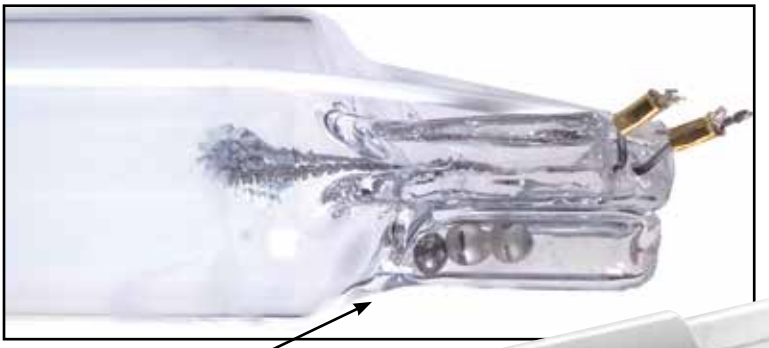

### Pellet Amalgam Lamp Features

- Outside diameters: up to 38mm
- Stable performance in extreme air and water temperatures
- Length: up to 2.5 meters
- Electrical power: up to 1,200 W
- Nominal UVC efficiency at 254 nm: 35%
- Power per unit length: up to 5 W/cm
- UVC power per unit length: up to 1.75 W/cm
- Ambient application temperature range: 4 - 40°C
- Operating hours: up to 16,000 hrs [1]
- UV Lamp maintenance: 90% [1]

### Spot Amalgam Lamp Features

- Outside diameters: 15mm – 28mm
- Stable UVC output performance over a broad air and water temperature range
- Length: up to 2.5 meters
- Electrical power: up to 400 W
- Nominal UVC efficiency at 254 nm: 35%
- Power per unit length: up to 5 W/cm
- UVC power per unit length: up to 1.75 W/cm
- Ambient application temperature range: 4 - 40°C
- Operating hours: up to 16,000 hrs [1]
- UV Lamp maintenance: 90% [1]

***Note 1:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values.*



*Un-based pellet amalgam lamp with view of the pellets*

Other amalgam lamp sizes, shapes, and power levels are available upon request!

*Spot Amalgam Lamp*

## UVC Amalgam Germicidal Lamps

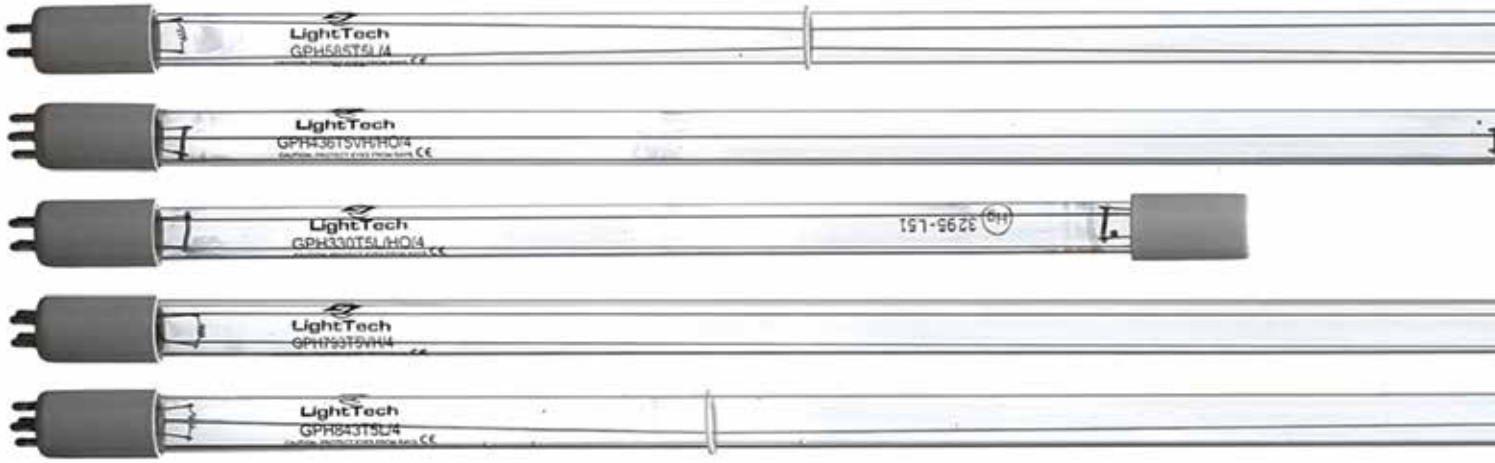
| | Tube Diam. mm | Overall Length mm | Arc Length mm | Power[1] W | Current[1],[2] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Spot Amalgam Lamps - *Available as low ozone or ozone generating: L, VH, or Synthetic quartz glass** | | | | | | | | | |
| GPHA357T5(*) | 15 | 357 | 278 | 42 | 1.2 | 36 | 110 | 11 | 16000 |
| GPHA843T5(*) | 15 | 843 | 764 | 110 | 1.2 | 88 | 320 | 35 | 16000 |
| GPHA1000T5(*) | 15 | 1000 | 921 | 127 | 1.2 | 107 | 370 | 42 | 16000 |
| GPHA1554T5(*) | 15 | 1554 | 1475 | 190 | 1.2 | 164 | 500 | 68 | 16000 |
| GPHA357T6(*) | 19 | 357 | 278 | 57 | 1.8 | 32 | 130 | 13 | 16000 |
| GPHA843T6(*) | 19 | 843 | 764 | 127 | 1.8 | 71 | 400 | 43 | 16000 |
| GPHA1000T6(*) | 19 | 1000 | 921 | 150 | 1.8 | 84 | 460 | 52 | 16000 |
| GPHA1554T6(*) | 19 | 1554 | 1475 | 240 | 1.8 | 134 | 630 | 87 | 16000 |
| GPHHA357T6(*) | 19 | 357 | 278 | 65 | 2.1 | 31 | 140 | 14 | 16000 |
| GPHHA840T6(*) | 19 | 840 | 740 | 140 | 2.1 | 68 | 445 | 48 | 16000 |
| GPHHA843T6(*) | 19 | 843 | 764 | 172 | 2.1 | 82 | 490 | 54 | 16000 |
| GPHHA1000T6(*) | 19 | 1000 | 921 | 207 | 2.1 | 99 | 570 | 65 | 16000 |
| GPHHA1145T6(*) | 19 | 1145 | 1045 | 200 | 2.1 | 95 | 570 | 66 | 16000 |
| GPHHA1554T6(*) | 19 | 1554 | 1475 | 320 | 2.1 | 154 | 820 | 107 | 16000 |
| GPHHA1570T6(*) | 19 | 1570 | 1470 | 315 | 2.1 | 150 | 805 | 105 | 16000 |
| GPHHA1578T6(*) | 19 | 1578 | 1478 | 325 | 2 | 162 | 840 | 110 | 16000 |
| GPHA843D28(*) | 28 | 843 | 750 | 230 | 3.8 | 60 | 670 | 72 | 16000 |
| GPHA1000D28(*) | 28 | 1000 | 900 | 270 | 3.8 | 70 | 770 | 86 | 16000 |
| GPHA1200D28(*) | 28 | 1200 | 1100 | 320 | 3.8 | 85 | 880 | 103 | 16000 |
| GPHA1554D28(*) | 28 | 1554 | 1450 | 420 | 3.8 | 110 | 1050 | 137 | 16000 |
| GPHHA1570D28(*) | 28 | 1570 | 1470 | 420 | 3.8 | 110 | 1000 | 135 | 16000 |
| **Pellet Amalgam Lamps - *Available as low ozone or ozone generating: L, VH, or Synthetic quartz glass** | | | | | | | | | |
| GPHVA1200D28(*) | 28 | 1200 | 1100 | 320 | 3.8 | 85 | 880 | 103 | 16000 |
| GPHVA1554D28(*) | 28 | 1554 | 1450 | 420 | 3.8 | 110 | 1050 | 137 | 16000 |
| GPHVA843T10(*) | 32 | 843 | 750 | 250 | 5.5 | 45 | 710 | 77 | 16000 |
| GPHVA1000T10(*) | 32 | 1000 | 900 | 300 | 5.5 | 55 | 840 | 94 | 16000 |
| GPHVA1200T10(*) | 32 | 1200 | 1100 | 380 | 5.5 | 70 | 1020 | 120 | 16000 |
| GPHVA1554T10(*) | 32 | 1554 | 1450 | 500 | 5.5 | 90 | 1230 | 160 | 16000 |
| GPHMVA843T10(*) | 32 | 843 | 750 | 330 | 6 | 55 | 950 | 102 | 16000 |
| GPHMVA1000T10(*) | 32 | 1000 | 900 | 400 | 6 | 66 | 1120 | 125 | 16000 |
| GPHMVA1200T10(*) | 32 | 1200 | 1100 | 480 | 6 | 80 | 1310 | 154 | 16000 |
| GPHMVA1554T10(*) | 32 | 1554 | 1450 | 620 | 6 | 105 | 1540 | 200 | 16000 |
| GPHSVA843T10(*) | 32 | 843 | 750 | 380 | 7 | 55 | 1060 | 114 | 16000 |
| GPHSVA1000T10(*) | 32 | 1000 | 900 | 500 | 7 | 70 | 1400 | 155 | 16000 |
| GPHSVA1200T10(*) | 32 | 1200 | 1100 | 620 | 7 | 88 | 1650 | 195 | 16000 |
| GPHSVA1554T10(*) | 32 | 1554 | 1450 | 800 | 7 | 115 | 2000 | 260 | 16000 |

***Note¹:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*
***Note²:*** *LSI/LT Amalgam lamps are designed for operation on a preheat (a.k.a. program start) ballast only, unless otherwise noted.*

## High Output (HO) Quartz Lamps

High Output (HO) lamps yield up to 66% more UV output when compared to standard lamps of the same length. HO lamps offer system designers unique opportunities to decrease the number of lamps required without compromising functionality of the system. This has the added benefits of reduced system footprint, increased efficiency and/or increased system capacity. HO lamps are available in the same configurations as standard lamps. Custom lengths and configurations may also be produced to the customer's specific requirements. The table below shows a sampling of the more common lamp sizes. We can custom design the ideal HO lamp for your unique application.

Preheat & instant start configurations available



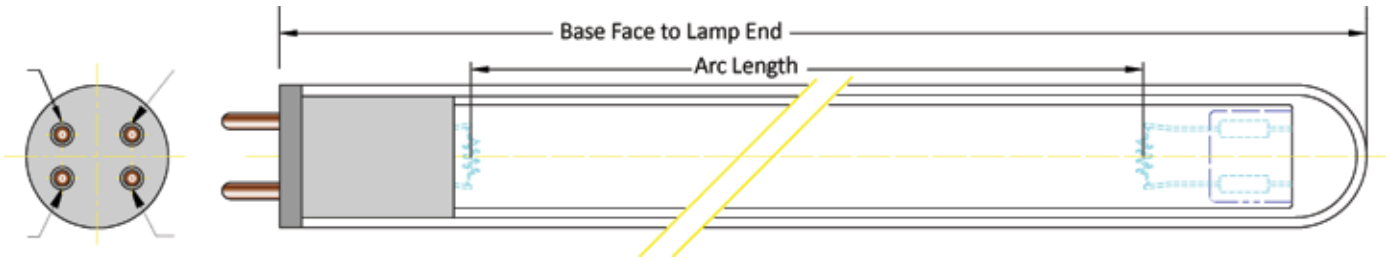

## High Output (HO) Quartz Germicidal Lamps

| | Tube Diam. mm | Overall Length mm | Arc Length mm | Power[1] W | Current[1] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Available in Low ozone (L) or Ozone generating** | | | | | | | | | |
| GHO436T5L | 15 | 436 | 360 | 36 | 800 | 45 | 99 | 10 | 16000 |
| G**X**O436T5L | 15 | 436 | 360 | 48 | 800 | 60 | 120 | 13 | 16000 |
| GHO36T5L | 15 | 842 | 755 | 75 | 800 | 95 | 230 | 24 | 16000 |
| G**X**O36T5L | 15 | 842 | 755 | 87 | 800 | 110 | 260 | 28 | 16000 |
| GHO846T5L | 15 | 846 | 767 | 75 | 800 | 95 | 235 | 25 | 16000 |
| G**X**O846T5L | 15 | 846 | 767 | 87 | 800 | 113 | 265 | 29 | 16000 |
| GHO893T5L | 15 | 893 | 815 | 85 | 800 | 106 | 250 | 27 | 16000 |
| G**X**O893T5L | 15 | 893 | 815 | 95 | 800 | 120 | 270 | 30 | 16000 |
| GHO64T5L | 15 | 1554 | 1421 | 145 | 800 | 182 | 410 | 53 | 16000 |
| G**X**O64T5L | 15 | 1554 | 1421 | 155 | 800 | 195 | 420 | 54 | 16000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

## Germipak UV Cell Germicidal Lamps

LightSources and LightTech offer a series of integrated assemblies consisting of germicidal lamps encapsulated into a quartz sleeve. This cellular concept offers a wide range of custom design possibilities for OEM applications. Germipak UV Cell lamps are very economical components in point-of-use water treatment systems and other applications. The standard units listed below have 15mm (T5) diameter lamps and 20.5 mm outer diameter sleeves.




## Germipak Quartz Germicidal Cell Lamps

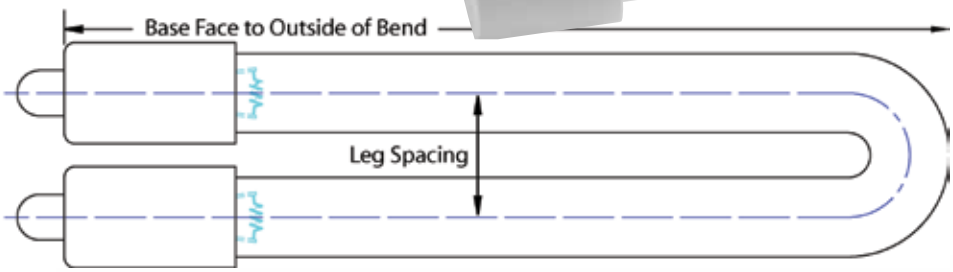
| | Tube Diam. mm | Sleeve Diam. mm | Overall Length mm | Arc Length mm | Power W | Current[1] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Low Ozone** | | | | | | | | | | |
| GCL436T5L/Cell | 15 | 20.5 | 436 | 356 | 21 | 425 | 51 | 65 | 6.5 | 16000 |
| GCL793T5L/Cell | 15 | 20.5 | 793 | 713 | 38 | 425 | 92 | 111 | 12.1 | 16000 |
| GCL36T5L/Cell | 15 | 20.5 | 842 | 762 | 41 | 425 | 98 | 130 | 14.0 | 16000 |
| **Ozone generating** | | | | | | | | | | |
| GCL436T5VH/Cell | 15 | 20.5 | 436 | 356 | 21 | 425 | 51 | 65 | 6.5 | 16000 |
| GCL793T5VH/Cell | 15 | 20.5 | 793 | 713 | 38 | 425 | 92 | 111 | 12.1 | 16000 |
| GCL36T5VH/Cell | 15 | 20.5 | 842 | 762 | 41 | 425 | 98 | 130 | 14.0 | 16000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

## Quartz U-Shaped Germicidal Lamps

Our quartz U-shaped germicidal and ozone lamps can produce more intense UV radiation in a limited space, allowing designers more flexibility. These lamps are available with center-to-center leg spacing of 22 or 76 mm, and offer the perfect solution by effectively doubling the arc length and UVC output.

Ask about custom configurations - custom lengths, and bases are available!


Various lengths and base configurations are available

## Quartz Germicidal U-Lamps

| | Tube Diam. mm | Length/ Leg Sp. mm | Arc Length mm | Power[1] W | Current[1] mA | Voltage[1] V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated[1,2] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Low Ozone** | | | | | | | | | |
| GU76-10T5L | 15 | 169/76 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GU22-10T5L | 15 | 186/22 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GU22-390T5L | 15 | 390/22 | 699 | 36 | 425 | 85 | 105 | 12 | 16000 |
| GU76-390T5L | 15 | 390/76 | 711 | 37 | 425 | 88 | 110 | 12.8 | 16000 |
| GU76-36T5L | 15 | 412/76 | 762 | 41 | 425 | 98 | 135 | 14.3 | 16000 |
| GU22-36T5L | 15 | 429/22 | 762 | 41 | 425 | 98 | 135 | 14.3 | 16000 |
| **Ozone Generating** | | | | | | | | | |
| GU76-10T5VH | 15 | 169/76 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GU22-10T5VH | 15 | 186/22 | 277 | 17 | 425 | 42 | 57 | 5.7 | 16000 |
| GU22-390T5VH | 15 | 390/22 | 699 | 36 | 425 | 85 | 105 | 12 | 16000 |
| GU76-390T5VH | 15 | 390/76 | 711 | 37 | 425 | 88 | 110 | 12.8 | 16000 |
| GU76-36T5VH | 15 | 412/76 | 762 | 41 | 425 | 98 | 135 | 14.3 | 16000 |
| GU22-36T5VH | 15 | 429/22 | 762 | 41 | 425 | 98 | 135 | 14.3 | 16000 |

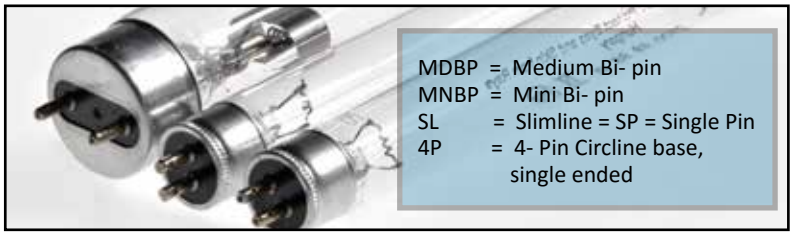
***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

## Soft Glass Germicidal Lamps

Soft glass lamps are an economical option for producing 254 nm UVC and also offer a much wider variety of shapes and sizes than what is available with quartz glass. Soft glass lamps have a wide range of operating currents (180 to 1700 mA). We offer custom configurations to meet OEM requirements. Standard soft glass lamps are available in T4, T5, T6, T8 and T12 bodies. At our glass plant in Hungary, we engineer our germicidal soft glass to the highest standards and from the best materials. Our optimized processing and superior materials provide higher UVC output over the life of the lamp.

### Advantages:

- Economical option versus quartz lamps
- Custom shapes and sizes including complex bends




## UV Soft Glass Germicidal Lamps

| | Tube Diam. mm | Base Config. | BF - BF mm | Arc Length mm | Power[1] W | Current mA | Voltage[1] Hi Freq[1] V | UV output[1] @ 254nm µW/cm² | W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|---|
| **Standard Lamps** | | | | | | | | | | |
| LTC4T5 | 15.7 | MNBP | 134 | 77 | 4 | 180 | 23 | 9 | 0.9 | 9000 |
| LTC6T5 | 15.7 | MNBP | 210 | 154 | 6 | 180 | 34 | 16 | 1.6 | 9000 |
| LTC8T5 | 15.7 | MNBP | 287 | 231 | 8 | 180 | 45 | 21 | 2.1 | 9000 |
| LTC11T5 | 15.7 | MNBP | 210 | 154 | 11 | 430 | 26 | 26 | 2.6 | 9000 |
| LTC11T5SE | 15.7 | 4P | 244 | 179 | 12 | 430 | 26 | 26 | 2.6 | 9000 |
| LTC16T5 | 15.7 | MNBP | 287 | 231 | 16 | 370 | 44 | 40 | 4 | 9000 |
| LTC16T5SE | 15.7 | 4P | 317 | 245 | 17 | 370 | 46 | 42 | 4.2 | 9000 |
| LTC40T5 | 15.7 | SL | 842 | 767 | 41 | 425 | 98 | 141 | 15.6 | 9000 |
| LTC64T5 | 15.7 | SL | 1554 | 1481 | 76 | 425 | 180 | 225 | 31 | 9000 |
| LTC40T5SE | 15.7 | 4P | 842 | 767 | 41 | 425 | 98 | 141 | 15.6 | 9000 |
| LTC64T5SE | 15.7 | 4P | 1554 | 1481 | 76 | 425 | 180 | 225 | 31 | 9000 |
| LTC10T8 | 25.7 | MDBP | 330 | 247 | 10 | 280 | 36 | 23 | 2.3 | 9000 |
| LTC15T8 | 25.7 | MDBP | 436 | 353 | 15 | 350 | 44 | 47 | 4.8 | 9000 |
| LTC17T8 | 25.7 | MDBP | 588 | 505 | 17 | 280 | 61 | 44 | 4.5 | 9000 |
| LTC30T8 | 25.7 | MDBP | 893 | 810 | 30 | 380 | 80 | 100 | 11.3 | 9000 |
| LTC20T10 | 32 | MDBP | 588 | 495 | 20 | 370 | 55 | 65 | 6.7 | 9000 |
| **High Output Lamps** | | | | | | | | | | |
| LTC80T5SE | 15.7 | 4P | 842 | 767 | 83 | 800 | 103 | 245 | 27 | 9000 |
| LTC125T5SE | 15.7 | 4P | 1554 | 1481 | 155 | 800 | 195 | 360 | 50 | 9000 |
| LTC25T8 | 25.7 | MDBP | 436 | 353 | 25 | 620 | 41 | 71 | 7.2 | 9000 |
| LTC55T8 | 25.7 | MDBP | 893 | 810 | 55 | 800 | 70 | 170 | 19 | 9000 |
| LTC75T8 | 25.7 | MDBP | 1198 | 1115 | 75 | 900 | 85 | 215 | 26.5 | 9000 |
| LTC115T12 | 37.7 | MDBP | 1198 | 1118 | 115 | 1700 | 69 | 280 | 34 | 9000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

## UVC Compact Germicidal Lamps

Our companies offer a superb line of UVC emitting compact germicidal lamps for applications in small spaces. These lamps are consistently a favorite product among our clients. Compact lamps are made of an engineered twin-tube innovative design, which allows a very uniform output. We provide all standard lamp sizes as well as custom configurations. The high efficiency of a compact lamp is enabled by leaving a small dead space at the end of the two parallel tubes. Because this area is not part of the path followed by the discharge (farther away from the center of the discharge column) the wall temperature is lower than anywhere else creating a dedicated mercury cold spot. These compact designs are available in soft glass (254nm only) and quartz glass (254nm and 185nm emission). LightSources and LightTech also offer compact lamp designs using our patented pellet amalgam technology. Providing outstanding UVC efficiency, it is one of the highest value solutions available on the market.

**2G7** **G23** **2G11**

Other lamp sizes, shapes, and power levels are available upon request!

## UVC Compact Germicidal Lamps

| | Tube Diam. mm | Base Config. | Overall Length mm | Power[1] W | Current mA | Voltage[1] † 50/60 hz V | UV output[1] @ 254nm µW/cm² | W | Rated[1] Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Soft Glass Low Pressure** | | | | | | | | | |
| LTC5W/G23 | 12.5 | G23 | 83 | 5 | 180 | 34 | 9 | 1 | 8000 |
| LTC7W/G23 | 12.5 | G23 | 115 | 7 | 175 | 47 | 16 | 1.8 | 8000 |
| LTC9W/G23/2G7 | 12.5 | G23 / 2G7 | 145 | 9 | 170 | 60 | 22 | 2.4 | 8000 |
| LTC11W/G23 | 12.5 | G23 | 214 | 11 | 160 | 89 | 33 | 3.6 | 8000 |
| LTC13W/G23 | 12.5 | GX23 | 155 | 13 | 290 | 59 | 31 | 3.4 | 8000 |
| **Soft Glass High Power** | | | | | | | | | |
| LTC18W2G11 | 17.5 | 2G11 | 225 | 18 | 370 | 60 | 51 | 5.5 | 8000 |
| LTC24W/2G11 | 17.5 | 2G11 | 320 | 24 | 350 | 87 | 65 | 7 | 8000 |
| LTC35WHO/2G11 | 17.5 | 2G11 | 225 | 35 | 850 | 40† | 105 | 11 | 8000 |
| LTC36W/2G11 | 17.5 | 2G11 | 415 | 36 | 440 | 105 | 110 | 12 | 8000 |
| LTC55W/2G11 | 17.5 | 2G11 | 535 | 55 | 540 | 103† | 156 | 17 | 8000 |
| LTC60WHO/2G11 | 17.5 | 2G11 | 415 | 60 | 670 | 120 | 169 | 18 | 8000 |
| LTC95WHO/2G11 | 17.5 | 2G11 | 535 | 95 | 950 | 100† | 304 | 32 | 8000 |
| **Quartz Glass High Power** | | | | | | | | | |
| LTCQ35WHO/2G11 | 15 | 2G11 | 225 | 36 | 800 | 45† | 110 | 11 | 9000 |
| LTCQ36W/2G11 | 15 | 2G11 | 415 | 36 | 440 | 105 | 119 | 13 | 9000 |
| LTCQ55W/2G11 | 15 | 2G11 | 535 | 55 | 540 | 103† | 168 | 18 | 9000 |
| LTCQ60WHO/2G11 | 15 | 2G11 | 415 | 60 | 670 | 118 | 179 | 19 | 9000 |
| LTCQ95WHO/2G11 | 15 | 2G11 | 535 | 95 | 950 | 100† | 328 | 34 | 9000 |

**Custom quartz high wattage (> 150W) pellet amalgam compact lamps available.*
*Note[1]: Measurements were performed on a 50/60 Hz magnetic ballast and represents average values at 100 cm.*
*†Measurements were performed on a high-frequency, current limited electronic ballast and represent average values at 100 cm*

## Spliced Quartz Germicidal lamps

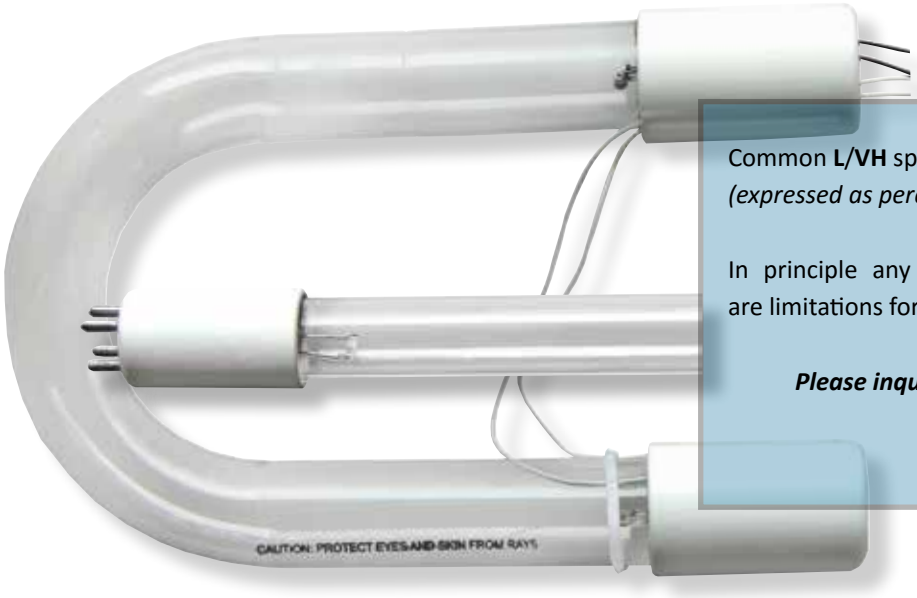
In addition to a wide selection of standard lamp solutions, we offer custom design and engineering of germicidal lamps to meet your specifications. For applications which require a moderate amount of ozone, our engineering team will splice together the two types of quartz required to provide the desired amount of ozone emissions. Light Sources offers many benefits to OEMs large and small with decades of experience and proven germicidal solutions worldwide.

- "L" or "Low ozone" type quartz glass glass transmits up to 90% at the 254 nm wavelength and is typically doped with titanium oxide, which blocks the transmission of 185 nm energy.

- "VH" or "Very high ozone" clear fused quartz transmits both 185 nm and 254 nm wavelengths. The 185 nm photons react with oxygen in the air to produce ozone.

In addition to simply varying the length or power of a germicidal lamp, the amount of ozone a germicidal lamp produces can also be controlled by reducing the amount of 185 nm that can transmit through the lamp body.

This is accomplished by forming the lamp body from the two different types of quartz glass, L and VH, quartz and varying their ratio. The ozone production of the lamp will be proportional to the length of the VH (185 nm-emitting) section.




Common **L/VH** splice ratios are **50:50**, **75:25**, and **90:10** *(expressed as percentage of the lamp's arc length).*

In principle any length ratio could be accomplished, but there are limitations for how short of a section can be practicably spliced.

***Please inquire about splicing possibilities for your lamp and application.***

## Quartz Spliced lamps

| | Tube Dia. mm | BF-BF Lgth. mm | Arc Lgth. mm | VH Sec. Lgth. mm | L Sec. Lgth. mm | Power W | Current mA | Voltage V | UV flux @ 254 nm W | UV flux. @ 185 nm W |
|---|---|---|---|---|---|---|---|---|---|---|
| **Splice Lamp Example:** | | | | | | | | | | |
| GPH287T5L/VH, 90/10* | 15 | 287 | 207 | 21 | 186 | 14 | 425 | 34 | 4 | 0.08 |
| GPH287T5L/VH, 80/20* | 15 | 287 | 207 | 41 | 166 | 14 | 425 | 34 | 4 | 0.17 |
| GPH287T5L/VH, 75/25* | 15 | 287 | 207 | 52 | 155 | 14 | 425 | 34 | 4 | 0.21 |
| GPH287T5L/VH, 50/50* | 15 | 287 | 207 | 103 | 104 | 14 | 425 | 34 | 4 | 0.42 |

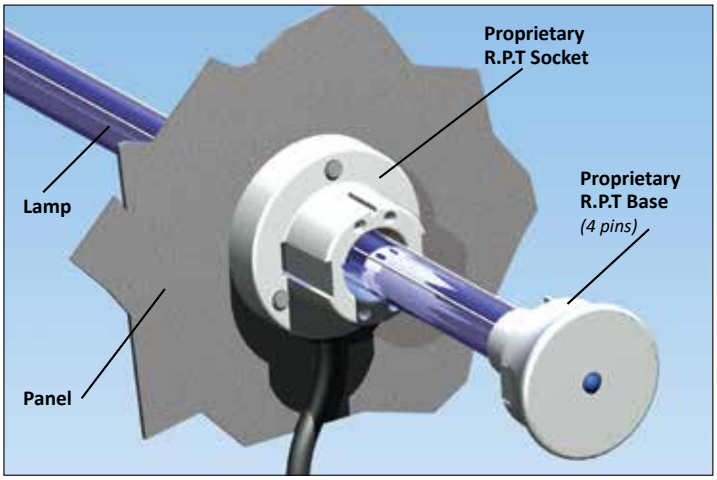
** Common L/VH splice ratios are 50:50, 75:25, and 90:10 (expressed as percentage of the lamp's arc length).*

## *R.P.T. UVC Germicidal Fixtures*

Retrofit system to fight bacteria & mold in HVAC systems

Respiratory diseases and allergies are becoming more common all over the world, whether at home or in the workplace. Evaporator coils, due to their high moisture levels, can easily harbor and distribute molds and disease-causing bacteria within cooling and ventilation systems.

The RPT UVC lamps can be quickly and efficiently installed in any new or existing HVAC (heating ventilation and air conditioning) system, helping to end major health concerns.

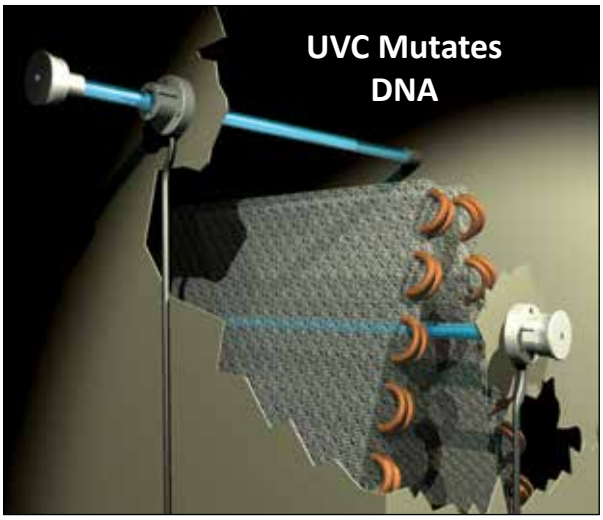


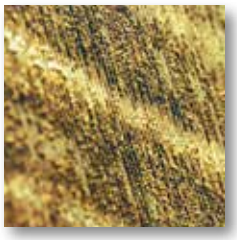

UVC light inactivates DNA-based airborne pollutants and mold spores by disabling its DNA molecular bonds, rendering them unable to reproduce.


### Benefits of UVC in a HVAC System

- Reduces, or eliminates, harmful airborne contaminants from air stream
- Improves air quality
- Diminishes respiratory diseases and allergies
- Eliminates odor and slimy build up associated with mold
- RPT lamps are placed inside the ducts or the evaporator chamber of the HVAC system and can be safely replaced without exposure to UV.

A dirty coil in an HVAC system can introduce pathogenic bacteria and molds into the air stream and also reduces system efficiency.



### Dirty AC Coil

- Air contaminated - Illness sensitivity increased
- Inefficient heat exchange

### Clean AC Coil

- Stops bacteria & molds from developing and reproducing - leaving fresh, clean air
- Clean coils also improve HVAC efficiency

### RPT Lamps

| | Tube Diam. mm | Overall Length mm | Arc Length mm | Power W | Current mA | Voltage V | UV output[1] @ 254nm µW/cm² | UV output[1] @ 254nm W | Rated Life hrs. |
|---|---|---|---|---|---|---|---|---|---|
| **Low Ozone** | | | | | | | | | |
| GPH357T5/HO/RPT | 15 | 357 | 272 | 35 | 510 | 70 | 75 | 6.9 | 16000 |
| GPH406T5L/HO/RPT | 15 | 406 | 322 | 40 | 800 | 58 | 100 | 10.0 | 16000 |
| GPH508T5L/HO/RPT | 15 | 508 | 424 | 50 | 800 | 80 | 130 | 15.0 | 16000 |
| GPH560T5L/HO/RPT | 15 | 560 | 476 | 57 | 800 | 86 | 150 | 17.0 | 16000 |
| GPH610T5L/HO/RPT | 15 | 610 | 526 | 65 | 800 | 93 | 175 | 19.0 | 16000 |

***Note[1]:*** *Lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature using a high-frequency, constant-current electronic ballast and represents average values. Irradiance measured at 100 centimeters.*

LightTech
LightSources

# Medium Pressure UV Lamps for Curing and Disinfection

At Light Sources and LightTech we understand medium pressure and high pressure ultraviolet lamp technology. With over 40 years of experience in the manufacture of UV lamps, our expertise will make it easy and convenient for you to select the best lamp design for your curing or disinfection application. Ultraviolet curing lamps are used in applications involving UV-cured inks, coatings, adhesives, and finishes (lacquers, glazes, and varnishes).

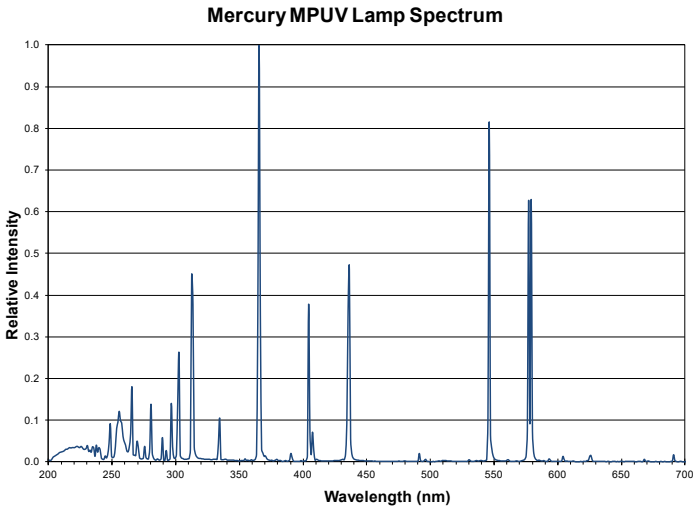
## Medium Pressure UV Lamps

Medium pressure (MPUV) lamps operate at much higher power levels and temperatures than low pressure lamps. MPUV lamps emit polychromatic energy from 200 nm through the visible and infrared spectral ranges and operate at a 600 to 900°C. They are available in power densities ranging from 100 watts per inch to 800 watts per inch (39 to 315 W/cm), with arc lengths ranging from 1 to 90 inches (25 to 2286 mm). We offer you the ability to customize your MPUV lamps to your own specifications and application needs through our custom design form. For special OEM designs, we provide technical consulting with our engineering staff and private labelling when requested.

## Chemical Additives/Doped Lamps

Standard mercury MPUV lamps have the highest output in the UVC range, while other applications may benefit from longer wavelengths in the UVB, UVA, and visible ranges.

To attain these additional wavelengths lamps can be dosed with metal halide compounds that add their own spectral emissions. The most common metal halide additives are gallium (400-450 nm), lead (350-380 nm) , and iron (350-400 nm). When adding a metal halide to a lamp, all the characteristic wavelengths of that metal will be produced and the mercury spectrum will have its lines changed in intensity somewhat because all of the materials in the arc are interactive.



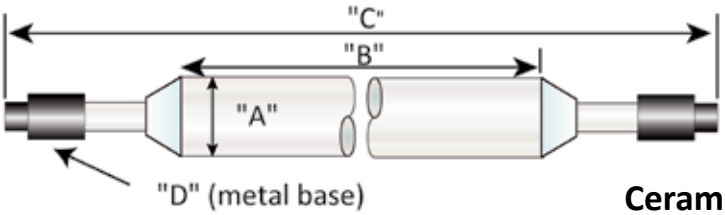

Metal halide lamps require specific ballasts designed to operate additive lamps. The starting voltage for an additive lamp is higher than for a standard mercury lamp by several hundred volts and can vary with lamp age and the number of times the lamp has been ignited.

*(The predicted intensity for specific lines in a metal halide lamp can only be stated relatively based on the lines listed in spectroscopy manuals as "strong" and "persistent".)*

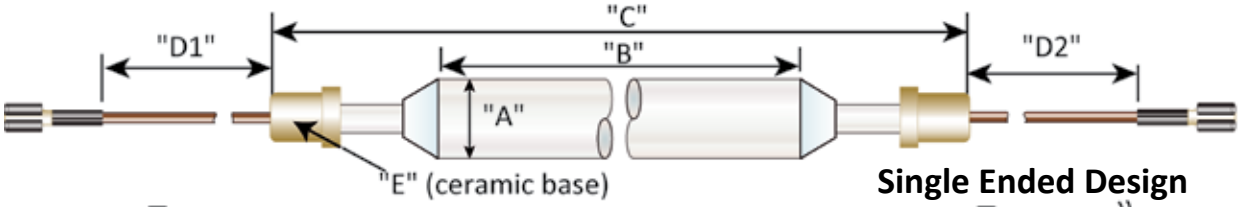
## Custom Lamp Design Requirements

***Physical Design Requirements***

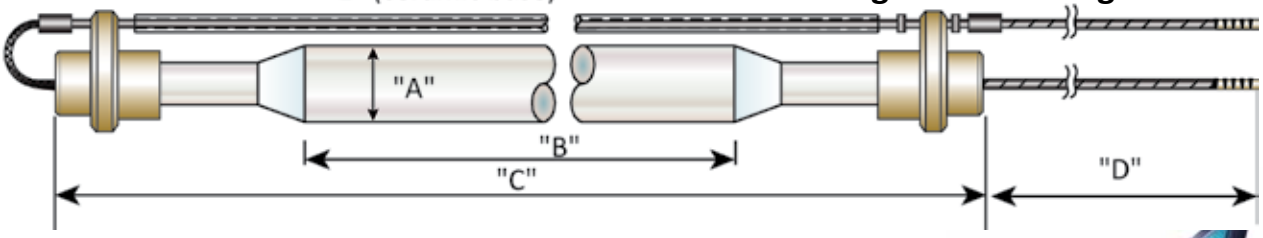
**Metal Base Design**




**Ceramic Base Design**




**Single Ended Design**




### Design Requirements

Electrical:

Lamp Voltage = _____ V ± 5% (Standard) = ____ V
Lamp Current = _____A (nominal)
Total Wattage = _____ kW
Max Starting Voltage = _____V

Physical Characteristics:

Outside Diameter (A) = _____ mm
Arc Length (between electrodes) (B) =_____mm
Overall Length (C) = _____mm
Bases:
If Metal Base (D) = _____
If Ceramic Base (E) = _____

Wire:

Wire Lengths (D1) = _____mm
Wire Lengths (D2) = _____mm

**Did you know?.....**

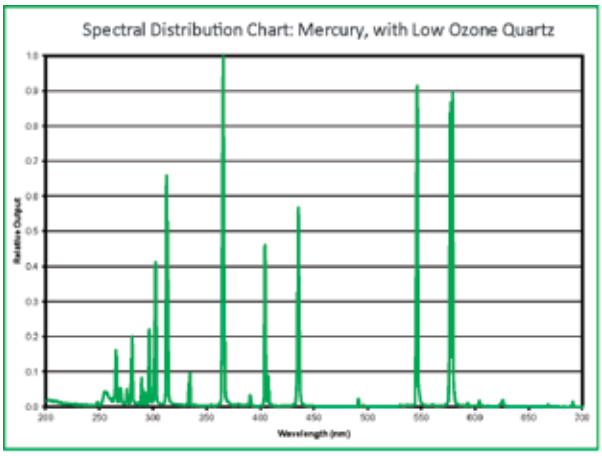
*Metal halide lamps require specific ballasts designed to run them. The starting voltage for an additive lamp is higher than for a standard mercury lamp by several hundred volts and can vary with lamp age and number of times the lamp has been ignited.*

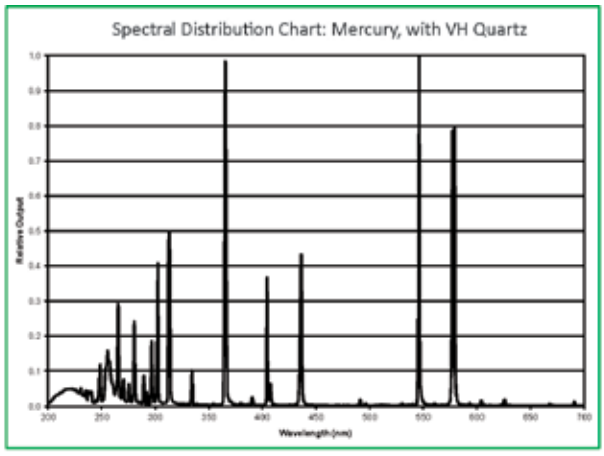
Terminations (T1 and T2):

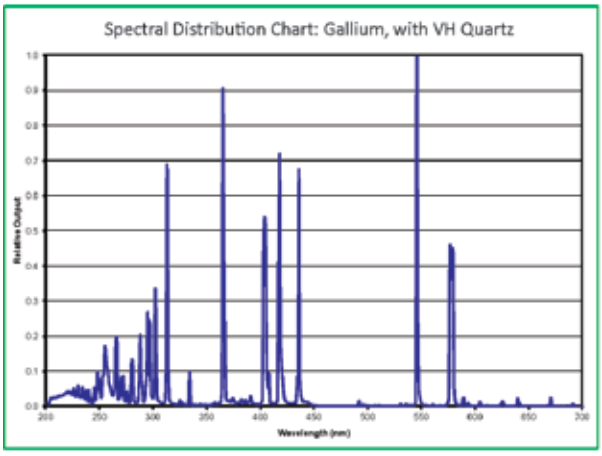
- ☐ None- Bare wire
- ☐ Lugs (F) :
- ☐ Ring Lug, #8 screw
- ☐ Ring Lug, #10 screw
- ☐ Ring Lug, 1/4" screw
- ☐ Ring Lug, Metric M5 screw
- ☐ Spade Lug, #8 screw
- ☐ Spade Lug, #10 screw
- ☐ 1/4 Female Quick Disconnect c Wire Pin
- ☐ Other-Specify_____

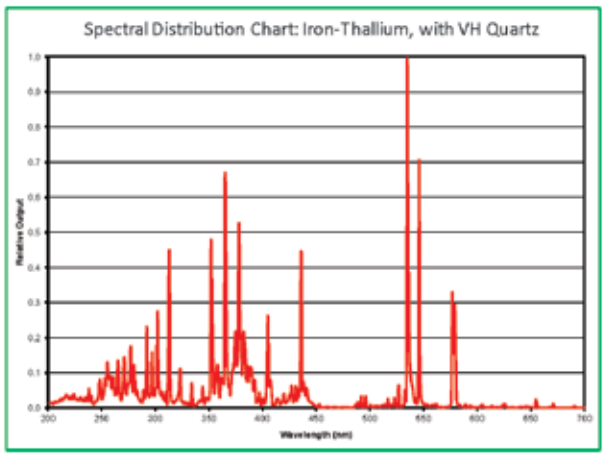
Not only does Light Sources produce custom lamp designs, but we also work with OEM's and system designers to produce unique products. By offering different/unique solutions we help keep your systems competitive in global markets and protect your aftermarket replacement lamp business.

## Medium Pressure/Metal Halide Lamp Spectra



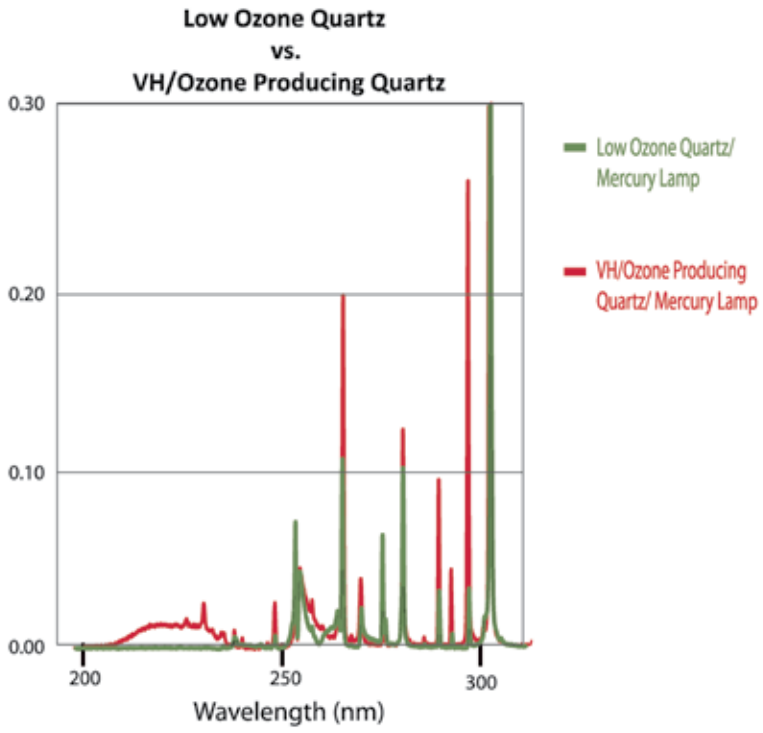

### Common Lamp Body Diameters:

Most sizes are available in both low ozone and ozone-generating quartz glass. (ID x OD)

11 x 13 mm
13 x 15 mm
16 x 18 mm
16 x 19 mm
17 x 20 mm
18 x 20.5 mm
20 x 22.5 mm
22 x 25 mm
22 x 26 mm
24 x 28 mm
25 x 28 mm

**Did you know?.....**
*Mercury (Hg) content of the lamp varies by lamp type but is typically between 10 and 300 mg on average.*

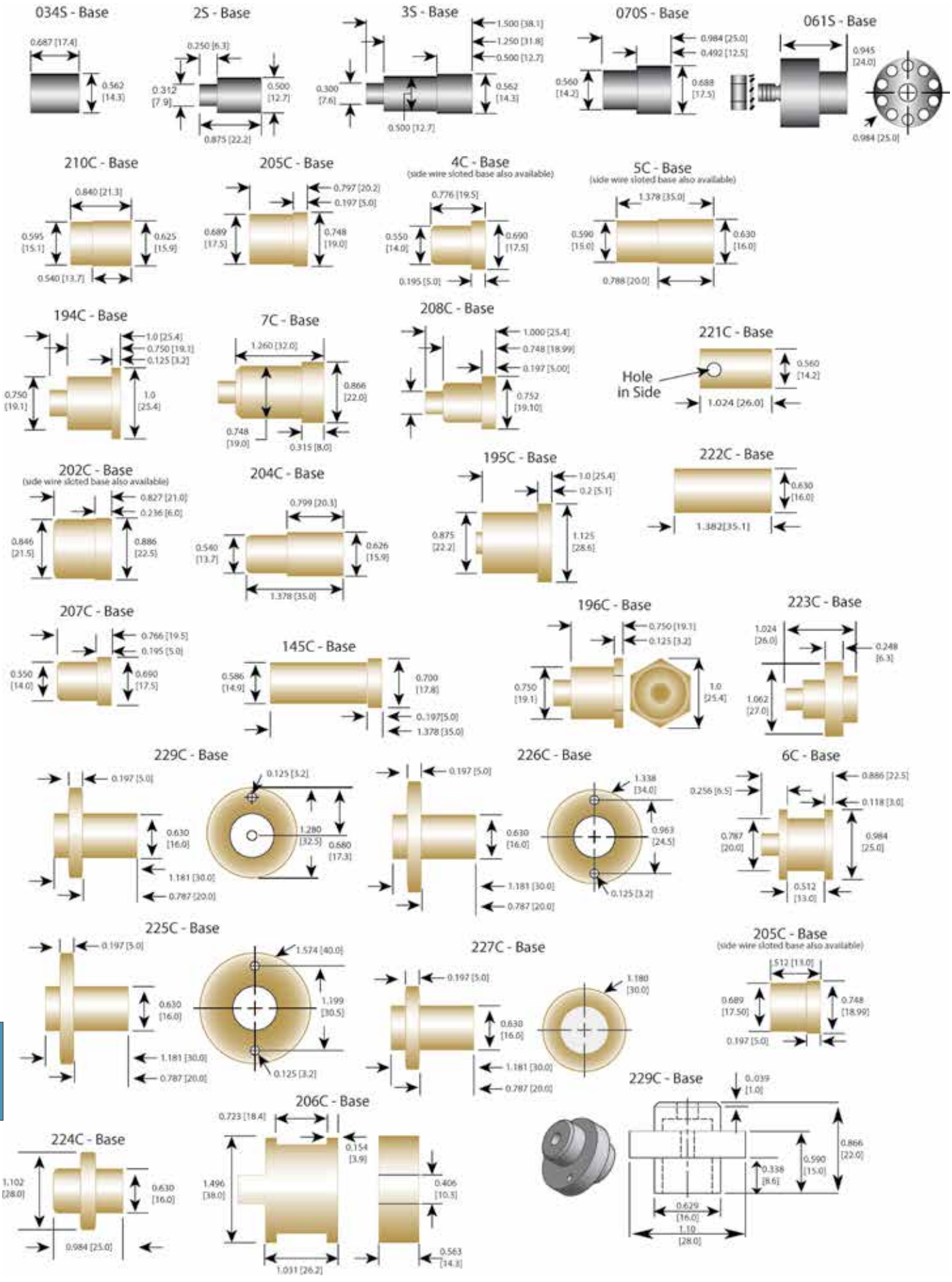
*Ink, coating, and adhesive formulations are made with photoinitiators that require the correct UV spectrum to polymerize and harden/cure properly.*




***Low Ozone Quartz:***
*Allows transmission of the UV-A, B, & C wavelengths while blocking the wavelengths below 230 nm that create ozone in the air.*

**Commonly used bases for MPUV Lamps**

We distinguish ourselves not only by our ability to produce customized lamps, but also by working with OEM's and designers to produce unique base solutions that keep your systems competitive in global markets.

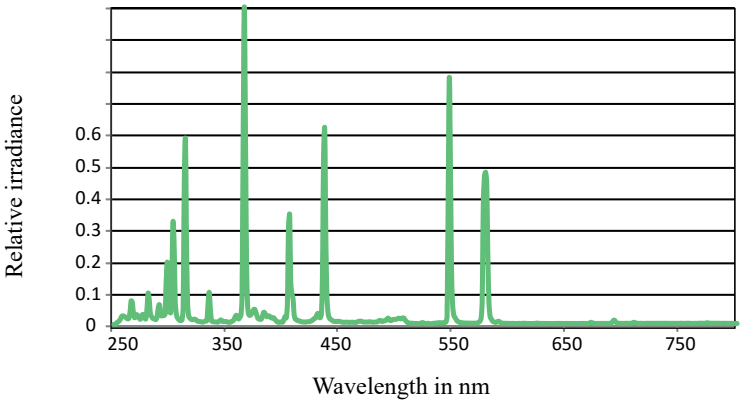


## Metal Halide Lamps

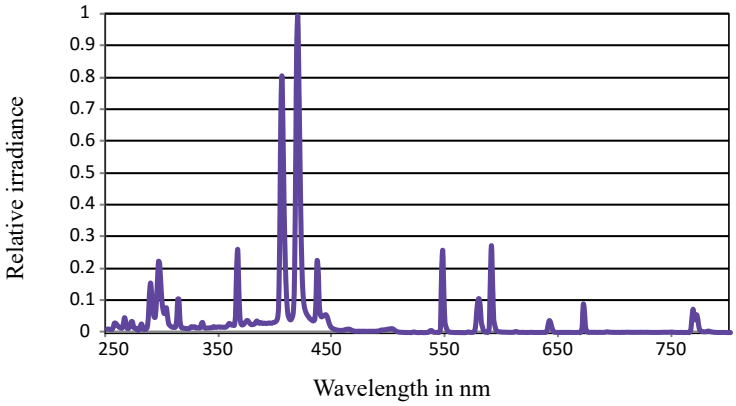
*for the Printing /Curing Industry*


Metal Halide lamps are high pressure mercury UV lamps for which the spectra are matched with the activation spectrum of photoinitiators by adding metal-halides such as iron or gallium iodide or combinations of such additives. Your ink supplier should be able to provide you with the correct spectrum required to cure the ink you are using. Once you provide us with the correct output spectrum, we can begin to work together to design the correct lamp for your specific application. Since we are a custom lamp manufacturer, we can change the metal halide content and lamp operating parameters to meet your specifications and processes.

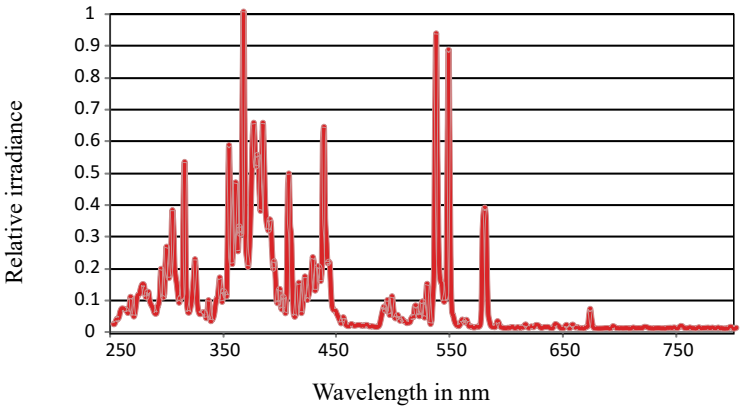
High Pressure Mercury (Hg) SPD




High Pressure Gallium (Ga) SPD



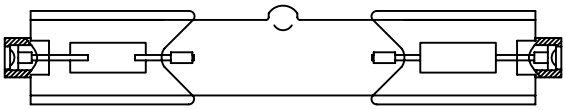

High Pressure Iron (Fe) SPD



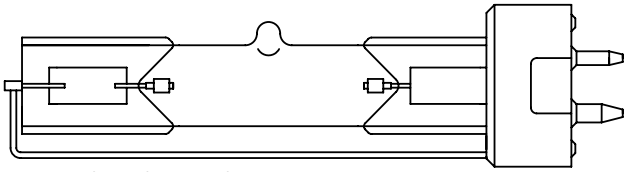
**High Pressure Metal Halide Lamps with Double- and Single-Ended Connection**

Typical lamp configurations - custom designs available

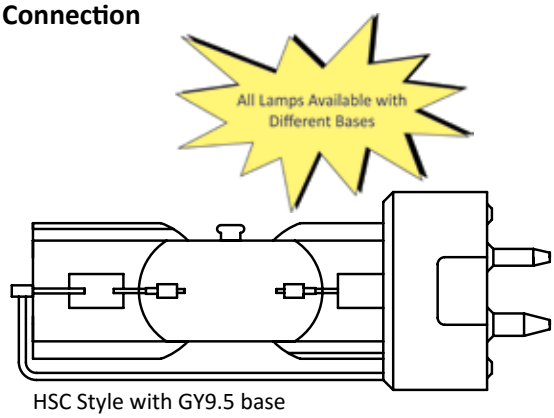
The product range for high pressure MH lamps extends from 200 watts to 2000 watts in various designs.



HTC Style with R7s base



HSC Style with GY9.5 base




HSC Style with GY9.5 base

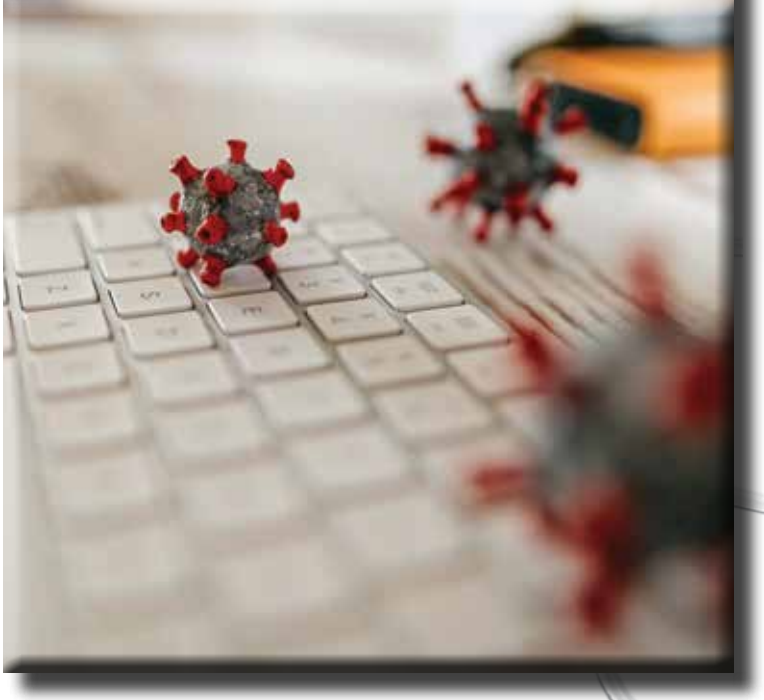
***Available with Hg, Fe, & Ga additives***

**Industrial Applications-**

- Automotive
- Pharmaceutical
- Reprography
- Photochemistry
- Photo Polymerization
- Curing of paints /lacquers
- Curing of adhesives
- Sewer rehabilitation
- Curing coatings on medical equipment
- Ballast water sterilization
- Cosmetic
- Food & beverage

| | Supply Power [W] | Operating Voltage [V] | Voltage [V] | Current [A] | Arc Length [mm] | Tube Diameter [mm] |
|---|---|---|---|---|---|---|
| **Mercury (Hg)** | | | | | | |
| | 200 | 230 | 130 | 2.0 | 22 | 12 |
| | 250 | 230 | 130 | 2.2 | 15 | 14 |
| | 400 | 230 | 130 | 3.5 | 33 | 14 |
| | 500 | 230 | 115 | 4.5 | 32 | 16 |
| | 600 | 230 | 130 | 5 | 45 | 14 |
| | 800 | 230 | 130 | 7 | 29 | 24.5 |
| | 1000 | 230/400 | 130/195 | 9/5,5 | 48/52 | 28 |
| | 2000 | 400 | 250 | 9 | 72 | 28 |
| **Iron (Fe)** | | | | | | |
| | 200 | 230 | 130 | 2.0 | 22 | 12 |
| | 250 | 230 | 130 | 2.2 | 15 | 14 |
| | 400 | 230 | 130 | 3.5 | 33 | 14 |
| | 500 | 230 | 115 | 4.5 | 32 | 16 |
| | 600 | 230 | 130 | 5 | 45 | 14 |
| | 800 | 230 | 130 | 7 | 29 | 24.5 |
| | 1000 | 230/400 | 130/195 | 9/5,5 | 48/52 | 28 |
| | 2000 | 400 | 250 | 9 | 72 | 28 |
| **Gallium (Ga)** | | | | | | |
| | 200 | 230 | 130 | 2.0 | 22 | 12 |
| | 250 | 230 | 130 | 2.2 | 15 | 14 |
| | 400 | 230 | 130 | 3.5 | 33 | 14 |
| | 500 | 230 | 115 | 4.5 | 32 | 16 |
| | 600 | 230 | 130 | 5 | 45 | 14 |
| | 800 | 230 | 130 | 7 | 29 | 24.5 |
| | 1000 | 230/400 | 130/195 | 9/5,5 | 48/52 | 28 |
| | 2000 | 400 | 250 | 9 | 72 | 28 |

*Note: lamp data is based on measurements performed under laboratory conditions in air at room ambient temperature*



## UVC Subminiature Germicidal Lamps

LightSources makes it possible to realize all the benefits of germicidal UVC light in limited space applications with our subminiature UVC technology. These lamps are customized to each OEM's innovative design.

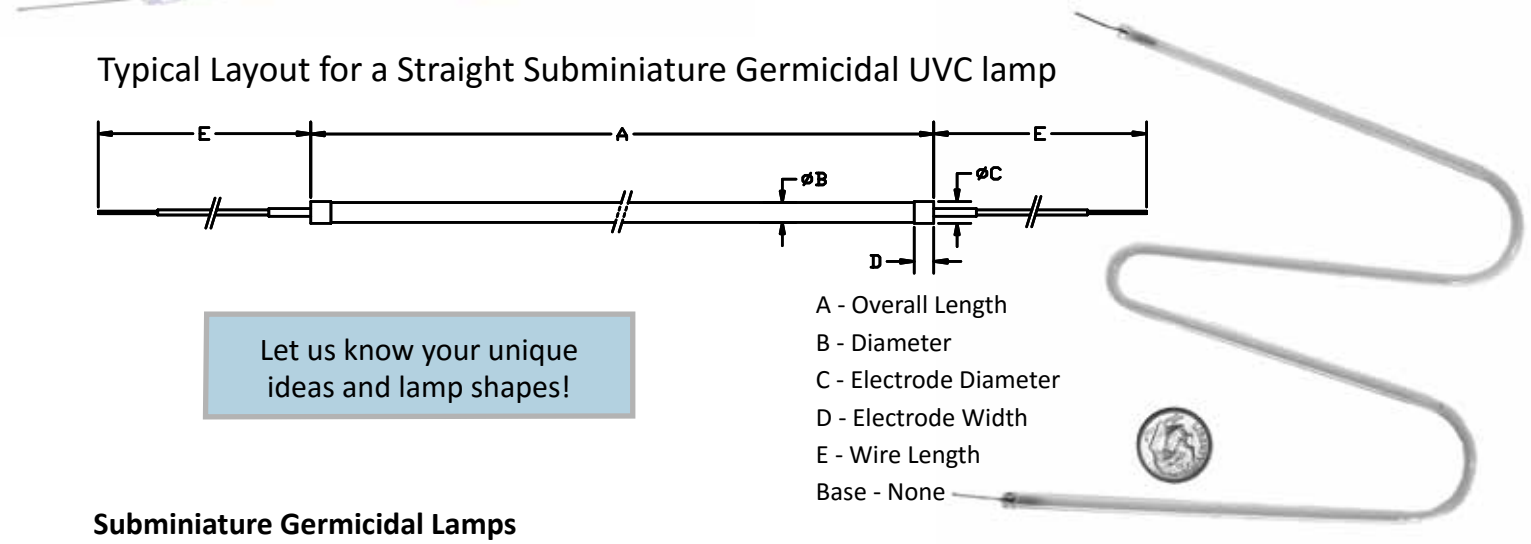
Call and talk to us about your design ideas!

## Typical Layout for a Straight Subminiature Germicidal UVC lamp




Let us know your unique ideas and lamp shapes!

A - Overall Length
B - Diameter
C - Electrode Diameter
D - Electrode Width
E - Wire Length
Base - None



## Subminiature Germicidal Lamps

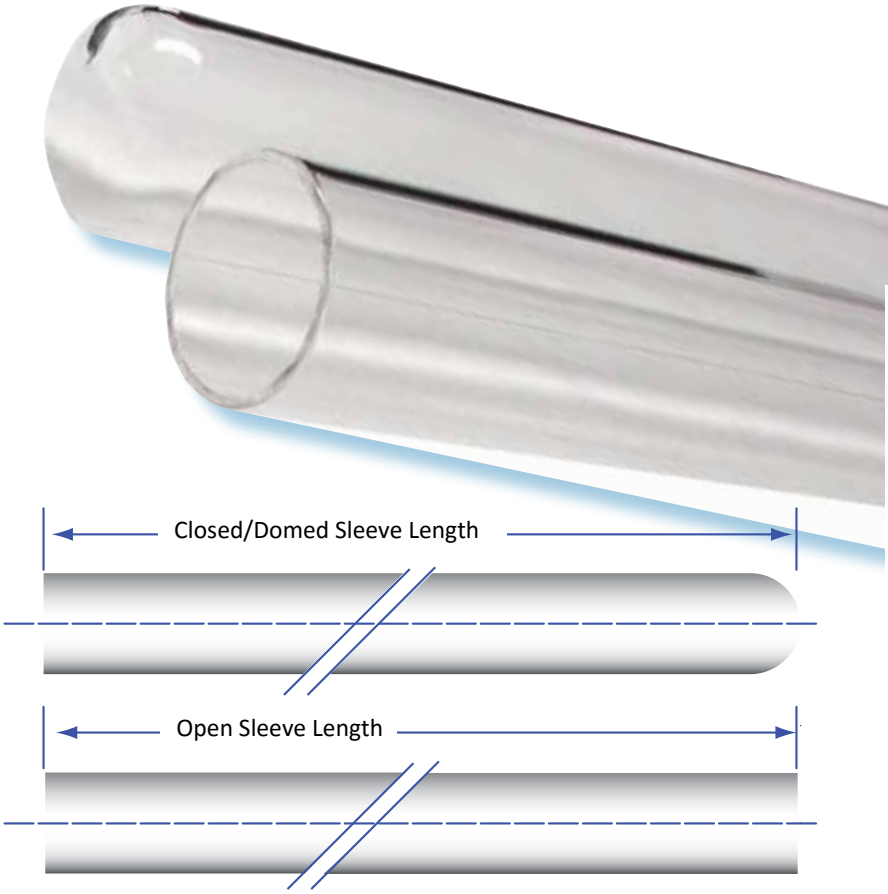
| | Tube Diam. mm | Overall Length mm | Wire Length mm | Power V | Current mA | Voltage V |
|---|---|---|---|---|---|---|
| **Low ozone** | | | | | | |
| GSM-3-51 | 3.0 | 51 ± 1.5 | 10.0 | 1.3 | 6 | 210 |
| GSM-3-106 | 3.0 | 106 ± 1.5 | 10.0 | 1.7 | 6 | 280 |
| GSM-3-175 | 3.0 | 175 ± 1.5 | 10.0 | 2.2 | 6 | 360 |
| GSM-4-75 | 4.0 | 75 ± 1.5 | 10.0 | 1.3 | 6 | 220 |
| GSM-4-125 | 4.0 | 125 ± 1.5 | 10.0 | 1.6 | 6 | 270 |
| GSM-4-200 | 4.0 | 200 ± 1.5 | 10.0 | 2.1 | 6 | 350 |

## Quartz Sleeves for Germicidal Lamps

Quartz sleeves offer protection against air and water flow, breakage, leakage, temperature fluctuations, and environmental hazards. LightSources and LightTech offer a variety of standard and custom quartz sleeves and jackets that can be applied to a range of germicidal UVC lamp types, including standard, high output (HO), and amalgam lamps. We offer OEM's multiple options such as open, closed (domed), flared or beaded ends and fire polish finishing. Our quartz sleeves are available in a wide range of diameters and lengths for use in air purification units, water disinfection units, photochemical reactors, and other specialized equipment.

### Common Sleeve Sizes

| I.D. mm | O.D. mm | Wall Thickness mm |
|---|---|---|
| 17.0 | 19.0 | 1.00 |
| 18.0 | 20.5 | 1.25 |
| 19.6 | 22.0 | 1.20 |
| 20.0 | 22.0 | 1.00 |
| 20.0 | 22.5 | 1.25 |
| 20.0 | 23.0 | 1.50 |
| 20.0 | 24.0 | 2.00 |
| 22.0 | 24.5 | 1.25 |
| 22.0 | 25.0 | 1.50 |
| 25.0 | 28.0 | 1.50 |
| 26.0 | 30.0 | 2.00 |
| 26.4 | 30.0 | 1.80 |
| 27.0 | 30.0 | 1.50 |
| 28.0 | 32.0 | 2.00 |
| 30.0 | 33.0 | 1.50 |
| 32.0 | 36.0 | 2.00 |
| 34.0 | 38.0 | 2.00 |
| 35.0 | 38.0 | 1.50 |
| 35.0 | 40.0 | 2.50 |
| 38.0 | 42.0 | 2.00 |
| 42.0 | 45.0 | 1.50 |
| 44.0 | 48.0 | 2.00 |
| 45.0 | 48.0 | 1.50 |
| 50.0 | 54.0 | 2.00 |




# *The Shatter Protech Technology*

***Lamp envelope that protects against glass fragments in the event of lamp breakage***


The new **Shatter ProTech Technology** from Light Sources adds "peace-of-mind" to a wide variety of applications. The new **Shatter ProTech** shield is a cost-effective solution for glass and mercury containment, while sacrificing minimal UVC output.

**Shatter ProTech** lamps are jacketed in fluoropolymer film to provide maximum consumer safety with a minimal output loss. The UVC transmission loss through the ProTech sleeve is only 5% more than that of a quartz sleeve.

No lamp is too big or small for the **Shatter ProTech Technology**.

***Note:*** *Shatter ProTech does not guarantee water tightness.*

## *The Shatter Protech Technology*

- Reduced risk for mercury contamination if breakage occurs
- Heat and acid resistant
- Excellent for applications that involve food or drinking water
- High performance at a low cost
- Environmentally friendly and safe

## Custom Bases for the OEM

Not only does LightSources and LightTech produce custom lamp designs, but we also work with OEM's and system designers to produce unique end fittings and matching sockets. By offering different/unique solutions we help you protect your aftermarket replacement lamp business. If you don't see what you are looking for, simply sketch out your design and send it to us. We will work with you to make your vision come to life.

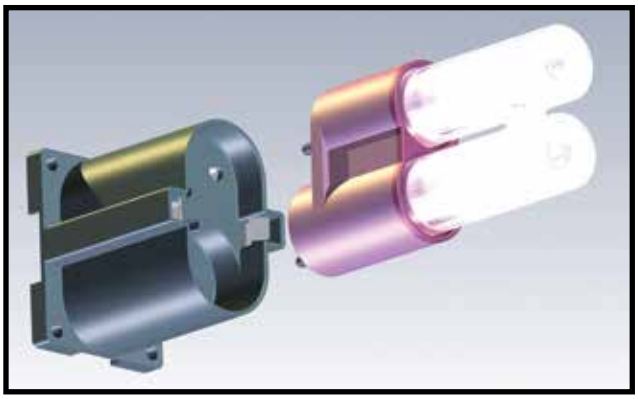
If you have a special connector or wire requirement, please ask.

## What's Your Competitive Advantage?

Our custom designed lamp bases are just one of the many reasons why our customers come back to us.

We work with OEM's to ensure that custom lamps only fit into their custom systems. Benefit from greater flexibility in your system design and distinguish your product with identifiable and unique bases/sockets, end caps or pin configurations. Add value to the components and parts of your systems by creating a business identity.

Bases and sockets can be manufactured in various colors and can even be labeled with your own corporate logo to enhance brand recognition.



*Examples of Custom Proprietary Non-Standard Bases*

# Surface Disinfection

## *Radiometric Terminology Explained:*

### Radiant Flux:

Optical power, measured in watts [W].

***1 W = 1 J/s***

Can be thought of as the number of photons emitted by a source per unit time, multiplied by the energy of each photon.

### Irradiance:

Radiant flux incident upon a defined surface area, measured in watts per square meter [W/m²].

The scientifically rigorous definition of "intensity". Irradiance must always be stated at a specified measurement distance!

Can be thought of as the number of photons hitting a defined surface area per unit time, multiplied by the energy of each photon

***In practice, mW/cm² is a more convenient unit.***

### Dose (or Fluence)

Accumulated irradiation energy absorbed by a surface or particle, the product of irradiance multiplied by exposure time, measured in joules per square meter [J/m²].

Can be thought of as the number of photons that hit a surface during a given exposure time, multiplied by the energy of each photon.

***Again, mJ/cm² is more practical.***

UV surface disinfection follows the same principles as air and water disinfection – namely irradiance, exposure time, and dosage – but is made simpler by the need to only consider a two-dimensional surface rather than a three-dimensional volume in exposure calculations and measurements.

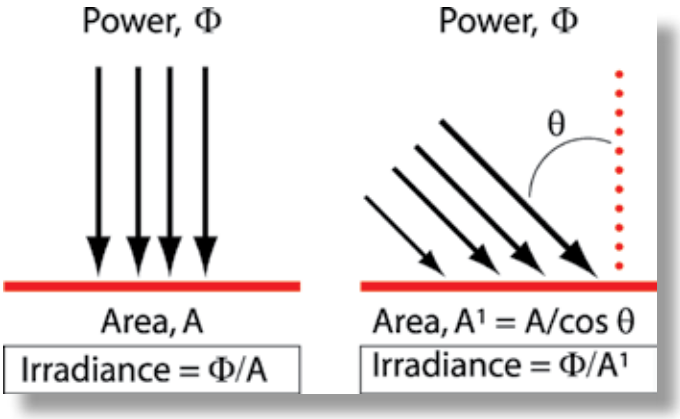
Dose is the product of irradiance and exposure time (see graphic below) and generally there is reciprocity of the time and irradiance factors. In other words, half the irradiance for twice the time produces an equal dose as twice the irradiance for half the time. For this reciprocity relation to hold reliably when comparing different irradiance levels, we recommend the irradiance levels are within an order of magnitude of each other.

**Dose [mJ/cm²] = Irradiance [mW/cm²] x Exposure Time [s]**

| | | | |
|---|---|---|---|
| Viruses: | 2 – 20 mJ/cm² | Bacteria: | 4 – 60 mJ/cm² |
| Yeasts: | 10 – 25 mJ/cm² | Fungi: | 15 – 400 mJ/cm² |

*Typical 254 nm dose ranges for 99.9% (3-log) inactivation of various microorganisms.*

In the case of surfaces, the irradiance will depend not only on the power of the UV source and distance between source and surface, but also on the angle of incidence of the incoming UV radiation with the surface. The effective irradiance will thereby vary as the cosine of the angle of incidence, which is explained in the graphic below. This calculation shows that the highest irradiance will be achieved at normal (90°) incidence, i.e. when a linear UV lamp is positioned parallel to the surface targeted for disinfection.



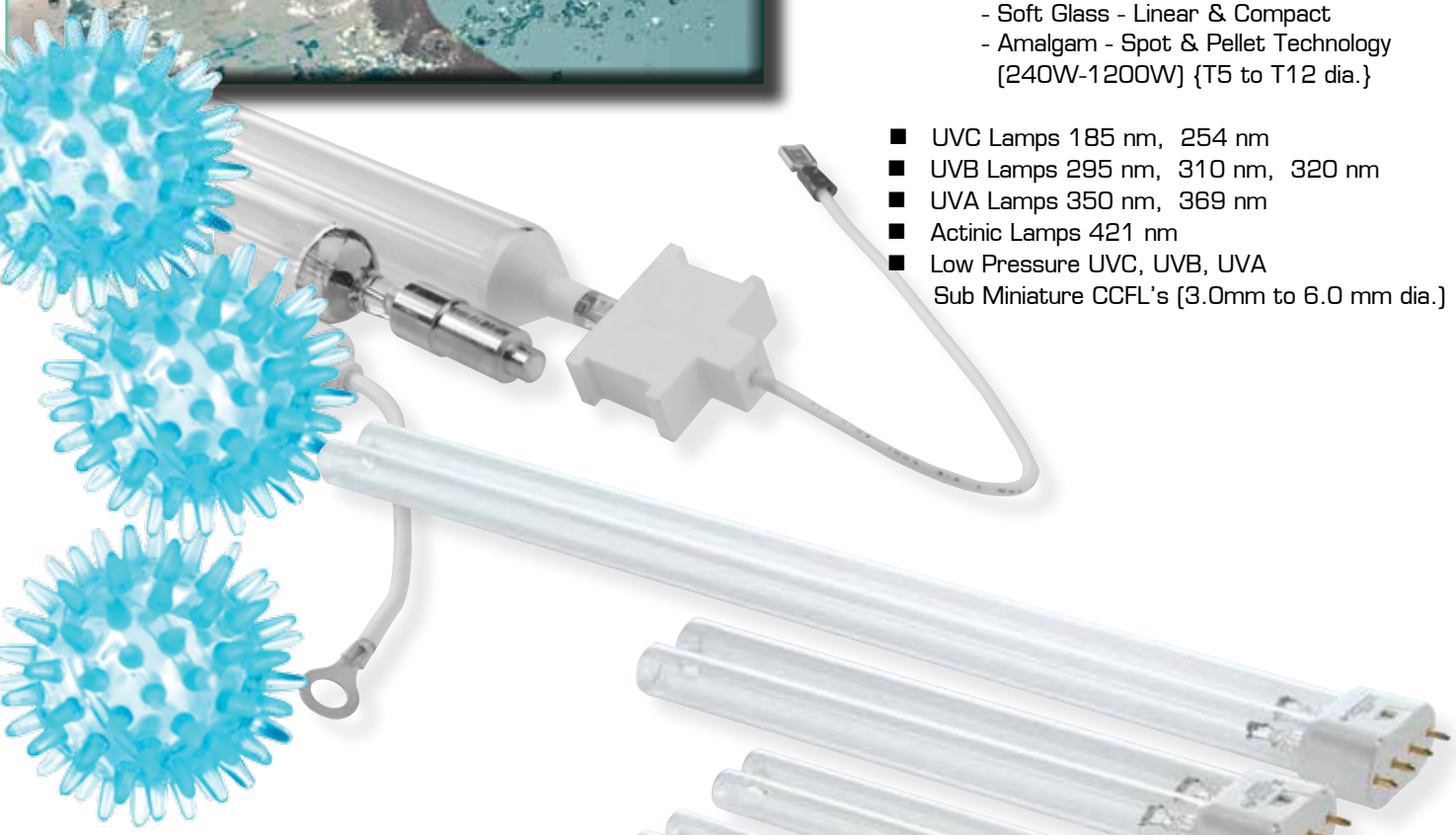

It is also important to note that surface disinfection is strictly a line-of-sight process and there is very little penetration into most materials. This means that shaded areas, crevices, and heavily textured surfaces will be difficult or impossible to disinfect using UV.

Also keep in mind that UV will degrade organic and polymeric materials such as plastics, wood, and textiles. A change in color is most typical, but UV-degradation can also result in chalking, cracking, and embrittlement of surfaces and materials.


# Innovation and leadership for UV Lamp Technology

With 38 Years of UV lamp Design,
Engineering & Manufacturing experience,
We are the One-Stop-Manufacturer for
All your UVC, UVB & UVA needs

- HID/MPUV UVC & UVA
  - Press seal
  - Neck down vacuum seal
- Low Pressure UVC
  - Hard Quartz, Linear, Compact & Bent
  - Soft Glass - Linear & Compact
  - Amalgam - Spot & Pellet Technology
    (240W-1200W) {T5 to T12 dia.}
- UVC Lamps 185 nm, 254 nm
- UVB Lamps 295 nm, 310 nm, 320 nm
- UVA Lamps 350 nm, 369 nm
- Actinic Lamps 421 nm
- Low Pressure UVC, UVB, UVA
  Sub Miniature CCFL's (3.0mm to 6.0 mm dia.)



Custom Designs are our Specialty…

We don't have Customers…
We have Business Partners
…for Life!

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# Technical Notes

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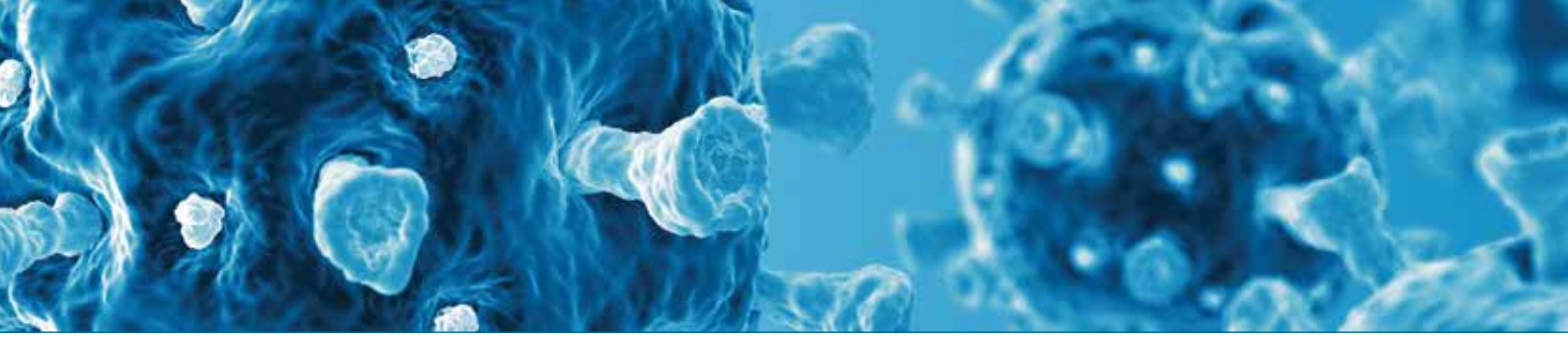

# Technical Notes

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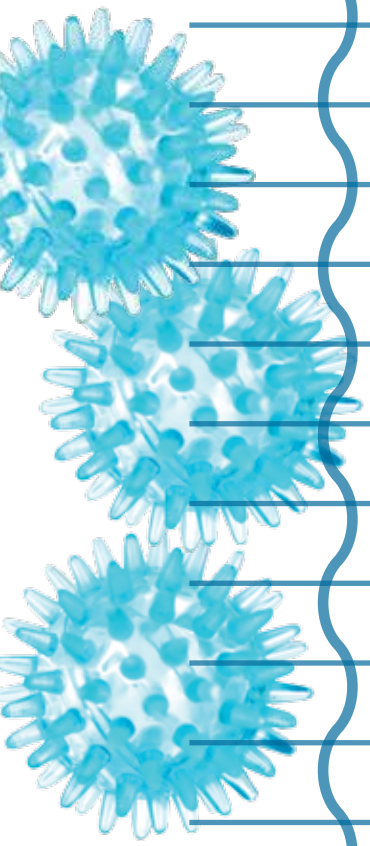



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In 1990 the EPA developed the TCLP test (Toxicity Characteristic Leaching Procedure) to simulate the effect of disposing waste in conventional landfills under complex environmental conditions. The method is designed to determine the mobility of toxic material in liquid, solid and multiphasic waste. The EPA developed the Toxic Characteristic Leaching Procedure to determine the toxicity of waste. The TCLP test does NOT measure the total mercury content but rather the potential of mercury to leach into groundwater if a waste is disposed of in a landfill. TCLP is designed to simulate the leaching a waste will undergo if disposed in a sanitary landfill. This test includes mercury, lead, cadmium, and other hazardous materials. Passing this test for mercury, for instance, requires a yield of less than 0.2 milligrams per liter upon completion of the test. Lamps that PASS the TCLP are considered as non-hazardous waste by the EPA. We are proud to be among the first to offer the majority of our germicidal lamps as TCLP compliant.

While lamps that pass TCLP may be classified as non-hazardous waste by the EPA, LightSources and LightTech strongly encourage the recycling of spent germicidal lamps. Please contact your local environmental agency for assistance with lamp recycling or visit www.lamprecycle.org.