LightSources

Germicidal lamps

LightTech

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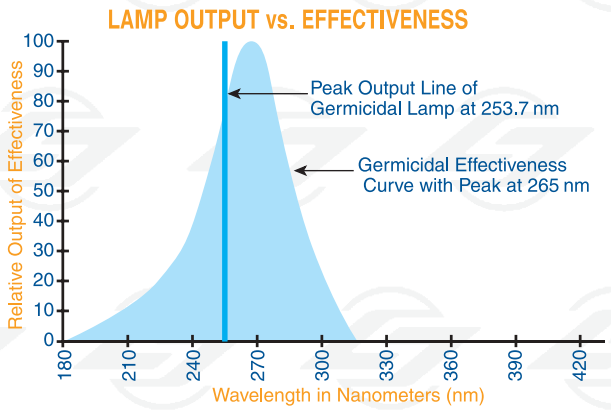
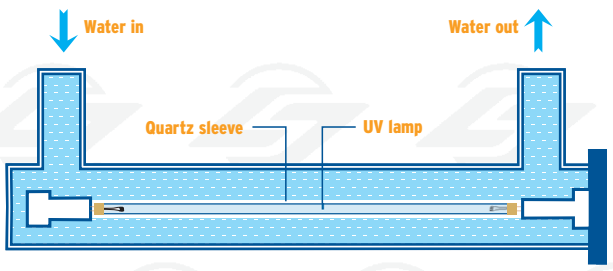




Germicidal action

UV-action

Ultraviolet radiation in the 200-300 nanometer (nm) range is extremely effective in killing microorganisms such as airborne and surface bacteria, viruses, yeasts and molds.

Light Sources & Lighttech low-pressure, mercury-arc germicidal lamps are specially designed to produce the highest amounts of UV radiation - typically about 90% of the total rated energy is at 253.7nm. This radiation is very close to the peak of the germicidal effectiveness curve of 265nm, the most lethal wavelength to microorganisms (see graph below). Our germicidal lamps are used extensively in air and water purification applications such as in the food and beverage industry, medical applications, HVAC systems (Heating, Ventilating, and Air Conditioning), pharmaceutical and semiconductor sterilization applications. In addition, they are used in drinking water, waste water and ground water remediation.

Ozone Action

Our "VH" germicidal lamps generate energy at 185nm in addition to the 253.7nm line. This UV emission produces abundant amounts of ozone in air. Ozone is an extremely active oxidizer. It destroys microorganisms on contact and acts as a deodorizer.

One of its primary advantages is that it can be carried by air into places that the UV radiation cannot directly reach. We design and manufacture lamps to produce various amounts of ozone to meet specific application requirements. "VH" lamps are typically used in the treatment of air, pool and spa water, T.O.C. (Total Organic Compound) reduction, and HVAC.

Advantages of UV-Radiation:

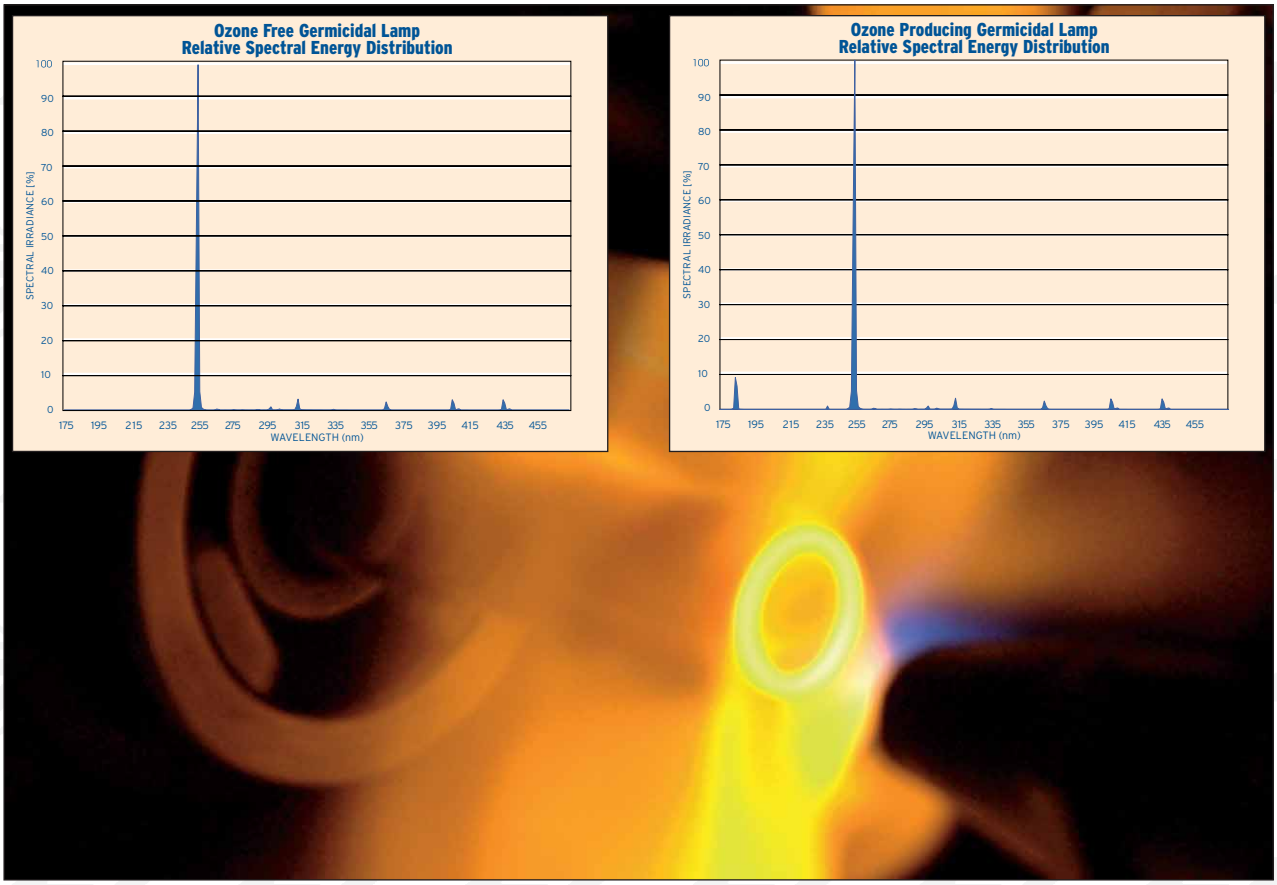
- Environmentally friendly, no dangerous chemicals to handle or store, no problems of overdosing
- Low initial capital cost and reduced operating expenses when compared with other technologies such as chemical processing
- Immediate treatment process, no need for holding tanks, long retention times
- No chemicals added to water supply; no by-products
- No change in taste, odor, pH, conductivity or the general chemistry of the water
- No handling of toxic chemicals, no need for specialized storage requirements
- Simplicity and ease of maintenance, periodic cleaning (if applicable) and annual lamp replacement
- Highly compatible with other water and air treatment processes

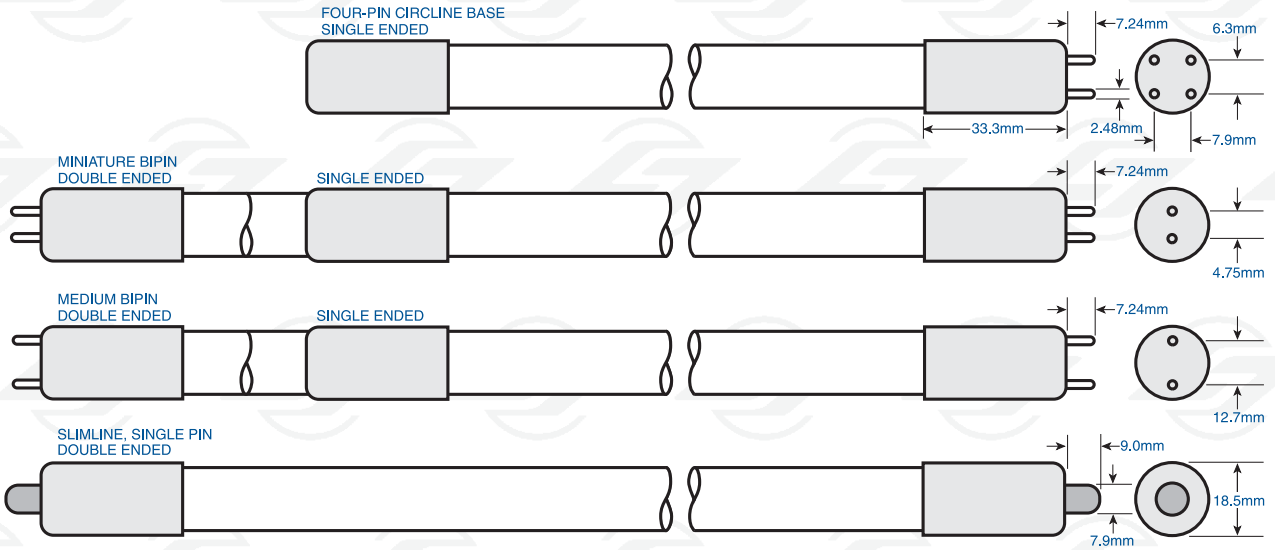
Germicidal applications can be used for all three states of matter: gases, liquids and solids.

Quartz Germicidal Lamps

The type of fused quartz used to make the envelope or bulb of the germicidal lamp determines the emission of the wavelengths of UV energy that react with the oxygen in the air to produce ozone. The relative amount of ozone generating energy at 185nm is indicated by the letters "L" and "VH". "L" lamps are made with a specially doped fused quartz that prohibits the emission of the energy at 185nm. "VH" lamps are made with clear fused quartz which will transmit both the 254nm and 185nm energy. In applications where a moderate amount of ozone may be required, we can splice the two types of quartz together in a ratio to produce the desired amount of ozone*.

*Ozone generation is the result of a complex reaction of the oxygen in the air to the presence of radiation at 185nm. Other factors influencing ozone production include: temperature, relative humidity, air flow, dew point, UV intensity, etc. The actual amount of ozone generated will depend on the above factors as well as the actual system design.

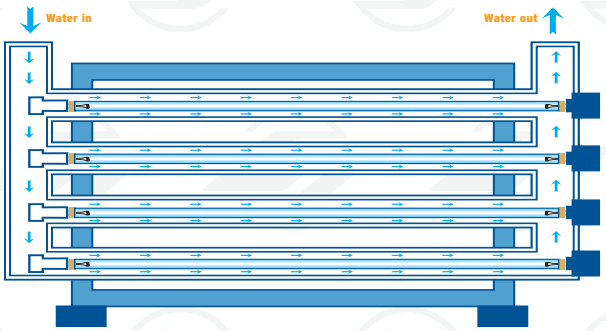




Ultraviolet radiation in the 200-300 nanometer range is extremely effective in killing microorganisms.

Standard Output Quartz Germicidal Lamps

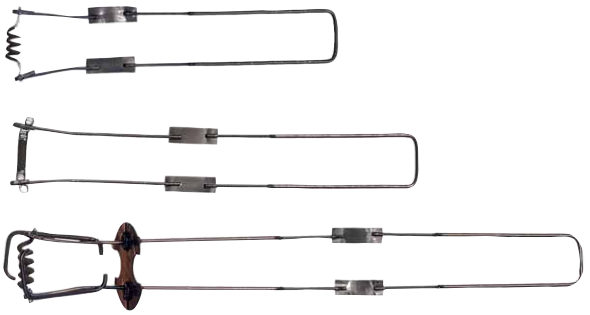
	Tube diameter	BF-BF	Arc length	Power	Current	Voltage at 50/60Hz	Voltage at High Freq	UV Output at 254nm		Rated Life Standard Life Version	Rated Life Long Life Version
	mm	mm	mm	W	mA	V	V	$\mu W/cm^2$	W	h	h
Preheat Start Lamps											
GPH212T5L	15	212	132	10	425	30	25	26	2.7	9,000	13,000
GPH212T5VH	15	212	132	10	425	30	25	26	2.7	9,000	13,000
GPH287T5L	15	287	207	14	425	41	34	40	4	9,000	13,000
GPH287T5VH	15	287	207	14	425	41	34	40	4	9,000	13,000
GPH303T5L	15	303	223	15	425	43	35	43	4.3	9,000	13,000
GPH303T5VH	15	303	223	15	425	43	35	43	4.3	9,000	13,000
GPH357T5L	15	357	277	17	425	51	42	57	5.7	9,000	13,000
GPH357T5VH	15	357	277	17	425	51	42	57	5.7	9,000	13,000
GPH436T5L	15	436	356	21	425	62	51	72	7.3	9,000	13,000
GPH436T5VH	15	436	356	21	425	62	51	72	7.3	9,000	13,000
GPH793T5L	15	793	713	38	425	112	92	125	13.5	9,000	13,000
GPH793T5VH	15	793	713	38	425	112	92	125	13.5	9,000	13,000
GPH843T5L	15	843	762	41	425	120	98	136	15	9,000	13,000
GPH843T5VH	15	843	762	41	425	120	98	136	15	9,000	13,000
GPH1148T5L	15	1,148	1,067	55	425	165	135	174	21	9,000	13,000
GPH1148T5VH	15	1,148	1,067	55	425	165	135	174	21	9,000	13,000
GPH1554T5L	15	1,554	1,474	75	425	220	179	223	31	9,000	13,000
GPH1554T5VH	15	1,554	1,474	75	425	220	179	223	31	9,000	13,000
GPH1630T5L	15	1,630	1,550	79	425	231	189	228	32.5	9,000	13,000
GPH1630T5VH	15	1,630	1,550	79	425	231	189	228	32.5	9,000	13,000
Instant Start Lamps											
G10T5L	15	357	277	17	425	51	42	57	5.7	9,000	13,000
G10T5VH	15	357	277	17	425	51	42	57	5.7	9,000	13,000
GSL692T5L	15	692	612	32	425	94	77	95	11	9,000	13,000
GSL692T5VH	15	692	612	32	425	94	77	95	11	9,000	13,000
G36T5L	15	843	762	41	425	120	98	130	15	9,000	13,000
G36T5VH	15	843	762	41	425	120	98	130	15	9,000	13,000
G48T5L	15	1,148	1,067	55	425	165	135	170	21	9,000	13,000
G48T5VH	15	1,148	1,067	55	425	165	135	170	21	9,000	13,000
G64T5L	15	1,554	1,474	75	425	220	179	220	31	9,000	13,000
G64T5VH	15	1,554	1,474	75	425	220	179	220	31	9,000	13,000
G67T5L	15	1,630	1,550	79	425	231	189	225	32.5	9,000	13,000
G67T5VH	15	1,630	1,550	79	425	231	189	225	32.5	9,000	13,000
Cold Catode Lamps											
782L10	15	357	221	15	90	180	165	22	2.8	17,500	NA
782VH10	15	357	221	15	90	180	165	22	2.8	17,500	NA
782L20	15	611	475	22	90	270	240	45	5.5	17,500	NA
782VH20	15	611	475	22	90	270	240	45	5.5	17,500	NA
782L30	15	865	729	28	90	350	310	63	8.3	17,500	NA
782VH30	15	865	729	28	90	350	310	63	8.3	17,500	NA



Germicidal short wavelength low pressure mercury vapor lamps produce ultraviolet radiation at wavelengths lethal to microorganisms.

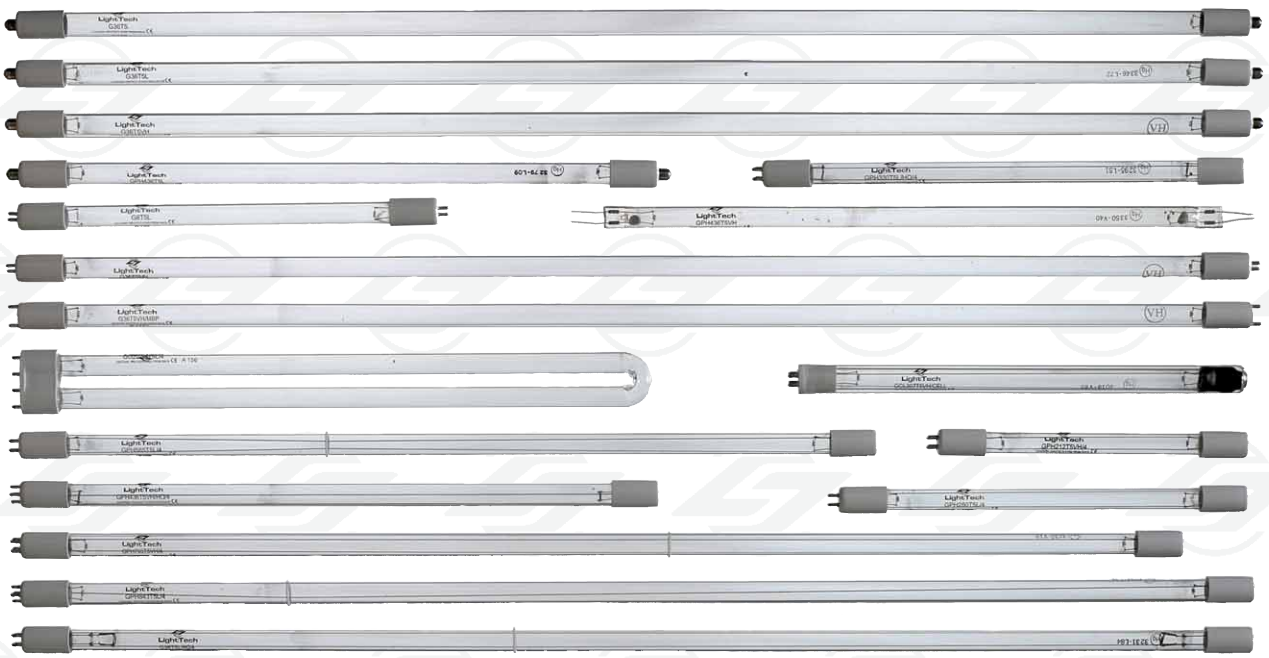
Application Notes

- All values are nominal. Straight lamps are measured from base-face to base-face. U-lamps are measured from base-face to outside of bend.
  Length tolerances are for:
  Double ended Bipin straight lamps: ±3.0mm
  Slimline, Cold Cathode & all single ended: ±3.0mm
- The genetic material DNA (deoxyribonucleic acid) of the microorganisms is the target for the UV light
- Custom designed lamps can be engineered to combine any of the above type quartz or special higher purity quartz such as synthetic grades
- While 15mm (T5) lamps have been the industry standard, we offer lamps in diameters of 4 – 32mm, and in custom lengths up to 2 meters!
- Available in bulk-packs of 60 lamps per carton to reduce freight costs
- Approximate output at 253.7nm at 100 hours use under laboratory conditions. Subject to wide variations due to application conditions.
- Rated average useful life is defined as the average life of a group of lamps when operated under laboratory conditions in air and for reference purposes only. Actual life depends heavily on operating conditions.
- Ozone output of "VH" lamps varies widely with changes in airflow, ambient air temperature, pressure, humidity, and many other factors
- The unique single-ended design, originated by Light Sources, is particularly suited for domed quartz sleeve applications. The end of the lamp with the pins is positioned at the open end of the sleeve at the top. This reduces electrical problems associated with condensation at the bottom of vertical units. Electrical continuity is accomplished through the use of two



external Teflon coated wires. Longer lengths employ spacing rings. The 4-pin single ended design permits the use of standard circline sockets. The lamps are supplied with ceramic bases, which are resistant to UV and ozone. They will not burn or deteriorate, and they eliminate quartz sleeve fogging.
- At line frequencies of 50 or 60Hz when using a magnetic ballast, the lamp wattage is determined by the product of the lamp voltage and current times the apparent power factor of the power supply being used. At high frequency (>10KHz) the power factor is unity (one) and the wattage is obtained as the product of voltage and current.

Note: The description G36T5 and G36T6L have been historically used interchangeably to refer to a lamp that is 15mm in diameter. Today, many lamps are made in a true T6 (19 mm) diameter when requested.

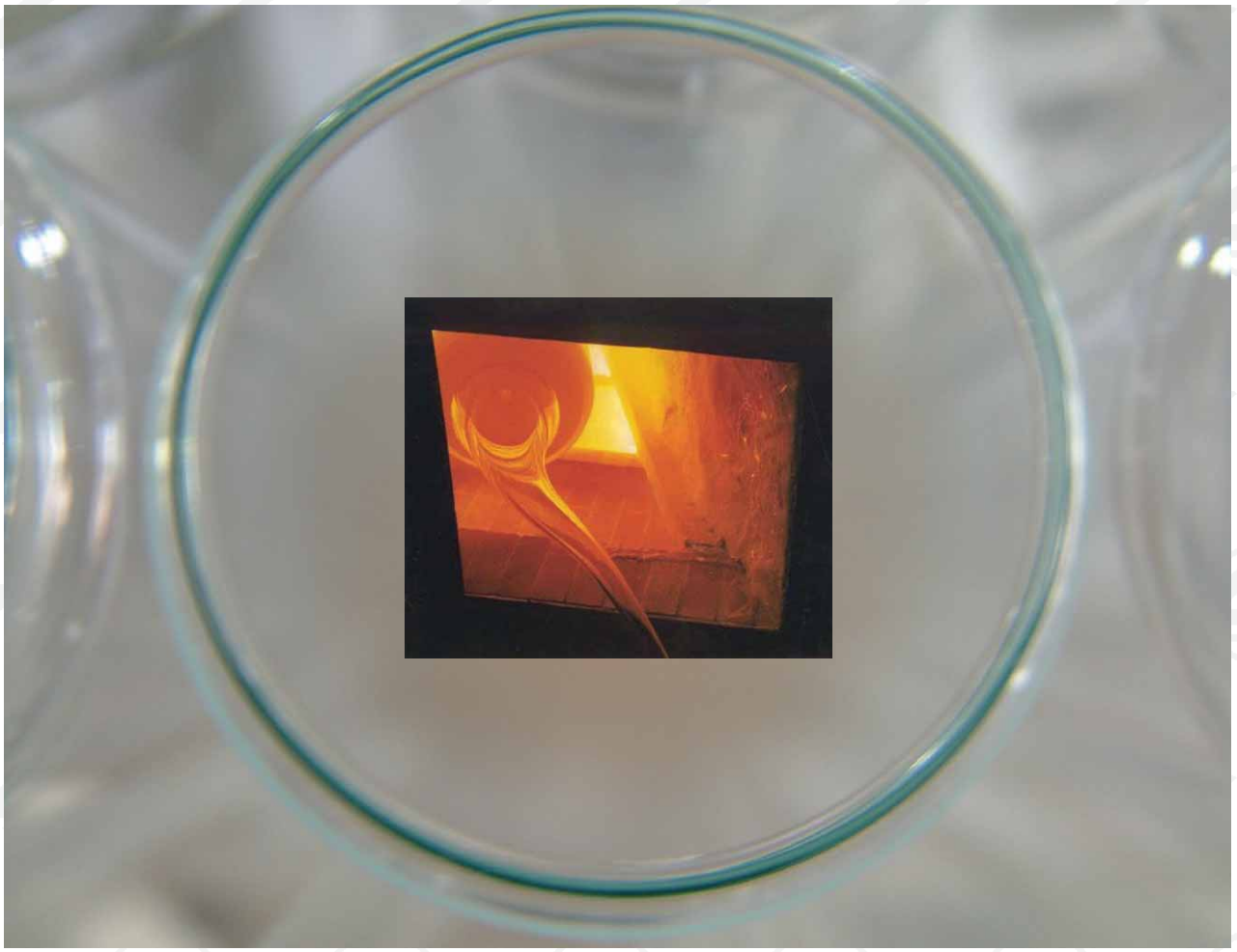


High Output Lamps

High Output (HO) germicidal lamps yield 1/3 to 2/3 more UV output than standard lamps of the same length. High Output lamps are available in most of the common lamp lengths in use today. Custom designed lengths can also be supplied. High Output lamps offer the system designer unique opportunities to reduce the number of lamps required to perform the function of the system and possibly reduce the footprint of the system, or increase the efficiency and capacity of an existing system while keeping the same footprint. The table below represents a sampling of the more common lamp sizes. We can custom design the ideal HO lamp for your unique application.

High Output Quartz Germicidal Lamps

	Tube diameter	BF-BF	Arc length	Power	Current	Voltage at 50/60Hz	Voltage at High Freq	UV Output at 254nm		Rated Life	
										Standard Life Version	Long Life Version
	mm	mm	mm	W	mA	V	V	$\mu W/cm^2$	W	h	h
GPH436T5L/HO	15	436	360	48	800	70	60	120	13	9,000	13,000
GPH436T5VH/HO	15	436	360	48	800	70	60	120	13	9,000	13,000
GHO36T5L	15	842	755	87	800	125	110	260	28	9,000	13,000
GHO36T5VH	15	842	755	87	800	125	110	260	28	9,000	13,000
GPH846T5L/HO	15	846	767	90	800	127	113	265	29	9,000	13,000
GPH846T5VH/HO	15	846	767	90	800	127	113	265	29	9,000	13,000
GPH893T5L/HO	15	893	815	95	800	135	120	270	30	9,000	13,000
GPH893T5VH/HO	15	893	815	95	800	135	120	270	30	9,000	13,000
GHO64T5L	15	1,554	1,421	155	800	220	195	380	45	9,000	13,000
GHO64T5VH	15	1,554	1,421	155	800	220	195	380	45	9,000	13,000
GPH1149T12L/HO	38	1,149	985	90	1,250	90	75	325	35	10,000	13,000
GPH1149T12VH/HO	38	1,149	985	90	1,250	90	75	325	35	10,000	13,000

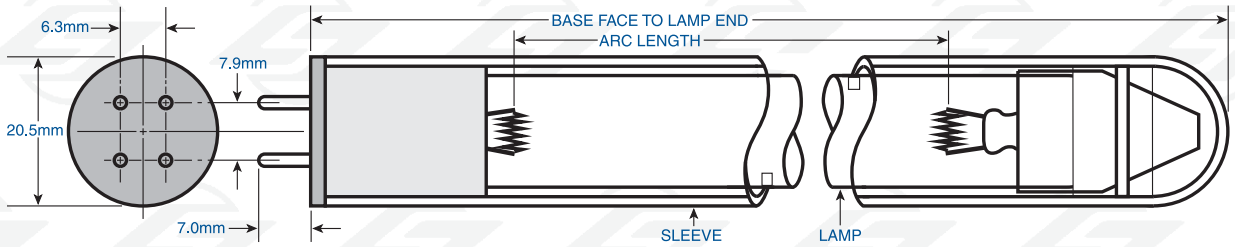


As UV penetrates through the cell wall and cytoplasm membrane, it causes a molecular rearrangement of the microorganisms' DNA.

Germipak UV Cell Lamps

Here is a new series of integrated assemblies of germicidal lamps mounted directly inside quartz sleeves. These all quartz versions are available in a series of standard models. This concept offers a wide range of custom design possibilities for the OEM. Germipak UV Cell lamps are very economical components for Point Of Use (POU) water systems and other applications. The standard units listed below have 15mm (T5) lamps and 20mm diameter sleeves.

Germipak UV Cell lamps can be custom designed for single ended use in instant start, preheat and rapid start modes. Standard units employ a four-pin circline ceramic base. Custom designed bases and lampholders can be designed to fit the equipment designer's needs. Here is an opportunity for OEMs to be in a position to ensure proper operation of their equipment by supplying proprietary Germipak UV Cell lamps for replacement purposes.

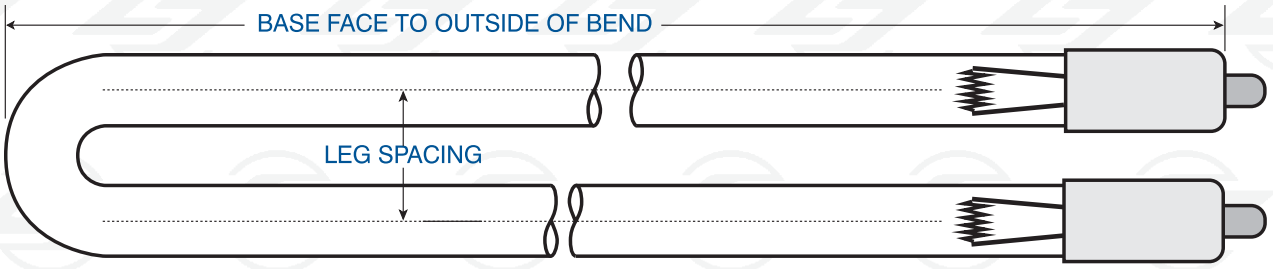


Germipak Quartz Germicidal Cell Lamps

	Lamp Tube diameter	Sleeve diameter	BF-Lamp end	Arc length	Power	Current	Voltage at 50/60Hz	Voltage at High Freq	UV Output at 254nm		Rated Life Standard Life Version	Rated Life Long Life Version
	mm	mm	mm	mm	W	mA	V	V	$\mu W/cm^2$	W	h	h
GCL436T5L/Cell	15	20.5	436	356	21	425	62	51	65	6.5	9,000	13,000
GCL436T5VH/Cell	15	20.5	436	356	21	425	62	51	65	6.5	9,000	13,000
GCL793T5L/Cell	15	20.5	793	713	38	425	112	92	111	12.1	9,000	13,000
GCL793T5VH/Cell	15	20.5	793	713	38	425	112	92	111	12.1	9,000	13,000
GCL36T5L/Cell	15	20.5	842	762	41	425	120	98	116	12.8	9,000	13,000
GCL36T5VH/Cell	15	20.5	842	762	41	425	120	98	116	12.8	9,000	13,000

U-Lamps

Wherever a product design requires more intense ultraviolet radiation in a limited space, the designer should consider Light Sources "U" shaped germicidal and ozone lamps. These lamps are available with center-to-center leg spacing of 22 or 76mm, and offer the perfect solution by effectively doubling the arc length



Quartz Germicidal U-Lamps

	Tube diameter	BF-OB LS	Arc length	Power	Current	Voltage at 50/60Hz	Voltage at High Freq	UV Output at 254nm		Rated Life Standard Life Version	Rated Life Long Life Version
	mm	mm	mm	W	mA	V	V	$\mu W/cm^2$	W	h	h
GU76-10T5L	15	169/76	277	17	425	51	42	57	5.7	9,000	13,000
GU76-10T5VH	15	169/76	277	17	425	51	42	57	5.7	9,000	13,000
GU22-10T5L	15	186/22	277	17	425	51	42	57	5.7	9,000	13,000
GU22-10T5VH	15	186/22	277	17	425	51	42	57	5.7	9,000	13,000
GU22-390T5L	15	390/22	699	36	425	100	85	105	12	9,000	13,000
GU22-390T5VH	15	390/22	699	36	425	100	85	105	12	9,000	13,000
GU76-390T5L	15	390/76	711	37	425	108	88	110	12.8	9,000	13,000
GU76-390T5VH	15	390/76	711	37	425	108	88	110	12.8	9,000	13,000
GU76-36T5L	15	412/76	762	41	425	120	98	130	14.3	9,000	13,000
GU76-36T5VH	15	412/76	762	41	425	120	98	130	14.3	9,000	13,000
GU22-36T5L	15	429/22	762	41	425	120	98	130	14.3	9,000	13,000
GU22-36T5VH	15	429/22	762	41	425	120	98	130	14.3	9,000	13,000

Microorganisms such as viruses, bacteria, fungi and yeasts can be effectively destroyed, by UV irradiation produced by germicidal Lamps.

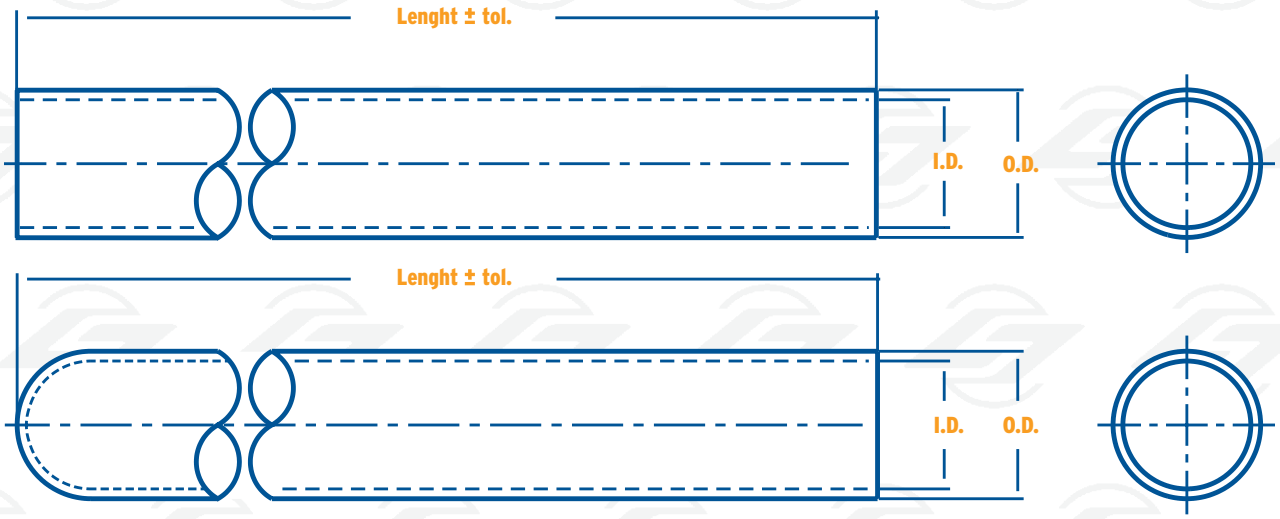
Sleeves

Quartz Sleeves

Light Sources and Lighttech make a variety of quartz sleeves, jackets, and wells in various diameters and lengths for use in water disinfection and air purifier units, photochemical reactors and other special equipment. These are available with closed or open ends, saw cut or fire polished ends, or in special shapes.

Most Commonly Used Quartz Sleeves

Inside Diameter mm	Outside Diameter mm	Wall Thickness mm	Suggested Applications
17.0	19.0	1.00	15mm O.D. Standard and High Output lamps without end caps
18.0	20.5	1.25	
19.6	22.0	1.20	
20.0	22.0	1.00	15mm O.D. Standard and High Output lamps
20.0	22.5	1.25	15mm O.D. Standard and High Output lamps
20.0	23.0	1.50	15mm O.D. Standard and High Output lamps
22.0	24.5	1.25	15mm O.D. Standard, High Output and Amalgam lamps
22.0	25.0	1.50	15mm O.D. Standard and High Output lamps
25.0	28.0	1.50	19mm O.D. Standard, High Output and Amalgam lamps
26.0	30.0	2.00	19mm O.D. Standard and High Output lamps
26.4	30.0	1.80	19mm O.D. Standard and High Output lamps
30.0	33.0	1.50	19mm O.D. Standard and High Output lamps
32.0	36.0	2.00	25mm O.D. Standard, High Output and Amalgam lamps
34.0	38.0	2.00	
35.0	38.0	1.50	
42.0	45.0	1.50	32mm O.D. Standard, High Output and Amalgam lamps
44.0	48.0	2.00	32mm O.D. Standard, High Output and Amalgam lamps
45.0	48.0	1.50	32mm O.D. Standard and High Output lamps



Amalgam Lamps

We are pleased to announce the introduction of high intensity low-pressure amalgam lamps. Extensive research and testing has allowed us to provide the OEM market with the proven technology to take UV applications to the next level. Amalgam lamps are a cost effective alternative to medium pressure lamps. Amalgam lamps provide the highest electrical efficiency converting up to 35% or more of input power to UVC radiation at 254 nm.

These lamps can also be manufactured to provide the additional output at 185 nm. Amalgam technology benefits include:

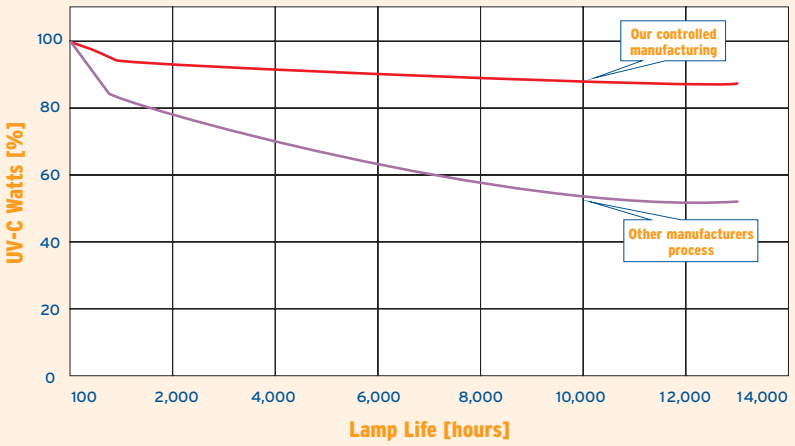
- Amalgam lamps produce up to three times the UV output over standard germicidal lamps of the same length
- 13,000 hour life
- Consistent high intensity across a broad temperature range (4 °C-40°C)
- Lower quantity of lamps per application decreases capital and maintenance costs

As your custom OEM manufacturer, we can engineer and manufacture amalgam lamps from 15 mm to 32 mm diameter. Custom length configurations are available from 300 mm to 1800 mm providing unlimited possibilities.

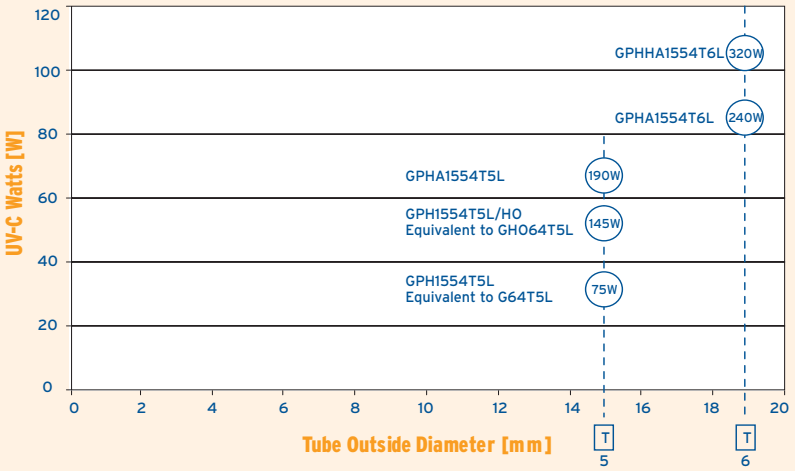
We have applied our proprietary long life process to the amalgam line. The long life feature eliminates the typical drawback of accelerated depreciation associated with higher intensity lamps.

While developing your new product line remember our ability to design a proprietary base to keep replacement sales with the OEM.

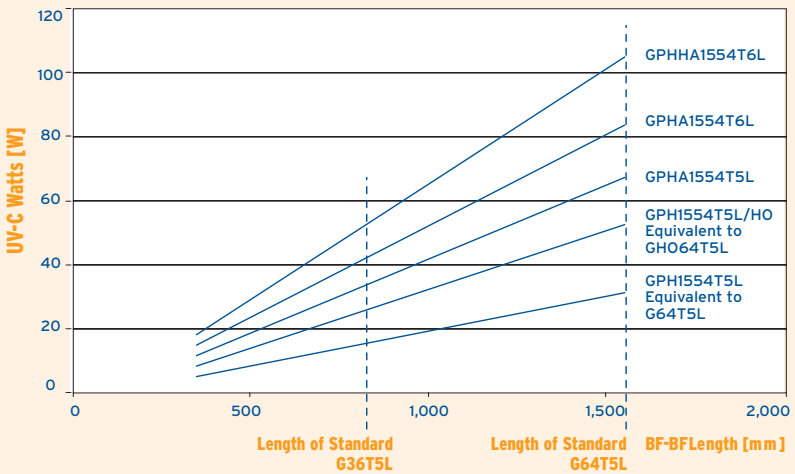
Maintenance of Amalgam Lamps
Controlled Manufacturing Process versus Other Manufacturers' Process



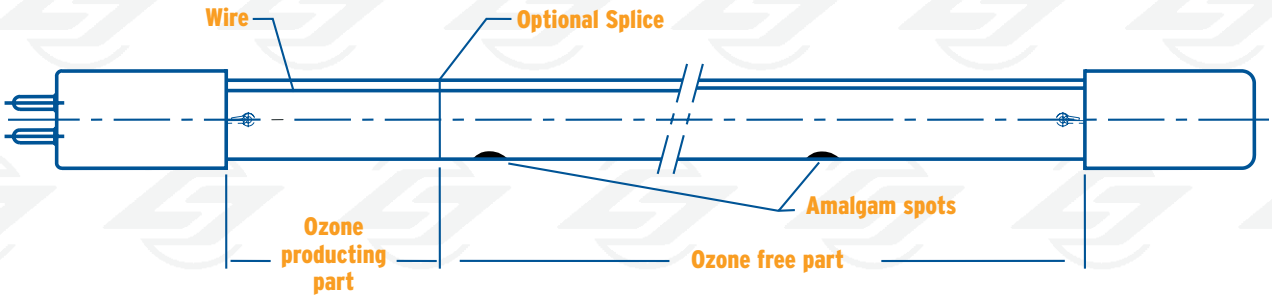
Amalgam Lamps versus Standard Lamps
Baseface of baseface Length: 1554mm



Amalgam Lamps versus Standard Lamps
Baseface to baseface length: 357mm - 1554mm



Low-pressure mercury discharge lamps are the most efficient source for generating UV-C.



Amalgam Lamps

	Operating Conditions	Tube Diameter	BF-BF Length	Arc Length	Lamp Power	Lamp Current	Lamp Voltage	UV Irradiance	UV Power	Rated Life	Ballast Models	Ballast Power	Ballast Input Current
		mm	mm	mm	W	A	V	μW/cm^2	W	Hours		W	A
GPHA357T5L	Horizontal	15	357	278	42	1.2	36	110	11	13,000	E230.104	50	0.25
GPHVA357T5L	Universal Application	15	357	278	42	1.2	36	115	11	13,000	E230.104	50	0.25
GPHA843T5L	Horizontal	15	843	764	105	1.2	88	320	35	13,000	E230.101	118	0.53
GPHVA843T5L	Universal Application	15	843	764	105	1.2	88	320	35	13,000	E230.101	118	0.53
GPHA1000T5L	Horizontal	15	1,000	921	127	1.2	107	370	42	13,000	E230.101	140	0.62
GPHVA1000T5L	Universal Application	15	1,000	921	127	1.2	107	370	42	13,000	E230.101	140	0.62
GPHA1554T5L	Horizontal	15	1,554	1,475	190	1.2	164	500	68	13,000	E230.101	216	0.95
GPHVA1554T5L	Universal Application	15	1,554	1,475	190	1.2	164	500	68	13,000	E230.101	216	0.95
GPHA357T6L	Horizontal	19	357	278	57	1.8	32	130	13	13,000	E230.107	68	0.32
GPHVA357T6L	Universal Application	19	357	278	57	1.8	32	130	13	13,000	E230.107	68	0.32
GPHA843T6L	Horizontal	19	843	764	127	1.8	71	400	43	13,000	E230.108	140	0.62
GPHVA843T6L	Universal Application	19	843	764	127	1.8	71	400	43	13,000	E230.108	140	0.62
GPHA1000T6L	Horizontal	19	1,000	921	150	1.8	84	460	52	13,000	E230.108	164	0.74
GPHVA1000T6L	Universal Application	19	1,000	921	150	1.8	84	460	52	13,000	E230.108	164	0.74
GPHA1554T6L	Horizontal	19	1,554	1,475	240	1.8	134	600	84	13,000	E230.102	261	1.14
GPHVA1554T6L	Universal Application	19	1,554	1,475	240	1.8	134	600	84	13,000	E230.102	261	1.14
GPHHA357T6L	Horizontal	19	357	278	65	2.1	31	140	14	13,000	E230.110	74	0.35
GPHHA843T6L	Horizontal	19	843	764	172	2.1	82	490	54	13,000	E230.110	180	0.79
GPHHA1000T6L	Horizontal	19	1,000	921	207	2.1	99	570	65	13,000	E230.110	218	0.96
GPHHA1554T6L	Horizontal	19	1,554	1,475	320	2.1	154	750	105	13,000	E230.103	340	1.52
GXA1500T10L	Horizontal	32	1,500	1,435	270	3.8	75	650	93	13,000	Please Call For Details		
GPHHA1310T10L	Universal Application	32	1,310	1,190	404	5.0	82	1,050	130	13,000	Please Call For Details		
GPHHA1554T10L	Universal Application	32	1,554	1,434	471	5.0	95	1,160	157	13,000	Please Call For Details		

Amalgam lamp ballasts

Light Sources offers a wide variety of reliable high frequency electronic ballasts. Light Sources amalgam lamps in combination with matching electronic ballast provide a very highly efficient solution for any UV disinfection system. Electronic ballasts are available in single and double lamp combinations for best fit to your systems. In addition, dimmable high frequency electronic ballasts are available for special applications where reduced power operation is crucial for the most economical solution. These high efficiency ballasts are available in rapid start or preheat start operations for increased lamp life. End of life protection features are incorporated to prevent destructive arcing which may occur at normal end of life.

The radiation generated by low-pressure germicidal lamps at 254 nm provides 85% of the maximum germicidal effect.

Specialty UV Emitting Germicidal Lamps

Our in-house manufactured germicidal glass was developed to the highest standards specifically for low pressure mercury vapor lamps serving the water and air purification industries

- Maximum efficiency in producing short wave UVC radiation at 254nm
- Newly developed manufacturing process provides higher UVC Output over lamp life
- Custom configurations available to meet OEM requirements

Specialty UV Emitting Lamps

	Tube diameter mm	Base configuration	BF-BF BF-EOL* mm	Arc length mm	Power W	Current mA	Voltage at 50/60Hz V	Voltage at High Freq V	UV Output at 254nm $\mu W/cm^2$	UV Output at 254nm W	Rated Life h
Standard Lamps											
LTC4T5	15.7	Mini Bipin	134.7	77	4	180	28	23	9	0.9	7,000
LTC6T5	15.7	Mini Bipin	210.9	154	6	180	40	34	16	1.6	9,000
LTC8T5	15.7	Mini Bipin	287.1	231	8	180	55	45	21	2.1	9,000
LTC11T5	15.7	Mini Bipin	210.9	154	11	280	49	40	22	2.2	9.000
LTC11T5SE	15.7	4-Pin Single Ended	241.1	170	12	280	53	43	24	2.4	9,000
LTC16T5	15.7	Mini Bipin	287.1	231	16	370	54	44	40	4	9,000
LTC16T5SE	15.7	4-Pin Single Ended	317.3	245	17	370	57	46	42	4.2	9,000
LTC40T5	15.7	Single Pin	842	767	39	425	120	92	136	15	9,000
LTC64T5	15.7	Single Pin	1,554	1,481	76	425	220	180	230	30	9,000
LTC40T5SE	15.7	4-Pin Single Ended	842	767	39	425	120	92	136	15	9,000
LTC64T5SE	15.7	4-Pin Single Ended	1,554	1,481	76	425	220	180	230	30	9,000
High Output Lamps											
LTC80T5SE	15.7	4-Pin Single Ended	842	767	76	800	120	97	245	27	9,000
LTC125T5SE	15.7	4-Pin Single Ended	1,554	1,481	150	800	230	191	345	48	9,000
LTC10T8	25.7	Medium Bipin	330.3	247	10	280	40	36	23	2.3	9,000
LTC15T8	25.7	Medium Bipin	436.2	353	15	350	49	44	47	4.8	9,000
LTC25T8	25.7	Medium Bipin	436.2	353	25	620	43	41	71	7.2	9,000
LTC30T8	25.7	Medium Bipin	893.4	810	30	380	98	80	100	11.3	9,000
LTC55T8	25.7	Medium Bipin	893.4	810	55	800	87	70	170	19	9,000
LTC75T8	25.7	Medium Bipin	1,198.2	1,115	75	900	110	85	215	26.5	9,000
LTC115T12	37.7	Medium Bipin	1,198.2	1,118	115	1,700	85	69	280	34	9,000
Compact Lamps											
LTCPL5	13	G23	83*	125	5	180	34	30	9	1	8,000
LTCPL9	13	G23	145*	210	9	170	60	55	22	2.4	8,000
LTCPL11	13	G23	214*	350	11	160	89	71	33	3.6	8,000

- All values are nominal. Straight lamps are measured from base-face to base-face. U-lamps are measured from base-face to outside of bend. Length tolerances are for:
  Double ended Bipin straight lamps: ±1.2mm
  Slimline and all single ended: ±2.0mm
- Approximate output at 253.7nm at 100 hours use under laboratory conditions. Subject to wide variations due to application conditions.
- Rated average useful life is defined as the average life of a group of lamps when operated under laboratory conditions in air. For reference purposes only. Actual life depends heavily on operating conditions.

Using germcidal lamps reduces or eliminates the need to use, handle and store hazardous chemicals.

Ballasts

Electronic Ballasts

When considered as an element in an electrical circuit a germicidal lamp is unique in that it is not a "passive" element such as a resistor, inductor or capacitor; rather it is an "active" element that generates harmonic and transient voltages and currents. In addition the lamp exhibits a seemingly strange characteristic, a negative AC resistance, i.e., its voltage decreases with increasing current. Gas discharge devices therefore are inherently unstable; once lit, the current would increase without limit unless another circuit element is used to restore and maintain stable operation - this element is commonly called a "ballast".
In fact, it is the interaction of lamp and ballast that is the true determinant of system performance. In recognition of this, and to provide a "germicidal system", LSI has developed a series of electronic high frequency ballasts matched to provide optimal performance with our lamps in a true systems approach.
This extensive line of ballasts, covering the gamut of germicidal lamps, delivers all the advantages of electronic HF operation:

- High efficiency
- Lighter weight and smaller size
- High power factor
- Insensitivity to line voltage variation
- Operation on multiple supply voltages

Light Sources ballasts are manufactured in ISO-9002 facilities and meet IPC610 quality requirements.

Electronic Ballasts for Germicidal Lamps

Ballast Type	Part Number	Input Voltage V	Nominal Lamp Voltage V	Maximum Lamp Power W	Maximum Lamp Current mA	Lamp Starting Method*	Operation*	Certifications
LCG 800/240	-	230	100-200	170	800	IS	DL	UL,CUL
LCG 800/120	-	120	100-200	170	800	IS	DL	UL,CUL
LCG 500/240	-	230	70-120	90	425-500	IS	DL	UL,CUL
LCG 500/120	-	120	70-120	90	425-500	IS	DL	UL,CUL
2GXO64-230V-950mA	80507	230	100-200	170-380	950	IS	DL	UL,CSA
2GXO64-230V	80014	230	100-200	380	850	IS	DL	UL,CSA
2GXO36-120V	80009	120	70-120	170	850	IS	DL	UL,CSA
2GXO36-230V	80010	230	70-120	170	850	IS	DL	UL,CSA
ING64-Universal	80525	120-230	100-200	65	320-450	IS	SL	UL,CUL
2G64-230V	80016	230	100-200	170	425	IS	DL	UL,CSA
2G64-120V	80015	120	100-200	170	425	IS	DL	UL,CSA
FLDC8-12V	80513	12 DC	40-50	8	100-200	IS	SL	-
FLDC13-12V	-	12 DC	50-60	13	100-200	IS	SL	-
ING10-120V	80518	120	50	20	320-450	IS	SL	UL,CUL
ING10-230V	80519	230	50	20	320-450	IS	SL	UL,CUL
ING36-120V	80504	120	100	40	320-450	IS	SL	UL,CUL
ING36-230V	80505	230	100	40	320-450	IS	SL	UL,CUL
INGXO36-Universal	80524	120-230	70-120	65-85	600-800	IS	SL	UL,CUL
GHO550-120/230V	80527	120-230	30-60	60	600-800	RS	SL	UL,CUL,CE,FCC class B
GPH287-120V	80100	120	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH287-230V	80101	230	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH287-120/230V	80508	120-230	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH793-120V	80102	120	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH793-230V	80103	230	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH793-120/230V	80511	120-230	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH287-120V/PI	80509	120	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH287-230V/PI	80510	230	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH287-120/230V PI	80506	120-230	20-60	17	420	RS	SL	UL,CUL,FCC class B
GPH793-120V/PI	80514	120	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH793-230V/PI	80515	230	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH793-120/230V PI	80512	120-230	70-100	42	420	RS	SL	UL,CUL,FCC class B
GPH287-120/230V RTL	80528	120	20-60	7-17	420	RS	SL	UL,CUL,FCC class B
G20T10-120V	80501	120	55	15-30	365	RS	SL	UL,CUL,FCC class B
G25T8-120V	80502	120	46	15-30	400	RS	SL	UL,CUL,FCC class B
G30T8-120V	80503	120	100	15-30	365	RS	SL	UL,CUL,FCC class B

* IS=Instant Start, RS= Rapid Start, DL= Dual Lamp, SL=Single Lamp

Germicidal Base and Pin Configurations

All quartz lamps are supplied with ceramic bases unless otherwise specified. Other base materials such as plastic and metal-ceramic combinations are available by request.

Custom designed germicidal lamp bases are available in a wide variety of pin locations, steps, unique contours, and lead-wire configurations.
Ceramic bases, are preferred for Germicidal and Ozone producing lamps due to their high quality appearance and resistance to heat, moisture and the intense UV and/or ozone produced by these lamp types. Lamps can also be custom configured with no bases, special wiring harnesses, or bases made from other materials, such as plastic or hybrid materials such as metal-ceramic.

New Options For Germicidal OEM's

Light Sources recognized the need to expand the design options of OEMs. Our sister company, Cerlux is a specialty manufacturer of custom ceramic components with the engineering and manufacturing expertise to design and fabricate proprietary end fittings and matching sockets. Now germicidal system designers can literally design their own lamp base or we can design it for you!
Many OEMs opt for nonstandard lamp designs in order to fulfill needs that are critical to a specific germicidal application, instead of building the equipment around a lamp chosen from a limited number of standard, off-the-shelf models. It is often preferable to design the lamp to fit the system. The mechanical, electrical and output characteristics of the lamp can vary widely with the requirements of each design. As a result, numerous lamp models with different combinations of shapes, sizes and performance characteristics continue to be custom manufactured for the new equipment market. Our patented MultiStep bases and matching sockets provide the following advantages:

- Your exclusive base configuration
- Proprietary design
- Higher relamp sales potential
- Matching socket
- Your choice of color
- Greater flexibility of design
- Engineering design assistance
- UV and Ozone resistant ceramic

Germicidal UV lamps are more effective against viruses than chlorine.

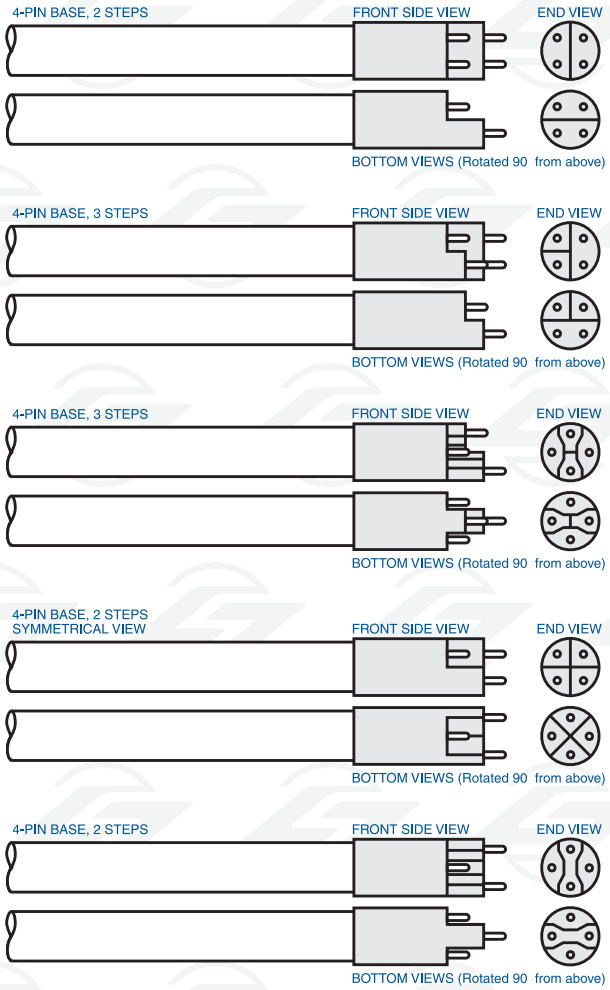
Proprietary Step Bases

These end fittings may be manufactured exclusively for an OEM on a prearranged basis if the design is not already reserved or available in the public domain. Two basic styles are available for individual design modification.

Examples of patented LSI MultiStep bases are shown at right. Made of ceramic and available in a variety of colors, this design permits variable height steps to be formed for each base-face that holds a pin. Because standard sockets are precluded, the spacing between pins can be varied according to your specification. Sockets are essentially female interfaces to the bases and have wirefast terminals for swift electrical connection.

MultiFacet is a second option that lends its style to multiple arrangements of heights of steps and pin spacing. Examples are shown at bottom. Sockets can be provided with wire-fast terminals.

If you are currently using a lamp with a standard base and change to a patented MultiStep or Multifacet base system, the relationship between arc length and base face or pin-to-pin length will change depending upon the individual design. It will also depend on whether the arc length is to be held constant.



TCLP Compliance

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 materials in liquid, solid and multiphasic waste. Lamps that pass the TCLP test are considered non-hazardous by EPA and are exempt from the Universal Waste Ruling (UWR FAQ P-5504). We are proud to be among the first to offer most of our germicidal lamps as TCLP compliant.

Mill sample lamp to <9,5 mm

↓

Agitate sample with pH5 buffered acetic-acid solution for 18 hours

↓

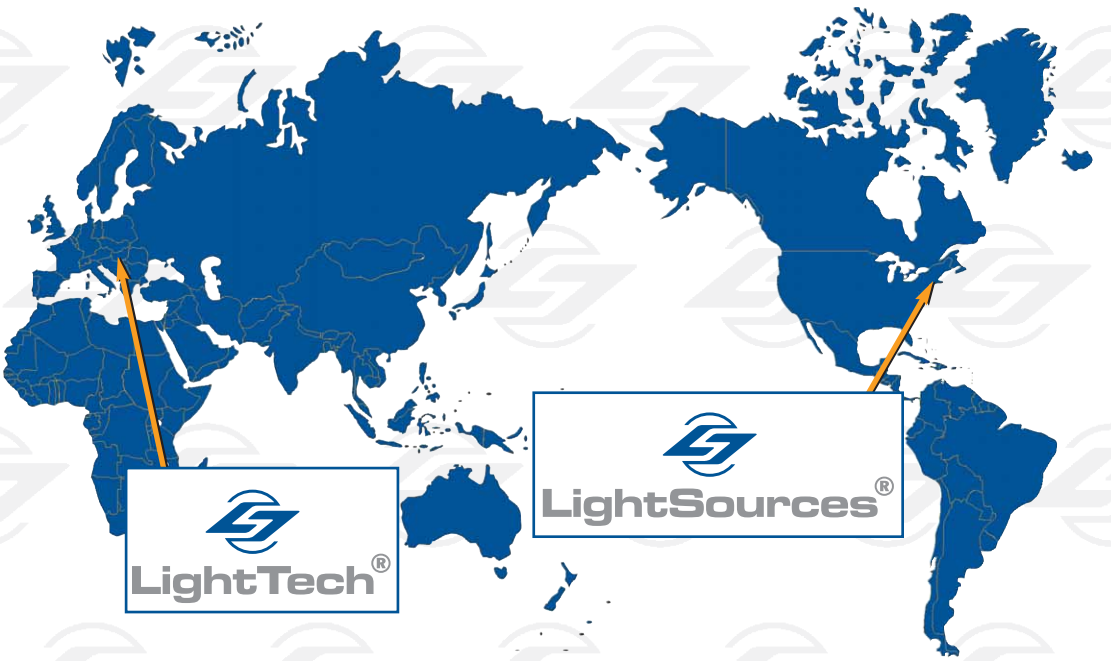
Filter and analyze leachate

↓

Dissolved mercury content in leachate to be <0.2 mg/L

LightSources & LightTech

World Wide Suppliers of Quality Germicidal Lamps



Light Sources, Inc was founded in 1983 and after more than 20 years of operation it is now the leading manufacturer of quartz germicidal lamps in the world. In 1993 LightTech Ltd. of Hungary was formed to serve the growing demand of germicidal lamps and sleeves to the European and Asian markets. The combined strengths of Light Sources and Lighttech in product design, application engineering, proprietary manufacturing processes and process controls enable us to provide the OEM with an integrated system approach from product concept through aftermarket sales retention. Our continued investment in state of the art manufacturing equipment, strategic vertical integration in glass manufacturing and ceramic base facilities, allows us to bring quality products to the market faster with reduced lead times. We design and manufacture lamps for a wide variety of special lighting applications in a number of industries. Our manufacturing capabilities of low pressure mercury vapor gas discharge lamps encompasses an extensive selection of colors, glass types, diameters, lengths, shapes and operating modes. Here are just a few of our areas of expertise; germicidal, photochemical, skin tanning, LCD backlighting and compact fluorescent lamps. Our companies are known in their respective markets for excellence in product design and performance. Our engineering capabilities permeate every aspect of product offerings. We consider the evolution of products from low volume to high volume production a fundamental process. Flexible manufacturing techniques allow us to respond cost effectively at any stage of the product life cycle. Our success in the markets we serve has stemmed from meeting our customers requirements for performance, quality and reliability. Our sales staff is ready to serve you in several languages.

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SERVE YOUR GERMICIDAL LAMP NEEDS WITH US!

We will do our utmost to satisfy your special application.

ISO 9001
Certified

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