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Modern technologies for professional light



High-tech light for precision tasks

Concentrating all the entrepreneurial activities, including marketing, development, production, inspection, logistics and sales, in the special professional sector of light and radiation has led to close contact with customers; this has had a positive effect on quality, service and technological competence. The technical refinements on our high-tech short-arc lamps metal halide lamps and halogen lamps are as varied as the applications for which they are used – applications that call for particularly high

levels of precision. In theatres and cinemas, for filming, for microchip fabrication, in medicine or in airport apron lighting, people rely on special lamps from the Display/Optic division each and every day.

The Display/Optic division is divided into four Business Units: Display Systems, Entertainment, Cinema and Semiconductor & Medical.



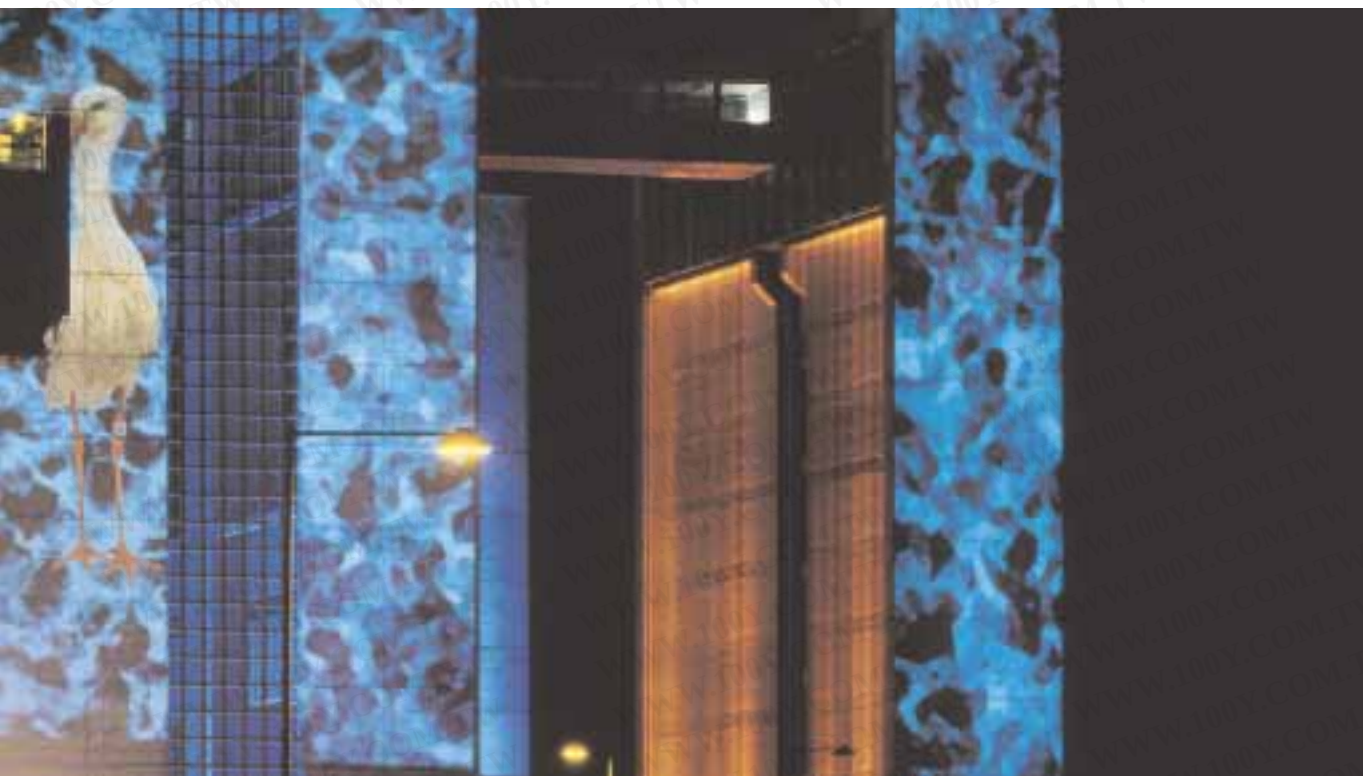
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General information

- The standard small tolerances apply to rated values and dimensions
- The lamps are guaranteed only if they are operated with approved control gear or with control gear declared to be suitable
- A list of sources of control gear and igniters is available on request. With the exception of the XBO® product family, all discharge lamps contain small quantities of materials which are harmful to the environment (such as mercury). In Europe, they therefore have to be disposed of under EEC Code 06 04 04*, Waste containing mercury, or 20 01 21*, Fluorescent tubes and other waste containing mercury. In other countries the relevant national regulations must be followed
- Specifications subject to change without notice, delivery subject to availability
- These special lamps should only be operated in casings that prevent exposure of the environment to UV light and the release of splinters



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For further information see the brochures for “Low-voltage tungsten-halogen lamps”, “XBO® cinema lamps” and “Metal halide lamps” and also the product list “HBO® lamps for microlithography”. These are available from OSRAM GmbH, Marketing Display/Optic, Nonnendammallee 44-61, D-13629 Berlin, Fax +49 (0)30 33862359.



Setting the pace in lighting engineering



Photo: Spectra (Sweden)



Photo: Spectra (Sweden)

Many events need impressive presentation in order to achieve their full effect. The brilliant large screens at pop concerts and professional multimedia presentations are excellent examples. For these pictures to impress the audience, OSRAM has developed extremely powerful and durable light sources.

In our **Display Systems** Business Unit we have combined all the lamps that are used for presenting images and data. These include innovative high-intensity discharge lamps developed specially for multimedia data and video projection and back-projection televisions, and high-tech lighting solutions for flat screens.

Competition in the entertainment sector is getting fiercer year by year. Success only comes to those who put on the best shows and reach the largest number of fans. Talent, creativity and energy have to be matched by perfect technical implementation. Lamps from OSRAM let stars appear in their best possible light right from the start.

Our **Entertainment** Business Unit supplies lamps and lighting systems for a wide range of applications in the entertainment industry. Our customers – producers, directors, stage designers, club owners, architects and so on – always know where they can find powerful and reliable light sources to turn their creative ideas into reality.





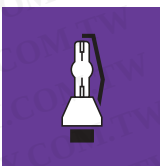
Photo: Intel

The cinema now performs a whole host of functions. It is a meeting place for people, young and old; it is a place where dreams and imagination come alive; it is where pictures and sound come together. And, lest we get carried away with the magic of the cinema, we should remember that it is an industry that turns over billions of dollars, pounds and euros each year. Yet all this would not be possible without a small but immensely important development – the artificial light source that enabled film to be projected onto a screen.

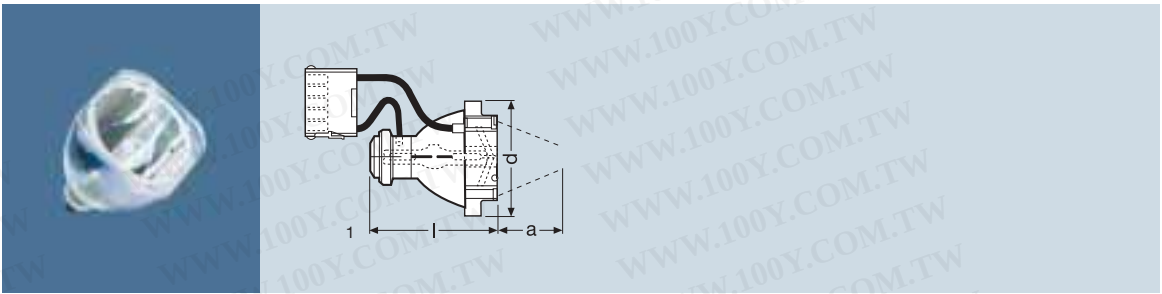
Our **Cinema** Business Unit offers customer in the cinema industry sophisticated and enormously powerful special lamps for film projection. Here, OSRAM is building on years of tradition. In close cooperation with the film industry and in a spirit of mutual trust we have continually improved these lamps in terms of their brightness, efficiency, durability and environmental impact. It all adds up to hours and hours of pleasure for film fanatics throughout the world.

However, innovations can only be achieved if the right tools are available. If the manufacture and testing of a product calls for extreme accuracy then optical processes are indispensable. Special lamps from OSRAM provide the perfect light for such processes.

Our **Semiconductors & Medical** Business Unit supplies lamps that illuminate small areas with high precision. This may involve ultra-violet (UV) radiation from HBO® lamps for microlithography or “artificial daylight” from XBO® lamps for endoscopy. To ensure the right results in each case, the lamps are matched to the relevant optical systems and applications to achieve optimum compatibility.



VIP®
Halogen discharge lamps



Product reference	Product number	W	V	A		lm	cd/cm²
VIP® halogen discharge lamps							
VIP R 273/45	4008321039989	270	38	7.1	Refl.	17000	100000
Product reference							No.
VIP R 273/45	5400	1.9	1000	73	67	45	1

VIP® lamps are halogen discharge lamps that meet the particular requirements of multimedia data and video projection thanks to their extremely short arcs and long life.

Their main characteristics and advantages are as follows:

- Short arc
- Very high luminance
- Long life
- High luminous efficacy
- Tailor-made colour spectrum
- Optimised reflector configuration
- ECG operation

VIP® lamps from OSRAM are used in light valve projectors (video projectors) based on LCD or DLP™ technology. Their spectral distribution has been adapted to the colour filter curves of the projectors and their service life optimised for maximum luminance and luminous efficacy. These benefits make them ideal light sources for professional projection applications, light guide systems and effect lighting.

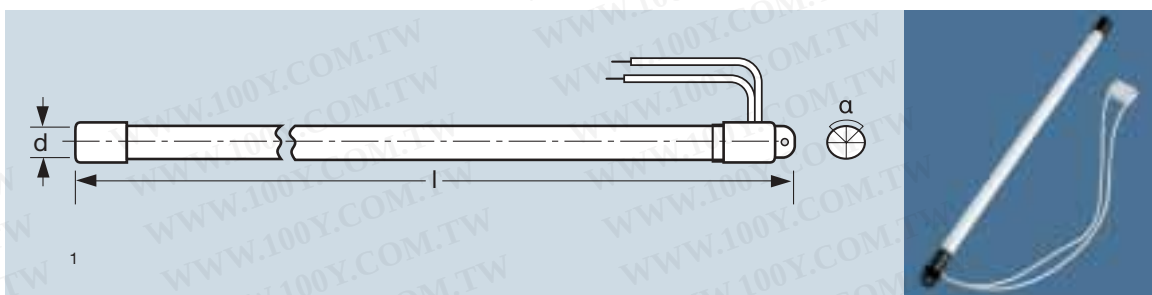
Standard VIP® lamps, on the other hand, are based on more conventional filling systems. With their longer arcs they offer a high degree of freedom for spectral matching. Information on special versions for OEMs is available on request.

Special versions for OEMs are supplied on request as P-generation OSRAM VIP® lamps. These P-VIP® lamps are high-pressure mercury lamps. Thanks to their specific filling parameters and very short electrode gaps, they achieve very high luminance values and very small spreads. Typical lamp parameters are luminance of over 200 kCd/cm² at 120 W and electrode gaps of 1.0 mm.

P-VIP® lamps are available with parabolic or elliptical reflectors with optimised contours for front and back projection based on LCD, LCOS or DLP™ light valve technology.



Aperture lamp in tubular form, 10 mm tube diameter LINEX® linear excimer lamp, mercury-free



Product reference	Product number	W		R _a	Lx 8 mm	TUBE d (mm)	l [mm]	°	No.	
LINEX® for ECG operation only										
A2-10W35	4008321039989	35	Daylight	1 B	50000	10	510	80	1	40
A3-10W40	4050300652603	35	Daylight	1 B	70000	10	392	80	1	50
A4-10W24	4050300652566	24	Daylight	1 B	60000	10	277	80	1	50

How LINEX® works:

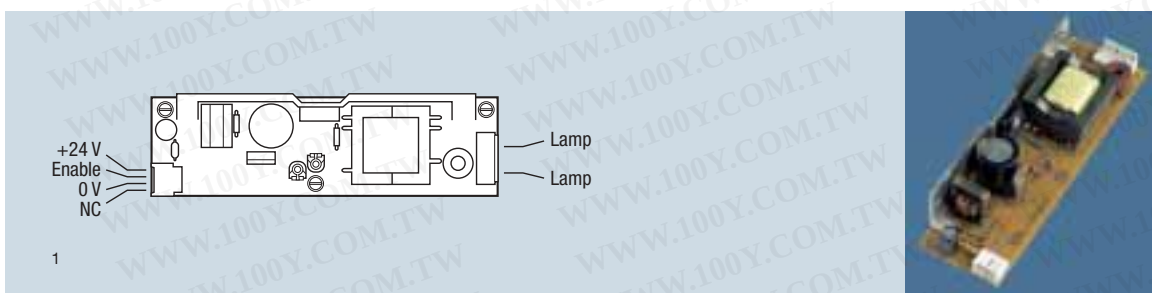
Xenon particles are excited by electrically restricted discharge and emit UV radiation. This radiation is efficiently converted into visible light by a special phosphor.

Product features:

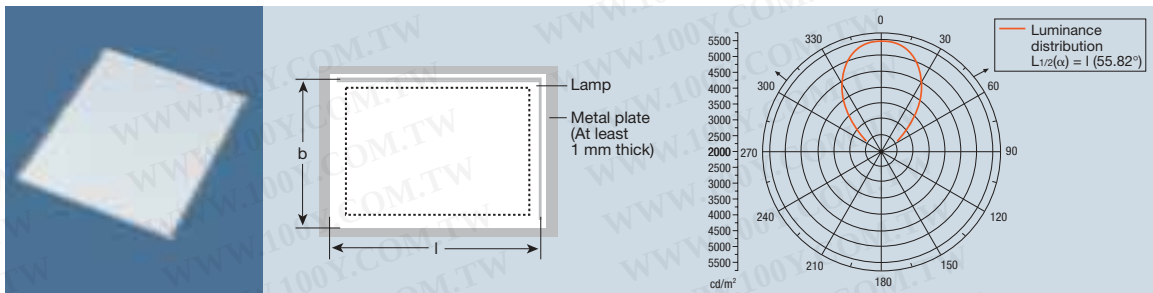
- Long life
- Instant light, flicker-free
- Excellent colour rendering (R_a = approx. 90)
- Luminous flux unaffected by temperature (-25 °C to +60 °C)
- Operating frequency > 100 kHz

Applications:

- Scanners, copiers, industrial image analysis, additional lighting



Product reference	Product number		V min.-max.	kHz ECG	A	W SYSTEM
QUICKTRONIC® for OSRAM LINEX®						
QT LINEX 1x40/24	4050300666662	40	21.6...26.4	> 100	1.7	40
QT LINEX 1x24/24	4050300666709	24	21.6...26.4	> 100	1.0	24
Product reference		l [mm]	b [mm]	h [mm]	g	No.
QT LINEX 1x40/24		135	40	28	130	1
QT LINEX 1x24/24		135	40	28	130	1



Product reference	Product number						
OSRAM PLANON®							
PLANON 10.4"/880 6	4050300 784304	24	86	8000	5200	24 V DC	20 % PWM ¹⁾
PLANON 15.0"/880 6	4050300 784366	40	86	8000	4400	24 V DC	20 % PWM ¹⁾
PLANON 18.1"/880 8	4050300 789187	80	86	8000	5100	24 V DC	20 % PWM ¹⁾
PLANON 21.3"/880 8	4050300 803906	65	86	8000	4000	24 V DC	20 % PWM ¹⁾
PLANON 21.3"/840 9	4008321 040046	75	86	4000	4800	24 V DC	20 % PWM ¹⁾

Product reference					ECG reference
PLANON 10.4"/880 6	231	174	8.5	5	QT PLANON 10.4"/20/24 6
PLANON 15.0"/880 6	324	258	8.5	5	QT PLANON 15.0"/40/24 6
PLANON 18.1"/880 8	384	317	8.5	5	QT PLANON 18.1"/80/24 8
PLANON 21.3"/880 8	441	359	8.5	5	QT PLANON 21.3"/80/24 8
PLANON 21.3"/840 9	441	359	8.5	5	QT PLANON 21.3"/75/24 9

OSRAM PLANON®:

A completely new dimension

- Two-dimensional, mercury-free discharge lamp
- Lamp size (diagonal) from 10.4 to 21.3 inches
- Ultra low profile ≤ 10 mm
- Luminances from 3000 to 10,000 cd/m²
- Homogeneous brightness distribution over the entire surface
- Dimmable in the ratio of 1:5 (20% of rated output)
- Extremely long life of up to 100,000 h (MTTH = Mean Time to Half Brightness)
- Lamp life unaffected by switching cycle
- Lamp and control gear (ECG) available as a system

Mercury-free technology:

- Luminous flux unaffected by temperature in the range from -30 °C to +85 °C
- Instant light (no warm-up time)
- Environmentally friendly product (waste disposal)

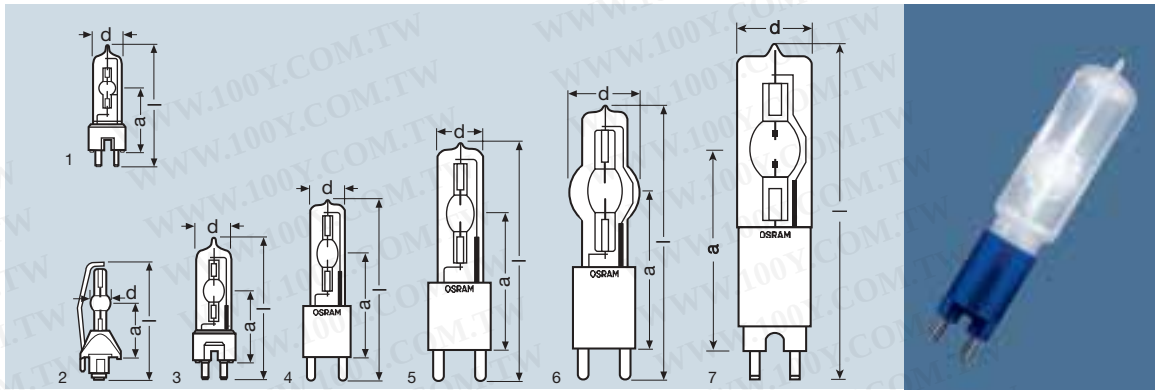
Applications:

- Lighting for indoors and outdoors
- LCD backlighting
- Industrial image processing
- Architecture lighting and image information systems
- Lighting for film and photography





HMI® Metal halide lamps



Product reference	Product number	W	V	A		Im	
HMI® metal halide lamps, single-ended, 6000 K							
HMI 200 W/SE	4050300 307961	200	70	3.0 	GZY9.5	16000	80
HMI 250 W/SE	4050300 239064	270	50	5.4 	FaX1.5	16200	84
HMI 400 W/SE	4050300 388441	400	70	6.9 ~	GZZ9.5	33000	110
HMI 575 W/SEL	4050300 422275	575	95	7.0 ~	G22	49000	145
HMI 1200 W/SEL XS	4008321 062109	1200	100	13.8 ~	G38	110000	200
HMI 2500 W/SE XS	4050300 284293	2500	115	25.6 ~	G38	240000	225
HMI 4000 W/SE XS	4050300 309743	4000	200	24.0 ~	G38	380000	250
HMI 6000 W/SE XS	4050300 564067	6000	123	55.0 ~	GX38	600000	360
HMI 12000 W/SE XS	4050300 650418	12000	160	84 ~	GX38	1150000	450
HMI 12000 W/SE/GX51 XS	4008321 098962	12000	160	84 ~	GX51	1150000	455
HMI 18000 W/SE/GX51 XS	4008321 098955	18000	225	88 ~	GX51	1600000	260
Product reference							
HMI 200 W/SE	20	39	5	200	universal	1	
HMI 250 W/SE	12	35	5	250	p 45	2	
HMI 400 W/SE	23	60	6	650	universal	3	
HMI 575 W/SEL	30	70	7	1000	universal	4	
HMI 1200 W/SE	42	107	10	1000	universal	5	
HMI 2500 W/SE XS	60	127	14	500	universal	6	
HMI 4000 W/SE XS	75	142	23.5	500	universal	6	
HMI 6000 W/SE XS	75	210	23	500	s 135	7	
HMI 12000 W/SE XS	100	255	28	300	s 135	7	
HMI 12000 W/SE/GX51 XS	100	260	27	300	s 135	7	
HMI 18000 W/SE/GX51 XS	100	260	44	300	s 135	7	

 = Square-wave ac current
~ = Sine wave ac current

 W = Watts
SE = Single ended
XS = eXtreme Seal (max. permissible foil temperature 450 °C)

HMI® lamps are ac-operated discharge lamps in which the arc burns in a dense vapour atmosphere comprising mercury and the halides of rare earths.

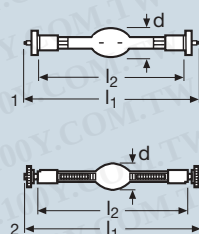
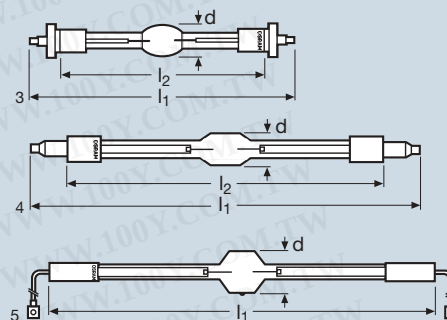
Their main characteristics and advantages are as follows:

- Very high luminous efficacy of up to 100 lm/W
- Daylight colour temperature of approx. 6000 K
- High colour rendering index ($R_a > 90$)
- Hot restart capability
- Dimmable

Applications:

- Film and television recording under daylight conditions in the studio or outdoors
- Reporting (low-wattage lamps)
- Film and TV production (high-wattage lamps)
- Stage (lighting for dramatic effect)
- Professional photography
- Entertainment

HMI® Metal halide lamps



Product reference	Product number	W	V	A		Im	l1 max. [mm]
HMI® metal halide lamps, double-ended, 6000 K							
HMI 575 W/GS XS	4050300575148	575	95	7.0 ~	SFc10	49000	136
HMI 1200 W/S XS ¹⁾	4050300480800	1200	100	13.8 ~	SFc10-4	110000	136
HMI 1200 W/GS	4050300239774	1200	100	13.8 ~	SFc15.5	110000	220
HMI 2500 W/GS	4050300302775	2500	115	25.6 ~	SFa21	240000	355
HMI 2500 W/S XS ¹⁾	4050300025780	2500	115	25.6 ~	SFa21	240000	210
HMI 4000 W XS	4050300216553	4000	200	24.0 ~	SFa21	380000	405
HMI 6000 W XS	4050300304137	6000	123	55.0 ~	S25.5	570000	450
HMI 12000 W/XS	4050300857763	12000	160	84.0 ~	S30	1150000	470
HMI 18000 W/XS	4050300296432	18000	225	88.0 ~	S30	1700000	500

Product reference	d [mm]	l2 max. [mm]		t [h]		No.
HMI 575 W/GS XS	21	115	7	1000	universal	1
HMI 1200 W/S XS ¹⁾	21	115	7	750	universal	2
HMI 1200 W/GS	27	180	10	1000	universal	3
HMI 2500 W/GS	31.5	290	14	500	p 30	4
HMI 2500 W/S XS ¹⁾	31.5	150	14	500	p 30	4
HMI 4000 W XS	36	340	34	500	p 15	4
HMI 6000 W XS	54		21	500	p 15	5
HMI 12000 W/XS	64		25	500	p 15	5
HMI 18000 W/XS	70		44	300	p 15	5

Supplied in single packs		W = Wattss
~ = Sine wave ac current		S = Short
GS = Gap Shortened		XS = eXtreme Seal (max. permissible foil temperature 450 °C)

Safety:

Because HMI® lamps emit UV radiation and operate at overpressure the following lamps must only be operated in appropriate fully enclosed luminaires. This also applies to the versions with outer bulbs. Suitable filters should be used to ensure that the UV radiation is reduced to an acceptable level.

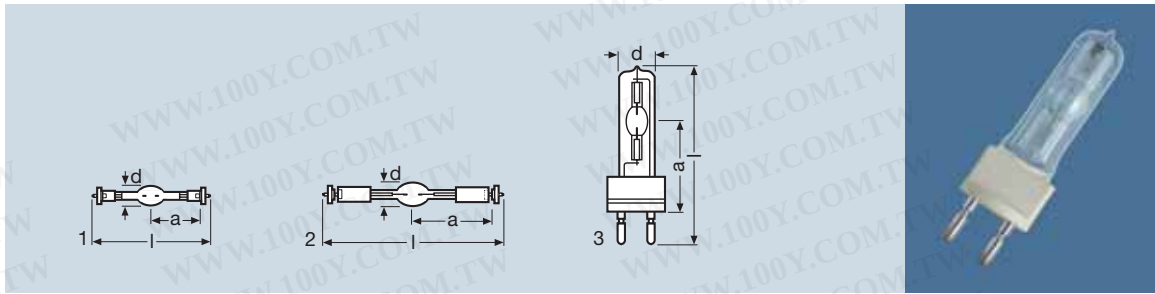
Literature:

Further information can be found in the following brochures, obtainable on request from OSRAM:

- "Technology and applications/Metal halide lamps"
- "Guidelines for control gear and igniters for metal halide lamps"
- "Availability of control gear and igniters"
- "Rome. 8 pm. Overcast. No problem. HMI lamps"
- "High Noon" HMI 12 and 18 kW/SE/GX51.



HMP® Metal halide lamps



Product reference	Product number	W	V	A		lm	K
HMP® metal halide lamps							
HMP 400 DE	4050300 396170	400 ²⁾	100	4.8 ~	SFc10-4	33000	6000
HMP 575 DE	4050300 407845	575 ³⁾	100	6.7 ~	SFc10-4	49000	6000
HMP 575 SE	4050300 401393	575 ³⁾	100	6.8 ~	G22	49000	6000
Product reference							
HMP 400 DE	93	16	35	5.5	750	p 45°	1
HMP 575 DE	136	21.5	57.5	7	1000	universal	2
HMP 575 SE	145	30	70	7	1000	universal	3
~ = Sine wave ac current DE = Double ended SE = Single ended							

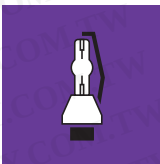
Thanks to their special filling and their electrode system, HMP® metal halide lamps can not only be dimmed, they can be “boosted”; in other words, they can be operated above their rated output. Whether the lamps are being dimmed or boosted, photometric characteristics such as colour temperature, colour rendering index and luminous efficacy remain virtually constant.

Major features:

- “Super Dim’n’Boost”
- Hot restart
- Long life at rated output
- Spectrum optimised for projection (daylight spectrum)

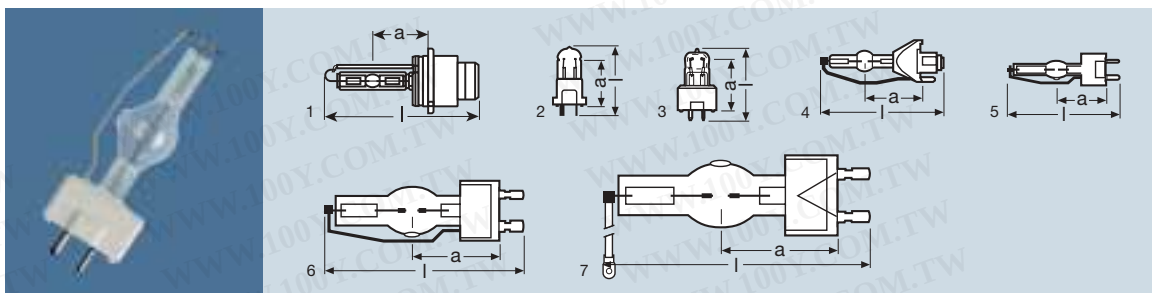
Applications:

- Overhead projection
- Video projection
- Multimedia projection



1) Exhaust point at the top
2) Permitted from 300 to 600 W
3) Permitted from 400 to 700 W

HTI® Metal halide lamps



Product reference	Product number	W	V	A		lm	cd/cm²
HTI® single-ended							
HTI S 35/12	4050300503578	35	85	2.5	P32d-2	3200	—
HTI 150 W	4050300301402	150	90	1.8 ~	GY9.5	10000	5000
HTI 152 W	4050300461519	150	95	1.8 ~	GY9.5	10000	4200
HTI 250 W/SE ¹⁾	4050300243795	270	45	6	FaX1.5	16000	40000
HTI 400 W/SE	4050300248035	400	55	7.3	FaX1.5	28000	30000
HTI 403 W/SE	4050300398327	400	55	7.3	FaX1.5	28000	30000
HTI 404 W/SE	4050300426020	400	55	7.3	FaX1.5	28000	40000
HTI 405 W/SE XS	4050300436074	400	55	7.3	GY9.5	28000	40000
HTI 600 W/SE	4050300308890	600	95	7.7 ~	FaX1.5	48000	25000
HTI 700 W/SE/75 XS	4008321061096	700	70	10	FaX1.5	59000	30000
HTI 705 W/SE XS	4050300618074	700	70	10	GY9.5	59000	30000
HTI 705 W/SE/75 XS	4008321061119	700	70	10	GY9.5	59000	30000
HTI 1200 W/SE XS	4050300371153	1200	100	13.8 ~	GY22 ³⁾	105000	26000
HTI 1800 W/SE XS ²⁾	4050300558127	1800	100	20 ~	GY22 ³⁾	160000	35000
HTI 2500 W/SE XS ³⁾	4050300371146	2500	115	25.6 ~	G22 ⁴⁾ +Cable	240000	30000

Product reference	K		t [h]	I max. [mm]	a [mm]		No.
HTI S 35/12	4300	4.2	3000 ⁵⁾	79.5	27.1	p 10	1
HTI 150 W	6900	5	750	46	30	universal	2
HTI 152 W	5000	6.75	2000	48	30	universal	3
HTI 250 W/SE	4900	2.5	250	80	35	p 45 ¹⁾	2
HTI 400 W/SE	4800	4	250	84	35	p 45 ¹⁾	4
HTI 403 W/SE	4800	4	750	84	35	p 45 ¹⁾	4
HTI 404 W/SE	5800	3	500	84	35	p 45 ¹⁾	4
HTI 405 W/SE XS	5800	3	500	80	36.5	p 45 ¹⁾	5
HTI 600 W/SE	5300	5.5	300	84	35	p 45 ¹⁾	4
HTI 700 W/SE/75 XS	7500	4	500	85	39	universal	4
HTI 705 W/SE XS	5500	4	500	85	39	p 45 ¹⁾	5
HTI 705 W/SE/75 XS	7500	4	500	85	39	universal	5
HTI 1200 W/SE XS	5400	7	750	135	59	s 135 ¹⁾	6
HTI 1800 W/SE XS ²⁾	5600	7	750	135	59	s 135 ¹⁾	6
HTI 2500 W/SE XS ³⁾	6000	14	600	180	85	s 135	7

~ = Sine wave ac current
SE = Single ended

= Square-wave ac current
XS = eXtreme Seal (max. permissible foil temperature 450 °C)

HTI® are metal halide lamps similar to HMI® lamps but use short-arc technology.

Their main characteristics and advantages are as follows:

- Short arc
- Daylight character
- Compact dimensions
- High luminance
- High luminous efficacy

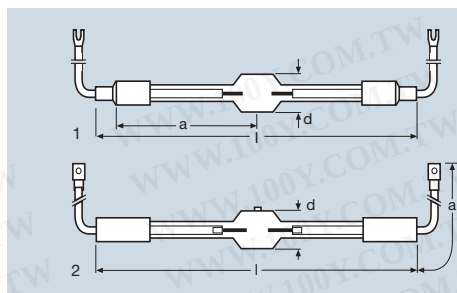
10.10

- 1) Current strap underneath
- 2) Supplied on request
- 3) Special GY22 base. The ignition voltage may be applied only to the thin pin

- 4) Important: The contact pins of the base are short-circuited; the electrode furthest from the base is connected via cable
- 5) Depending on the switching cycle, reflector and control gear
- 6) Discontinued



HTI® Metal halide lamps



Product reference	Product number	W	V	A		lm	cd/cm²	K
HTI® double-ended								
HTI 2500 W/DEL	4050300 596709	2500	115	26 ~	Special	270000	30000	6000
HTI 4000 W/DE	4050300 519845	4000	115	40 ~	S25.5	360000	35000	6300
Product reference			t [h]					 No.
HTI 2500 W/DEL		25	2000	295	31.5	108	p 45	1
HTI 4000 W/DE		15	500	270	40	140	p 30	2
<div>D = Double-ended</div> <div>DE = Double ended</div> <div>DEL = Longlife version of DE</div> <div> DX = Version of DE (eXtended robustness)</div> <div>~ = Sine wave ac current</div> <div>XS = eXtreme Seal (max. permissible foil temperature 450 °C)</div>								

Safety:

Because HTI® lamps emit UV radiation and operate at overpressure the following lamps must only be operated in appropriate fully enclosed luminaires. Suitable filters should be used to ensure that the UV radiation is reduced to an acceptable level.

Literature:

Further information can be found in the following brochures, obtainable on request from OSRAM:

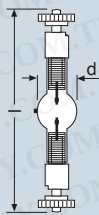
- "Technology and applications/Metal halide lamps"
- "Guidelines for control gear and igniters for metal halide lamps"
- "Availability of control gear and igniters"



Photo: Mondiale Publishing, "Live!" disco, Bratislava



Baby SharXS® HTI® Metal halide lamps



**Product
reference**

**Product
number**

W

**kV
START**

V

A



Im

Baby SharXS® HTI®

Baby SharXS HTI 250W/D5/80	4008321129161	250	2/25	95	3.2	SF _c 10-4	18000
Baby SharXS HTI 300W/D5/57	4008321129185	300	4.5/25	80	4.3	SF _c 10-4	20000
Baby SharXS HTI 300W/D5/65	4008321129208	300	4.5/25	80	4.3	SF _c 10-4	22000
Baby SharXS HTI 400W/D5/60	4008321129321	400	4.5/25	95	4.2	SF _c 10-4	33000
Baby SharXS HTI 575W/D5/56	4008321129345	575	4.5/25	95	7	SF _c 10-4	43000
Baby SharXS HTI 575W/D5/75	4008321129369	575	4.5/35	95	7	SF _c 10-4	43000

**Product
reference**

K

R_a

t [h]

**l max.
[mm]**

**Ø
d [mm]**

**a
[mm]**



Baby SharXS HTI 250W/D5/80	8000	> 80	3000	93	16	35	5	univ.
Baby SharXS HTI 300W/D5/57	5700	> 85	3000	93	16	35	5	univ.
Baby SharXS HTI 300W/D5/65	6500	> 85	750	93	16	35	5	univ.
Baby SharXS HTI 400W/D5/60	6000	> 85	750	93	16	35	5	univ.
Baby SharXS HTI 575W/D5/56	5600	> 85	500	93	16	35	5	univ.
Baby SharXS HTI 575W/D5/75	7500	> 85	750	93	16	35	5	univ.



XS = eXtreme Seal (max. permissible foil temperature 450 °C)

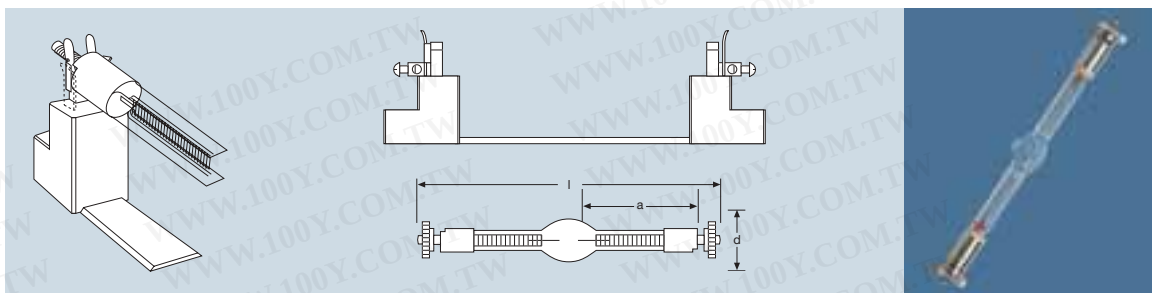
Baby SharXS® HTI® – the benefits at a glance:

- Standard wattages from 250 to 575 W
- One design, same lamp length, same LCL
- Pre-alignment base with slot
- Short-arc technology (5 mm)
- High average luminance (30 to 50 kcd/cm²)
- Daylight colour temperature (6000 K) and “bright light” character (7500, 8000 K)
- High colour rendering index (R_a > 80 to > 85)
- Greater thermal load capacity thanks to XS technology (450 °C max. pinch temperature)
- Hot restart possible
- Average life 500 h – 3000 h (depending on type)
- AC current





SharXS® HTI® Metal halide lamps



Product reference	Product number	W	kV START	V	A		lm	cd/cm²
SharXS® HTI®								
SharXS HTI 200 W/D3/70	4050300854311	200	3/25	60/-	3.3	SFc10-4	13000	30000
SharXS HTI 400 W/D3/75 ¹⁾	4050300854502	400	3/25	49/-	8.5	SFc10-4	26000	55000
SharXS HTI 575 W/D4/60	4008321123046	575	3/25	69/-	8.3	SFc10-4	49000	49000
SharXS HTI 575 W/D4/75	4050300854298	575	3/25	64/-	9.0	SFc10-4	44000	49000
SharXS HTI 700 W/D4/75 ¹⁾	4050300861876	700	3/25	70/73	10.0/11.0	SFc10-4	59000	60000
SharXS HTI 700 W/D4/60	4050300854465	700	3/25	70/73	10.0/11.0	SFc10-4	59000	60000
SharXS HTI 1200 W/D7/60 ¹⁾	4050300854595	1200	5/35	95/100	12.7/13.8	SFc10-4	110000	41000
SharXS HTI 1200 W/D7/75	4008321033833	1200	5/35	95/100	12.7/13.8	SFc10-4	110000	41000

Product reference	K	R _a	t[h]	I max. [mm]	Ø [mm]	a [mm]		
SharXS HTI 200 W/D3/70	7000	> 85	3000	136	15	57.5	3	univ.
SharXS HTI 400 W/D3/75 ¹⁾	7500	> 80	1000	136	18	57.5	3	univ.
SharXS HTI 575 W/D4/60	6000	> 85	750	136	18	57.5	4	univ.
SharXS HTI 575 W/D4/75	7500	> 80	750	136	18	57.5	4	univ.
SharXS HTI 700 W/D4/75 ¹⁾	7500	> 80	750	136	21	57.5	4	univ.
SharXS HTI 700 W/D4/60	6000	> 80	750	136	18	57.5	4	univ.
SharXS HTI 1200 W/D7/60 ¹⁾	6000	> 90	750	136	21	57.5	7	univ.
SharXS HTI 1200 W/D7/75	7500	> 80	750	136	21	57.5	7	univ.



XS = eXtreme Seal (max. permissible foil temperature 450 °C)

SharXS® HTI® – the benefits at a glance:

- Standard wattages from 200 to 1200 W
- One design, same lamp length, same LCL
- Pre-alignment base SFc10-4 with slot
- Short-arc technology (3 to 7 mm)
- High average luminance (30 to 60 kcd/cm²)
- Daylight colour temperature (6000 K) and “bright light” character (7000, 7500 K)
- High colour rendering index (R_a > 80 to > 90)
- Greater thermal load capacity thanks to XS technology (450 °C max. pinch temperature)
- Hot restart possible
- Average life 750 h – 3000 h (depending on type)
- AC current

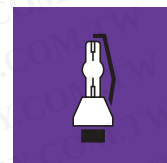
Literature:

- “Das echte Licht mit Biss/The original light with a bite”: SharXS® HTI® from OSRAM
- “Das echte Licht mit Biss/The original light with a bite”: SharXS® HTI® CD-ROM

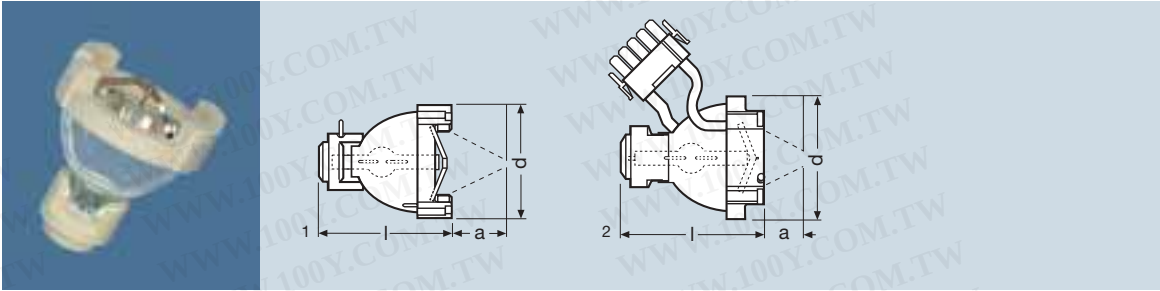
1) Also available as a DEM package with 30 units without knurled nuts



info@sharxs.com
www.sharxs.com



HTI®
Metal halide lamps



Product reference	Product number	W	V	A	K	$l_{max.}$ [mm]	d [mm]	a	t [h]		No.
HTI® with dichroic reflector (hot restartable)											
HTI 250 W/32 ¹⁾	4050300226576	270	45	6	⌋	5600	73	67	32	250	p 20 1
HTI 250 W/22 ¹⁾	4050300367804	270	45	6	⌋	5600	73	67	22	250	p 20 1
HTI 400 W/24	4050300228327	400	55	7.3	⌋	5600	73	67	24	250	p 20 2
HTI 403 W/24	4050300386331	400	55	7.3	⌋	5600	73	67	24	750	p 20 2
HTI 404 W/24 ²⁾	4050300446400	400	55	7.3	⌋	5600	73	67	24	500	p 20 2

⌋ = Square-wave ac current

HTI® reflector lamps have dichroic focusing reflectors and are highly efficient lighting systems.

They are used in endoscopy, boroscopy and light guide systems in the entertainment sector.

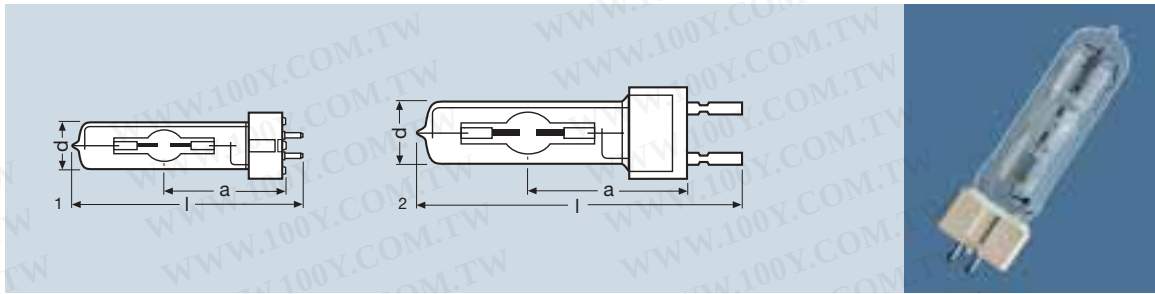


1) Also with connecting cable and plug contact
Product reference HTI® 250 W/32 C or HTI® 250 W/22 C
(Fig. 2)

2) Special adjustment for particularly uniform illumination in the far field at approx. 250 mm



HSR® Metal halide lamps

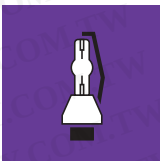


Product reference	Product number							
HSR® with outer bulb (not hot restartable)								
HSR 400/60	40503003 15942	400	67	6.9 ~	GX9.5	33000	20000	6000
HSR 575/60	40503005 09686	575	95	7 ~	GX9.5	49000	10000	6000
HSR 575/72	40503006 51187	575	95	7 ~	GX9.5	49000	10000	7200
HSR 700/60	40503003 15959	700	72	11 ~	G22	58000	10000	6000
HSR 1200/60	40503005 26836	1200	100	13.8 ~	G22/28x50	110000	20000	6000

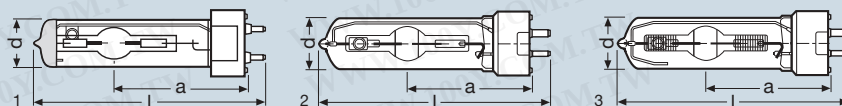
Product reference							
HSR 400/60	5	1000	110	23	62	universal	1
HSR 575/60	7	1000	125	30	65	universal	1
HSR 575/72	7	1000	125	30	65	universal	1
HSR 700/60	8	1000	155	30	75	universal	2
HSR 1200/60	10	1000	175	40	85	universal	2

~ = Sine wave ac current

HSR® lamps are single-ended lamps similar to HTI® lamps with have an outer bulb for ease of handling.
No hot restart.



4ArXS HSD™ Metal halide lamps



Product reference	Product number	W	V	A		Im	K
4ArXS HSD™ longlife lamps with outer bulbs (not hot restartable)							
4ArXS HSD 150W/70 ¹⁾	4050300665009	150	97	1.8 ~	G12	12000	7000
4ArXS HSD 150W/UL/75 ¹⁾	4008321083548	150	97	1.8 ~	G12	11000	7000
4ArXS HSD 200W/60	4050300424682	200	70	3.3 ~	GY9.5	13000	6000
4ArXS HSD 250W/60	4050300501925	250	90	3.1 ~	GY9.5	17000	6000
4ArXS HSD 250W/80	4050300808635	250	95	3.2 ~	GY9.5	17000	8000
4ArXS HSD 250W/UL/75	4008321083586	250	90	3.1 ~	GY9.5	15000	7500
4ArXS HSD 575W/60	4050300897684	575	88	7.4 ~	GX9.5	45000	6000
4ArXS HSD 575W/72	4050300593937	575	86	7.6 ~	GX9.5	45000	7200
4ArXS HSD 575W/UL/75	4008321083609	575	86	7.6 ~	GX9.5	43000	7500
4ArXS HSD 1200W/60 ²⁾	4008321083562	1200	100	13.8 ~	G22	110000	6000

Product reference		t [h]					No.
4ArXS HSD 150W/70 ¹⁾	5	3000	105	20	56	universal	1
4ArXS HSD 150W/UL/75 ¹⁾	5	6000	105	20	56	universal	1
4ArXS HSD 200W/60	5	2000	108	23	55	universal	2
4ArXS HSD 250W/60	5	2000	108	23	55	universal	2
4ArXS HSD 250W/80	5	3000	108	23	55	universal	2
4ArXS HSD 250W/UL/75	5	6000	108	23	55	universal	2
4ArXS HSD 575W/60	7	3000	135	30	65	universal	2
4ArXS HSD 575W/72	7	3000	135	30	65	universal	3
4ArXS HSD 575W/UL/75	7	6000	135	30	65	universal	3
4ArXS HSD 1200W/60 ²⁾	12.5	3000	175	40	85	universal	—

~ = Sine wave ac current



4ArXS HSD™ lamps are long-life short-arc lamps intended primarily for applications in entertainment and archtainment.

Safety:

Because 4ArXS HSD™ lamps emit UV radiation and operate at overpressure the following lamps must only be operated in appropriate fully enclosed luminaires. Suitable filters should be used to ensure that the UV radiation is reduced to an acceptable level.

Literature:

Further information can be found in the following brochures, obtainable on request from OSRAM:

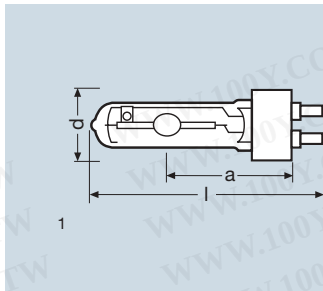
- “Technology and applications/Metal halide lamps”

- “Guidelines for control gear and igniters for metal halide lamps”
- “Availability of control gear and igniters”
- “4ArXS has it all” – Innovative metal halide lamps for creative architecture and effect lighting.
- CD-ROM 4ArXS HSD™ and HCD®





4ArXS HCD® Ceramic metal halide lamps



Product reference	Product number	W	V	A		lm	K
4ArXS HCD® longlife ceramic lamps with outer bulbs (not hot restartable)							
4ArXS HCD® 35W/30	4008321126054	35	90	0.53 ~	G12	3400	3000
4ArXS HCD® 35W/42	4008321126078	35	90	0.53 ~	G12	3200	4200
4ArXS HCD® 70W/30	4008321126092	70	100	0.98 ~	G12	6700	3000
4ArXS HCD® 70W/42	4008321126115	70	90	1.0 ~	G12	6500	4200
4ArXS HCD® 150W/30	4008321126139	150	99	1.8 ~	G12	14500	3000
4ArXS HCD® 150W/42	4008321126153	150	92	1.8 ~	G12	14200	4200

Product reference	t [h]	max. [mm]	d [mm]	a [mm]		No.
4ArXS HCD® 35W/30	8000	100	19	56	universal	1
4ArXS HCD® 35W/42	8000	100	19	56	universal	1
4ArXS HCD® 70W/30	8000	100	19	56	universal	1
4ArXS HCD® 70W/42	8000	100	19	56	universal	1
4ArXS HCD® 150W/30	8000	105	25	56	universal	1
4ArXS HCD® 150W/42	8000	105	25	56	universal	1

~ = Sine wave ac current

4ArXS HCD® lamps with ceramic technology are characterised by exceptionally long life. They are intended primarily for applications in entertainment and archtainment.

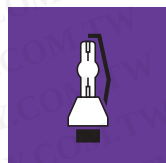
Safety:

Because they operate at overpressure 4ArXS HCD® lamps must only be used in appropriate fully enclosed casings. A UV filter in the outer bulb ensures that UV radiation is reduced to an acceptable level.

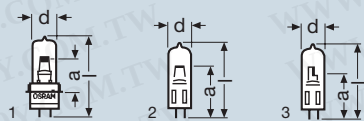
Literature:

Further information can be found in the following brochures, obtainable on request from OSRAM:

- "Technology and applications/Metal halide lamps"
- "Guidelines for control gear and igniters for metal halide lamps"
- "Availability of control gear and igniters"
- "An excellent all-rounder" – archtainment lighting for indoors and outdoors: 4ArXS HCD® Ceramic with round arc tube and XS technology.
- CD-ROM 4ArXS HSD™ and HCD®



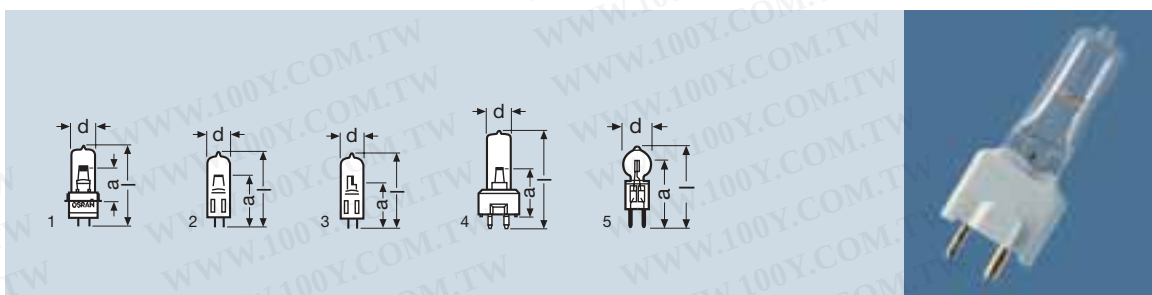
Low-voltage halogen lamps without reflectors



Product reference	Product number	ANSI	LIF	V	W		t [h]	lm
Low-voltage halogen lamps without reflectors								
64222	4050300327273			6	10	PG22	300	150
64223	4050300017372		M/43	6	10	G4	300	150
64225	4050300006758	ESA	M/29	6	10	G4	100	200
64250 HLX	4050300012407	ESB	M/30	6	20	G4	100	480
64251 HLX	4050300582290			6	20	PG22	100	500
64265 HLX	4008321107053			6	30	G4	100	765
64275	4050300258690		M/137	6	35	G4	50	780
64258	4050300285153			12	20	G4	2000	350
64258 A	4008321050892			12	20	G4	2000	350
64260	4050300099798		M/185	12	30	PG22	50	800
64261	4050300220529		M/130	12	30	G6.35	50	750
64602	4008321107077		M/134	12	50	G6.35	1100	1000
64609 HLX	4050300246253			12	50	PG22	50	1550
64610 HLX	4050300006697	BRL	A1/220	12	50	G6.35	50	1600
64611 HLX	4008321107091			12	50	G6.35	100	1350
62138 HLX	4050300242958			12	100	G6.35	50	2800
64621 HLX	4050300535531			12	100	PG22	2000	2750
64623 HLX	4050300012018	EVA	M/28	12	100	GY6.35	2000	2800
64625 HLX	4050300006703	FCR	A1/215	12	100	GY6.35	50	3600
Product reference								
64222	universal	9	44	14	1.3x0.8	30	1	
64223	universal	9	38	24	1.5x0.7	40	2	
64225	s 90	9.5	31	19.5	1.7x0.65	40	2	
64250 HLX	universal	9	31	19.5	2.3x0.8	40	2	
64251 HLX	universal	9	40	14	2.3x0.8	30	1	
64265 HLX	universal	9	31	19.5	1.5x1.5	40	2	
64275	universal	9	40	26	1.2x1.5	40	3	
64258	s 90	9	max. 30	19.5	3.5x0.8 ¹⁾	40	2	
64258 A	s 90	9	max. 33	19.5	3.5x0.8	40	2	
64260	universal	9	40	14	2.6x1.3	30	1	
64261	universal	11.5	44	30	2.6x1.3	40	2	
64602	s 90	11.5	44	30	3.0x3.0	40	2	
64609 HLX	s 90	11.5	48	18	3.3x1.6	30	1	
64610 HLX	s 90	11.5	44	30	3.3x1.6	40	2	
64611 HLX	s 90	11.5	44	30	3.3x1.6	40	2	
62138 HLX	p 90/15	11.5	37	27	2.4x1.8	40	3	
64621 HLX	s 90	11.5	48	18	4.7x2.7	30	1	
64623 HLX	s 90	11.5	44	30	4.7x2.7	40	2	
64625 HLX	s 90	11.5	44	30	4.2x2.3	40	2	

Some lamp models are available as "XENOPHOT[®]" versions (HLX[®] types). With xenon instead of krypton as the filler gas, these lamps produce a luminous flux up to 10 per cent higher than lamps with identical electrical data.

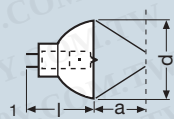
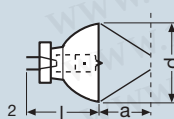
Low-voltage halogen lamps without reflectors



Product reference	Product number	ANSI	LIF	V	W		t _[h]	lm
Low-voltage halogen lamps without reflectors								
64626 HLX	4050300006765	EHE	A1/45	12	100	PG22	50	3600
64628	4008321099549	FDT	A1/261	12	100	GY9.5	50	3000
64633 HLX	4050300006710	BRJ	A1/234	15	150	G6.35	50	5600
64650	4008321107138			22.8	50	G6.35	1300	1000
64291 XIR	4050300888859			22.8	40	G6.35	800	1200
64668 XIR	4050300785042			22.8	80	G6.35	750	3000
64292 XIR	4008321023117			22.8	150	G6.35	600	6000
64638 HLX	4050300283050			24	100	G6.35	300	2900
64640 HLX	4050300006727	FCS	A1/216	24	150	G6.35	50	6000
64647	4008321107114			24	120	G6.35	300	3600
64641 HLX	4050300048260			24	150	G6.35	2000	2700
64642 HLX	4050300012025	FDV	M1/84	24	150	G6.35	300	5000
64643	4008321099648	FDS	A1/262	24	150	GY9.5	100	5000
64654 HLX	4008321099723			24	250	GY9.5	300	9000
64655 HLX	4050300006734	EHJ	A1/223	24	250	G6.35	50	10000
64656 HLX	4050300023120	FNT		24	275	G6.35	75	10000
64657 HLX	4050300012001	EVC	M/33	24	250	G6.35	300	9000
64663 HLX	4050300006741	EVD	A1/239	36	400	G6.35	50	16000
64664 HLX	4008321099747			36	400	G6.35	150	14500
64665 HLX	4008321099761			36	400	G6.35	300	12200
64669 HLX	4050300521688	GCD		50	590	GY9.5	50	21500
Product reference		 d [mm]	 l [mm]	 a [mm]	 b [mm] h [mm]		 No.	
64626 HLX	s 90	11.5	48	18	4.2x2.3	30	1	
64628	s 90	13	57	27	4.2x2.3	12	4	
64633 HLX	s 90	11.5	44	30	4.8x3	40	2	
64650	universal	13	44	30	2.0x5.0	40	3	
64291 XIR	h 90	12	44	30	3.9x1.4	40	5	
64668 XIR	h 90	14	44	30	2.2x5.5	40	5	
64292 XIR	h 90	14	44	30	2.8x6.7	40	5	
64638 HLX	universal	13	50	30	5.3x2.6	40	2	
64640 HLX	s 90	11.5	50	32	5.8x2.9	40	2	
64647	universal	13	44	30	2.3x6.4	40	3	
64641 HLX	s 135	11.5	50	32	3.0x6.0	40	2	
64642 HLX	s 90	11.5	50	32	6x3.2	40	2	
64643	s 90	15	57	33.5	6x3	12	4	
64654 HLX	s 90	13.5	68	35	8x4	12	4	
64655 HLX	s 90	12.5	55	33	7x3.5	40	2	
64656 HLX	s 90	13.5	55	33	7x3.5	40	2	
64657 HLX	s 90	13.5	55	33	8x4	40	2	
64663 HLX	s 90	15	60	36	9.3x4.9	40	2	
64664 HLX	s 105	18	57	36	10x5 ¹⁾	12	2	
64665 HLX	s 90	18	60	36	10.5x5.3	12	2	
64669 HLX	s 90	19	70	41.3	12.8x7.0	24	4	

1) Round-core double coil

Halogen lamps with reflectors



Product reference	Product number	V	W		t [h]
With reflector MR 11 – diameter 35 mm					
64255	405030006833	8	20	GZX4	50
64605 ¹⁾	4050300252421	8	50	GZ4	25
64613 ²⁾	4050300241012	12	75	G5.3-4.8	25
64614	4050300234380	12	75	G5.3-4.8	25
64617	4050300231211	12	75	G5.3-4.8	25
64617 S ³⁾	4050300461106	12	75	G5.3-4.8	25
64624	4050300013916	12	100	G5.3-4.8	25

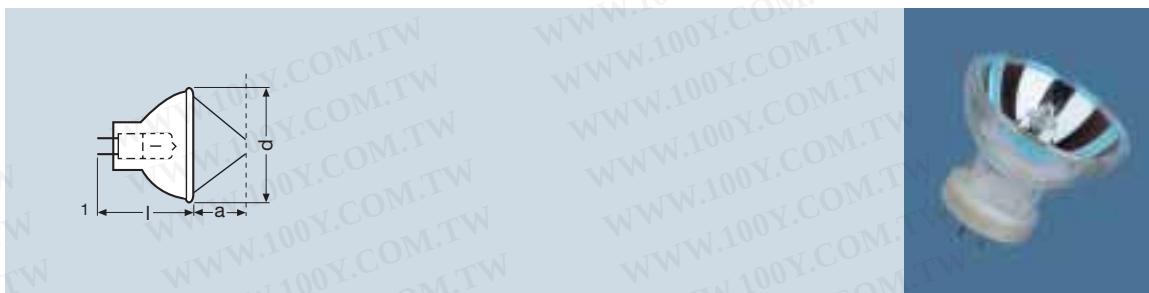
Product reference		 d [mm]	 l max. [mm]	 a [mm]			 No.
64255	p 90/15	35	32	26	White	10	2
64605 ¹⁾	p 90/15	35	32	26	White	10	2
64613 ²⁾	p 90/15	35	35.5	26	Blue	20	1
64614	p 90/15	35	35.5	26	UV	10	1
64617	p 90/15	35	35.5	26	White	10	1
64617 S ³⁾	p 90/15	35	35.5	26	White	10	1
64624	p 90/15	35	35.5	26	White	10	1

Product reference	Product number	ANSI	LIF	V	W		t [h]
With reflector MR 13 – diameter 42 mm							
93510	4050300350110	EXY		82	250	GX5.3	200
93515	4050300350158	EXR		82	300	GX5.3	35
93520	4050300350196	FHS		82	300	GX5.3	70

Product reference		 d [mm]	 l max. [mm]	 a [mm]			 No.
93510	s 90	42	45	152.5	White	24	1
93515	s 90	42	45	152.5	White	24	1
93520	s 90	42	45	152.5	White	24	1



Halogen lamps with reflectors



Product reference	Product number	ANSI	LIF	V	W		t [h]
With reflector MR 16 – diameter 50 mm							
64607	4050300006789	EFM	A1/229	8	50	GZ6.35	50
93609	40503000659541	ENL		12	50	GX5.3	3000
64615 HLX	4050300006796	EFN	A1/230	12	75	GZ6.35	50
64627 HLX	4050300006802	EPF	A1/231	12	100	GZ6.35	50
64629	4050300943169			12	100	GZ6.35	600
64637	4050300291970		A1/271	12	100	GZ6.35	1500
64608	4050300014142	EPZ		13.8	50	GX5.3	1000
64618	4050300017402	DED		13.8	85	GX5.3	1000
64619	4050300017273	EPX		14.5	90	GX5.3	500
64634 HLX	4050300006819	EFR	A1/232	15	150	GZ6.35	50
64635 HLX ¹⁾	4050300238807			15	150	GZ6.35	50
64620	4050300797397	EFR-5		15	150	GZ6.35	500

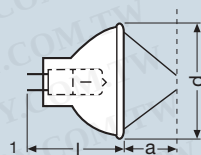
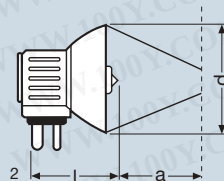
Product reference							
64607	p 90/15	51	42	32	Alu	20	1
93609	universal	51	44.5	44.5	White	24	1
64615 HLX	p 90/15	51	42	32	White	20	1
64627 HLX	p 90/15	51	42	32	White	20	1
64629	p 90/15	51	42	32	White	20	1
64637	s 120	51	42	32	White	20	1
64608	p 90/15	50	44.5	108	White	50	1
64618	p 90/15	51	44.5	165	White	20	1
64619	p 90/15	51	45	155	White	50	1
64634 HLX	p 90/15	51	42	32	White	20	1
64635 HLX ¹⁾	p 90	51	45	19	Gold	20	1
64620	p 90/15	50	42	32	White	20	1



1) Infra-red lamp; temperature at the focal point approx. 1300 °C



Halogen lamps with reflectors



Product reference	Product number	ANSI	LIF	V	W		t [h]
With reflector MR 16 – diameter 50 mm							
93637	4050300350097	EJV		21	150	GX5.3	100
93638	4050300456843	EKE		21	150	GX5.3	200
64653 HLX	405030006826	ELC	A1/259	24	250	GX5.3	50
93653	4050300636450	ELC-3		24	250	GX5.3	300
93505	4050300350172	EVW		82	250	GY5.3	50
93525	4050300349992	ENX		82	360	GY5.3	75
93526	4050300412917	FXL		82	410	GY5.3	75
93506	4050300349930	ENH		120	250	GY5.3	175
93518	4050300350059	ELH		120	300	GY5.3	35
Product reference		d [mm]	l max. [mm]	a [mm]			No.
93637	s 90	51	44.5	44.5	White	24	1
93638	s 90	51	44.5	44.5	White	24	1
64653 HLX	p 90/15	51	44.5	35	White	20	1
93653	p 90/15	51	44.5	35	White	24	1
93505	s 90	51	45	298.5	White	24	1
93525	s 90	51	45	298.5	White	24	1
93526	s 90	51	45	298.5	White	24	1
93506	s 90	51	45	152.5	White	24	1
93518	s 90	51	45	152.5	White	24	1



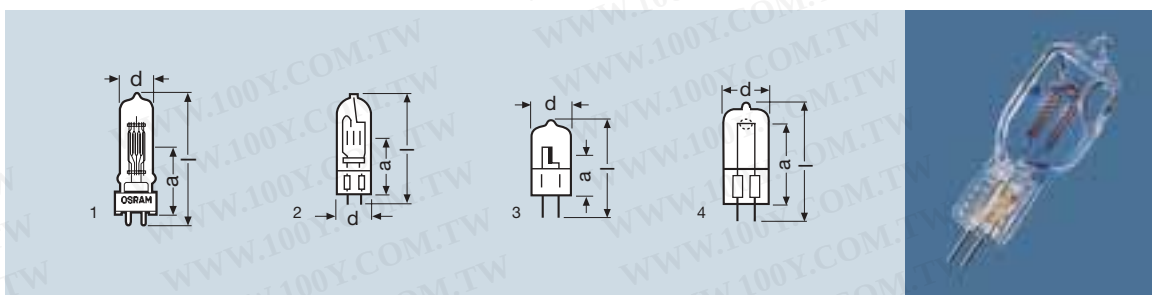
Product reference	Product number	ANSI	LIF	V	W		t [h]
With reflector MR 18 – diameter 58 mm							
93631	4050300350011	DNF		21	150	GX7.9	25
Product reference		d [mm]	l max. [mm]	a [mm]			No.
93631	p 15	57	51	69	White	24	2

Literature:

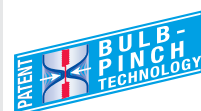
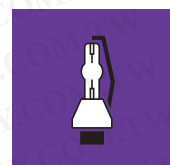
For further technical information and notes for manufacturers of control gear and lamp casings, please refer to the following OSRAM brochure:

- “Technology and applications, Low-voltage tungsten-halogen lamps”

Halogen lamps, medium/high voltage, single-ended



Product reference	Product number	ANSI	LIF	W	V		t [h]	K
Halogen mains voltage lamps, single-ended								
64501	4050300279237			150	120	GX6.35	25	3400
64502	4050300289977			150	230	GX6.35	25	3400
64505 ²⁾	4008321098436			200	230	GX6.35	25	3200
64505 ²⁾	4008321098610			200	240	GX6.35	25	3200
64648	4008321097910	BSJ		200	230	GX6.35	25	3400
64512 ²⁾	4008321098634	FNS		300	120	GX6.35	15	3350
64513 ²⁾	4008321098658			300	120	GX6.35	150	3200
64514 ²⁾	4008321098672		CP/96	300	120	GX6.35	75	3200
64515 ²⁾	4008321098696			300	230	GX6.35	15	3300
64515 ²⁾	4008321098719			300	240	GX6.35	15	3300
64516 ²⁾	4008321098733		CP/97	300	230	GX6.35	75	3100
64516 ²⁾	4008321098757		CP/97	300	240	GX6.35	75	3100
64661	4008321098474		A1/249	300	230	G6.35	50	3000
64662	4008321097873		M/38	300	230	GY9.5	2000	2900
64662	4008321097897		M/38	300	240	GY9.5	2000	2900
Product reference	lm		d [mm]	l max. [mm]	a [mm]			
64501	4500	universal	12	max. 55	30	11x2.2	25	3
64502	4000	universal	12	55	30	13x1.9	25	3
64505 ²⁾	5100	s 90	max. 18.5	max. 53	27	9.6x12.5	12	4
64505 ²⁾	5150	s 90	max. 18.5	max. 53	27	9.5x12.5	12	4
64648	4500	s 90	20	69.5	40	6x6	12	2
64512 ²⁾	9300	s 90	max. 18.5	max. 53	27	10x12.5	12	4
64513 ²⁾	7700	s 90	max. 18.5	max. 53	27	11x12.5	12	4
64514 ²⁾	8100	s 90	max. 18.5	max. 53	27	10.3x12.5	12	4
64515 ²⁾	9600	s 90	max. 18.5	max. 53	27	9.8x12.5	12	4
64515 ²⁾	8900	s 90	max. 18.5	max. 53	27	10x12.5	12	4
64516 ²⁾	7400	s 90	max. 18.5	max. 53	27	9.8x12.5	12	4
64516 ²⁾	7300	s 90	max. 18.5	max. 53	27	9.7x12.5	12	4
64661	7500	s 90	20	63.5	40	11x8"	12	2
64662	5000	universal	15	80	46.5	9x11"	12	1
64662	5000	universal	15	80	46.5	9x11	12	1



From their designs, halogen mains voltage lamps can be categorised as single-ended and double-ended lamps. Depending on the application, they are designed to operate on 230 V, 240 V or 120 V.

The colour temperature of the lamps varies according to the application: 3400 K for maximum luminous efficacy, 3200 K for professional film and

TV work, 3000 K or 2900 K for applications where long life is important.

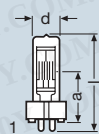
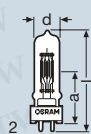
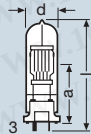
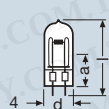
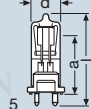
Literature:

For further information on pinch technology, please refer to the following brochure:

- "A whole lotta shakin' goin' on!" New halogen lamps with quartz pinch technology. (122 W 100 DE)

1) With monoplane filament
2) With quartz pinch technology

Halogen lamps, medium/high voltage, single-ended

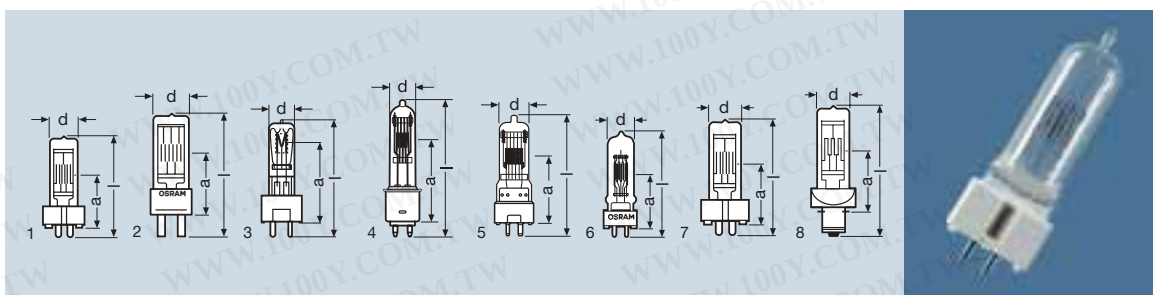


Product reference	Product number	ANSI	LIF	W	V		t[h]
Single-ended							
93592	4050300481531		FSX	400	230	GY9.5	75
93591	4050300481555		FSY	400	240	GY9.5	75
64672	4008321098559		M/40	500	230	GY9.5	2000
64672	4008321098535		M/40	500	240	GY9.5	2000
64680	4008321098573		A1/244	500	230	GY9.5	50
64680	4008321098597		A1/244	500	240	GY9.5	50
64535	4008321098771			650	120	GY9.5	15
64540	4008321098795	BVM	P1/13	650	230	GY9.5	15
64540	4008321098818	BVM	P1/13	650	240	GY9.5	15
64686	4008321098498	DYR	A1/233	650	230	GY9.5	50
64686	4008321098511	DYR	A1/233	650	240	GY9.5	50
64573	4008321098832			1000	120	GY9.5	15
64575	4008321098856	EGY	P1/15	1000	230	GY9.5	15
64575	4008321098450	EGY	P1/15	1000	240	GY9.5	15

Product reference	K	lm		d [mm]					 No.
93592	3200	¹⁾	s 90	20	77	36.5	10.7x12.2	24	1
93591	3200	¹⁾	s 90	20	77	36.5	10.7x12.2	24	1
64672	2900	8500	universal	22	85	46.5	12x11	12	2
64672	2900	8500	universal	22	85	46.5	12x11	12	2
64680	3200	14500	universal	22	75	36.5	10x10 ²⁾	12	3
64680	3200	14500	universal	22	75	36.5	10x10 ²⁾	12	3
64535	3400	20000	universal	24	57.5	30	14x15	12	4
64540	3400	20000	universal	24	57.5	30	14x15	12	4
64540	3400	20000	universal	24	57.5	30	14x15	12	4
64686	3200	16500	universal	21	64	36.5	10x10 ²⁾	12	5
64686	3200	16500	universal	21	64	36.5	10x10 ²⁾	12	5
64573	3400	33000	universal	24	67.5	38	14x14	12	4
64575	3400	33000	universal	24	67.5	38	14x14	12	4
64575	3400	33000	universal	24	67.5	38	14x14	12	4



Mains voltage halogen lamps

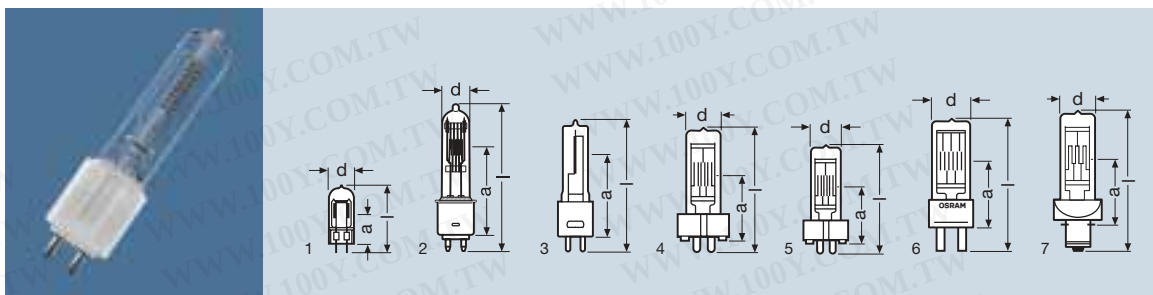


Product reference	Product number			ANSI	LIF	W	V		
Single-ended									
64673	4008321099785				CP/81	300	230	GY9.5	200
64673	4008321099808				CP/81	300	240	GY9.5	200
64670	4050300283449				T/25	500	230	GY9.5	300
64670	4050300635859				T/25	500	240	GY9.5	300
64674	4008321099822				CP/82	500	230	GY9.5	200
64674	4008321099846				CP/82	500	240	GY9.5	200
64716	4050300506494	GKV				600	230	GY9.5	250
64716	4050300506517	GKV				600	240	GY9.5	250
64717	4050300296692	FRK			CP/89	650	230	GY9.5	150
64717	4050300304953	FRK			CP/89	650	240	GY9.5	150
64718	4050300022543	GCT			T/27	650	230	GY9.5	400
64718	4050300283463	GCT			T/27	650	240	GY9.5	400
64719 ¹⁾	4050300019154				T/12	650	230	GY9.5	750
64720	4050300017716				CP/23	650	230	GY9.5	100
64721	4050300217970		FKH		CP/39	650	230	G22	100
64722 ¹⁾	4050300225906		FKB		T/13	650	230	P28s	750

Product reference									
64673	3200	7500	universal	18	90	46.5	6.5x13	12	3
64673	3200	7500	universal	18	90	46.5	6.5x13	12	3
64670	3000	11000	s 90	26	90	46.5	11x11	25	6
64670	3000	11000	s 90	26	90	46.5	11x11	25	6
64674	3200	13500	universal	18	90	46.5	8x18	12	3
64674	3200	13500	universal	18	90	46.5	8x18	12	3
64716	3200	14000	universal	18	101	60.5	11x8	25	4
64716	3200	14000	universal	18	101	60.5	11x8	25	4
64717	3200	16250	s 90	26	90	46.5	11x11	25	5
64717	3200	16250	s 90	26	90	46.5	11x11	25	5
64718	3000	14500	s 90	26	90	46.5	11x11	25	6
64718	3000	14500	s 90	26	90	46.5	11x11	25	6
64719 ¹⁾	3000	12000	s 90	35	110	55	13x17	20	7
64720	3200	16800	s 90	35	110	55	13x17 ²⁾	20	1
64721	3200	16800	s 90	35	140	63.5	13x17 ²⁾	20	2
64722 ¹⁾	3000	13000	s 90	26	130	55.6	13x17	20	8

1) 240 V on request
2) With monoplane filament

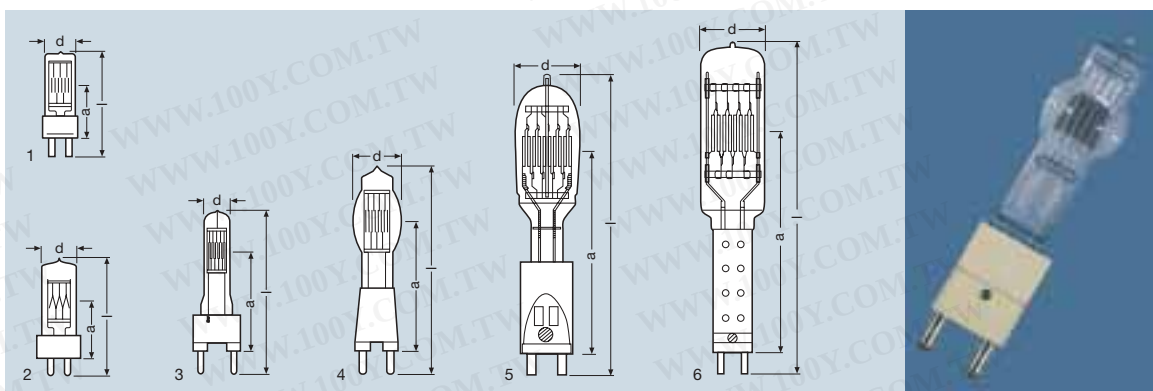
Mains voltage halogen lamps



Product reference	Product number	ANSI	LIF	W	V		t [h]
Single-ended							
64678	4050300609102			800	230	G9.5	250
64576	4008321099860		P2/17	1000	230	GX6.35	75
64743	4050300227610	FEL		1000	230	GX9.5	300
64744	4050300017723	FWP	T/19	1000	230	GX9.5	750
64744	4050300283333	FWP	T/19	1000	240	GX9.5	750
64745	4050300213262	FVA	CP/70	1000	230	GX9.5	200
64745	4050300283234	FVA	CP/70	1000	240	GX9.5	200
64746	4050300226620	FKD	T/20	1000	230	P28s	750
64747	4050300217604	FKJ	CP/71	1000	230	G22	200
64747	4050300283999	FKJ	CP/71	1000	240	G22	200
93734	4050300350073	FEP	CP/77	1000	240	G9.5	300
64752	4050300296616	FWS	T/29	1200	230	GX9.5	400
64752	4050300305011	FWS	T/29	1200	240	GX9.5	400
64754	4050300296746		CP/90	1200	230	GX9.5	200
64756 ¹⁾	4050300296722		CP/93	1200	230	G22	200

Product reference	K	lm		d [mm]					
64678	3200	20000	universal	19	105	60.5	13x9	25	2
64576	3200	27500	universal	24	67.5	38	14x14	12	1
64743	3200	27500	universal	20	101	60.5	7x18	20	3
64744	3000	20500	s 90	35	110	55	13x15	20	4
64744	3000	20500	s 90	35	110	55	13x15	20	4
64745	3200	26000	s 90	35	110	55	13x15	20	5
64745	3200	26000	s 90	35	110	55	13x15	20	5
64746	3000	20500	s 90	35	130	55.6	13x15	20	7
64747	3200	26000	s 90	35	140	63.5	13x15	20	6
64747	3200	26000	s 90	35	140	63.5	13x15	20	6
93734	3200	32000	universal	20	102	60.3	5.7x27	12	3
64752	3000	28600	s 90	35	125	67	14x16	20	4
64752	3000	28600	s 90	35	125	67	14x16	20	4
64754	3200	30000	s 90	35	125	67	14x16	20	5
64756 ¹⁾	3200	30000	s 90	35	140	63.5	14x16	20	6

Halogen studio lamps

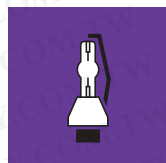


Product reference	Product number	ANSI	LIF	W	V		t _h
Single ended, 230 and 240 V 3000 K							
64777	4050300367682		CP/92	2000	230	G22	400
64787	4050300246154		CP/75	2000	230	G22	400
64788	4050300213286		CP/72	2000	230	GY16	400
64788	4050300283258		CP/72	2000	240	GY16	400
64789	4050300219103	FKK	CP/73	2000	230	G38	400
64789	4050300283371	FKK	CP/73	2000	240	G38	400
64796	4050300406428		CP/91	2500	230	G22	400
64805	4050300212609		CP/85	5000	230	G38	400
64805	4050300283401		CP/85	5000	240	G38	400
64815	4050300780696	ECR	CP/83	10000	230	G38	400
64818	4050300782713	BCM	CP/99	20000	230	G38	350

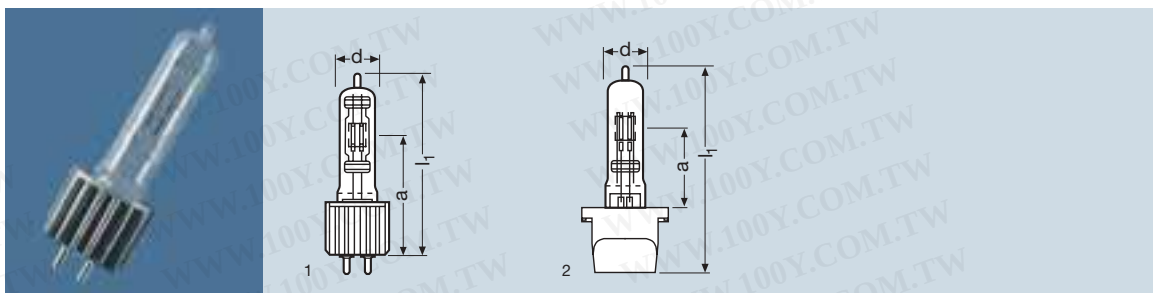
Product reference	K	lm		d [mm]	l max. [mm]	a [mm]			No.
64777	3200	52000	s 90	40	175	90	20x19	20	1
64787	3200	52000	s 90	40	160	75	20x19	20	1
64788	3200	52000	s 90	40	145	70	20x19	20	2
64788	3200	52000	s 90	40	145	70	20x19	20	2
64789	3200	52000	s 90	35	210	127	20x19	1	3
64789	3200	52000	s 90	35	210	127	20x19	1	3
64796	3200	65000	s 90	40	175	90	20x19	20	1
64805	3200	135000	s 45	61	265	165	26x33	1	4
64805	3200	135000	s 45	61	265	165	26x33	1	4
64815	3200	280000	s 45	70	380	254	52x41	1	5
64818	3200	580000	s 45	100	550	354	65x68	1	6

Literature:

A summary of studio lamps can be found on the halogen studio lamps poster.



Halogen lamps with special bases



Product reference	Product number	ANSI	W	V		t _h	lm
Halogen high-performance lamps HPL®, QXL®							
93728 HPL ¹⁾	4050300461816	HPL 575	575	230	2-pin	400	14900
93728 LL HPL ¹⁾	4008321090102	HPL 575 LL	575	230	2-pin	1500	11780
93729 HPL ¹⁾	4050300654201	HPL 750	750	230	2-pin	300	19750
93729 LL HPL ¹⁾	4008321090324	HPL 750 LL	750	230	2-pin	1500	15600
93721 QXL	4008321090195	QXL	750	77	Bayonet ²⁾	300	22950
93721 LL QXL	4008321090218	QXL LL	750	77	Bayonet ²⁾	1500	18000

Product reference	K		d [mm]	l ₁ max. [mm]	a [mm]			No.
93728 HPL ¹⁾	3200	universal	19	98	60.3	4-C8	12	1
93728 LL HPL ¹⁾	3050	universal	19	98	60.3	4-C8	12	1
93729 HPL ¹⁾	3200	universal	19	98	60.3	4-C8	12	1
93729 LL HPL ¹⁾	3050	universal	19	98	60.3	4-C8	12	1
93721 QXL	3250	universal	18.5	104	38	6.5x12	12	2
93721 LL QXL	3050	universal	18.5	104	38	6.5x12	12	2

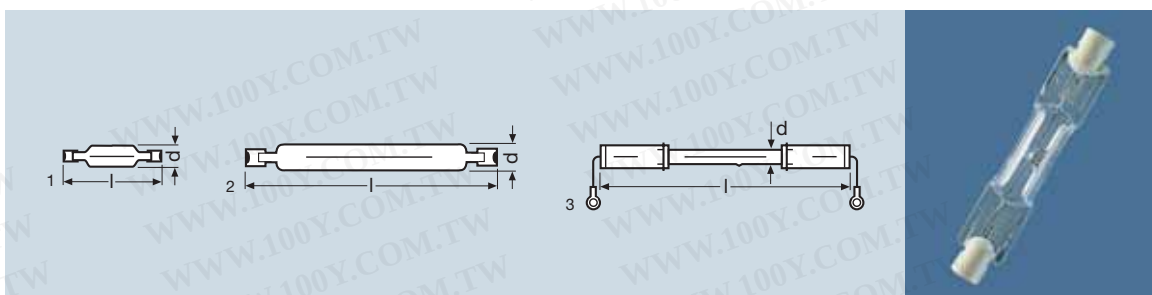
XS = eXtreme Seal (max. permissible foil temperature 450 °C)

High-performance HPL halogen lamps are manufactured under licence from ENTERTEC Inc., L.A. The special arrangement of the filament segments is matched to the "Source Four" spotlight family of E.T.C. This arrangement makes optimum use of the generated light and achieves the same useful luminous flux for which 1000 W lamps had previously been required.

The QXL® halogen lamp with the special bayonet base can be changed without tools and without opening the spotlight. This special base, equipped with XS technology, permits a base temperature of 500 °C. This patented lamp for entertainment and architecture applications has been developed in cooperation with Electronic Theatre Controls (ETC).



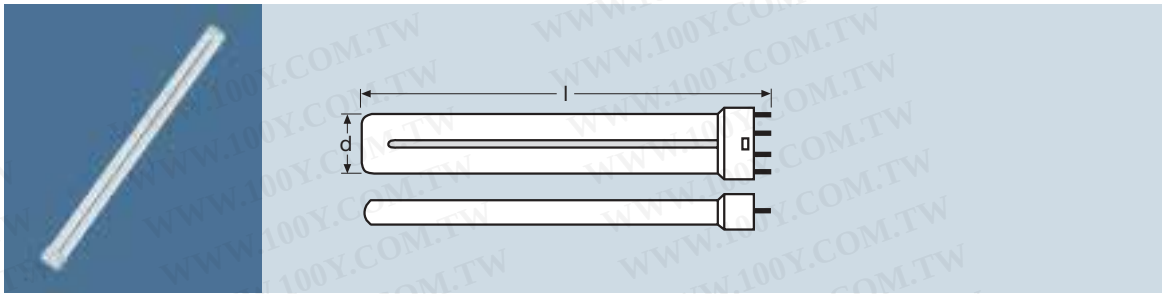
Halogen lamps, double-ended



Product reference	Product number	ANSI	LIF	W	V		t[h]
Double ended							
64553	4050300014173			650	230	R7s	75
64570	4050300014098			800	230	R7s	15
64571	4050300014180	DXX	P2/13	800	230	R7s	75
64571	4050300283388	DXX	P2/13	800	240	R7s	75
64579	4050300014104	FDG		1000	120	R7s	15
64580	4050300006888		P1/12	1000	230	R7s	15
64580	4050300283173		P1/12	1000	240	R7s	15
64583	4050300249094			1000	230	R7s	200
64583	4050300411477			1000	240	R7s	200
64741	4050300209333	EKM	P2/7	1000	230	R7s	200
64741	4050300283197	EKM	P2/7	1000	240	R7s	200
64751	4050300214641		P2/12	1250	230	R7s	200
64751	4050300283357		P2/12	1250	240	R7s	200
64781	4050300229997	FEX	P2/27	2000	230	RX7s	300
64781	4050300283500	FEX	P2/27	2000	240	RX7s	300
64800	4050300210254		P2/36	5000	230	K24s	1000

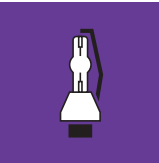
Product reference	K	lm						No.
64553	3200	17000	horizontal ¹⁾	17	74.9	20	25	1
64570	3400	22000	horizontal	15	74.9	25	25	1
64571	3200	21000	horizontal ¹⁾	17	74.9	20	25	1
64571	3200	21000	horizontal ¹⁾	17	74.9	20	25	1
64579	3400	33000	horizontal ¹⁾	12	121.7	81	12	2
64580	3400	35000	horizontal	12	181.7	85	12	2
64580	3400	35000	horizontal	12	181.7	85	12	2
64583	3200	27000	universal	12	114.2	65	12	2
64583	3200	27000	universal	12	114.2	65	12	2
64741	3200	25000	universal	12	185.7	125	12	2
64741	3200	25000	universal	12	185.7	125	12	2
64751	3200	33500	p 15	12	185.7	125	12	2
64751	3200	33500	p 15	12	185.7	125	12	2
64781	3200	50000	p 15	30	138.1	35	12	2
64781	3200	50000	p 15	30	138.1	35	12	2
64800	3200	125000	p 4	18	520 ²⁾	245	1	3

1) Burning position preferably horizontal; vertical possible for a short time
2) Overall length

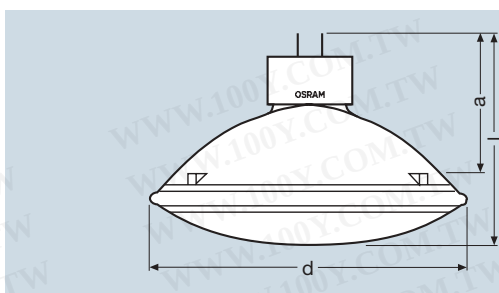


Product reference	Product number	W	lm	K	t[h]		
STUDIOLINE®							
STUDIOLINE 55 W/3200	4050300575278	55	3800	3200	8000	2G11	10
STUDIOLINE 55 W/5600	4050300575292	55	3800	5600	8000	2G11	10

OSRAM STUDIOLINE® fluorescent lamps are matched to the lighting requirements for filming and use with electronic cameras. Thanks to the special phosphor combination, STUDIOLINE® lamps can be used with halogen or HMI lamps without any problems.



PAR halogen lamps



Product reference	Product number	ANSI	LIF		W	V	
aluPAR® 56							
aluPAR 56 NSP	4008321108746			8°/9°	300	120	GX16d
aluPAR 56 NSP	4008321107923			8°/9°	300	230	GX16d
aluPAR 56 NSP	4008321107947			8°/9°	300	240	GX16d
aluPAR 56 MFL	4008321108760			15°/17°	300	120	GX16d
aluPAR 56 MFL	4008321107961			15°/17°	300	230	GX16d
aluPAR 56 MFL	4008321107985			15°/17°	300	240	GX16d
aluPAR 56 WFL	4008321108784			26°/27°	300	120	GX16d
aluPAR 56 WFL	4008321108128			26°/27°	300	230	GX16d
aluPAR 56 WFL	4008321108005			26°/27°	300	240	GX16d
PAR 64 halogen lamps, 3200 K							
64737/3 NSP	4008321905727	EXC	CP/60	12°/9°	1000	230	GX16d
64737/4 NSP	4008321905741	EXC	CP/60	12°/9°	1000	240	GX16d
64738/3 SP	4008321905765	EXD	CP/61	14°/10°	1000	230	GX16d
64738/4 SP	4008321905789	EXD	CP/61	14°/10°	1000	240	GX16d
64739/3 FL	4008321905802	EXE	CP/62	22°/14°	1000	230	GX16d
64739/4 FL	4008321905826	EXE	CP/62	22°/14°	1000	240	GX16d
Product reference	t [h]	cd		d [mm]	I max. [mm]	a [mm]	
aluPAR® 56							
aluPAR 56 NSP	2000	68000	universal	177	113	—	6
aluPAR 56 NSP	2000	70000	universal	177	113	—	6
aluPAR 56 NSP	2000	70000	universal	177	113	—	6
aluPAR 56 MFL	2000	24000	universal	177	113	—	6
aluPAR 56 MFL	2000	30000	universal	177	113	—	6
aluPAR 56 MFL	2000	30000	universal	177	113	—	6
aluPAR 56 WFL	2000	11000	universal	177	113	—	6
aluPAR 56 WFL	2000	10000	universal	177	113	—	6
aluPAR 56 WFL	2000	10000	universal	177	113	—	6
PAR 64 halogen lamps, 3200 K							
64737/3 NSP	300	320000	universal	204	152.4	102	6
64737/4 NSP	300	320000	universal	204	152.4	102	6
64738/3 SP	300	270000	universal	204	152.4	102	6
64738/4 SP	300	270000	universal	204	152.4	102	6
64739/3 FL	300	125000	universal	204	152.4	102	6
64739/4 FL	300	125000	universal	204	152.4	102	6

Beam angle: NSP = narrow spot, SP = spot, MFL = medium flood, FL = flood, WFL = wide flood

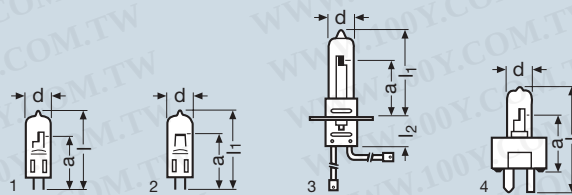
Literature:

Further information on the new aluPAR® lamps can be found in the brochure entitled:

- “A lightweight” The new OSRAM aluPAR® lamps with aluminium reflectors – lighter, brighter, cooler (122 W 101)

1) Do not tilt perpendicular to the filament

Halogen lamps, current controlled, single-ended



Product reference	Product number	ANSI	LIF	A	W		t[h]	Im
Halogen lamps, current controlled, single-ended								
64322	4008321100146	EXL		6.6	30	GZ9.5	1000	600
64311	4008321106346		J1/59	6.0	36	GZ(GY)9.5	1200	610
64320	4008321100122	EXM		6.6	45	GZ9.5	1000	875
64321	4008321106360		J1/57	6.6	45	G6.35	1200	840
64346	4008321106384		J1/58	6.6	100	G6.35	1200	2300
58798	4008321100184	EW		6.6	115	GZ(GY)9.5	1100	2900
64354	4008321100207	EW		6.6	150	GZ9.5	1000	3700
58746	4050300657257	EZL		6.6	200	P30d	1300	5200
58750	4008321100160	EZL		6.6	200	GZ(GY)9.5	1300	5200
64386	4008321106407		J1/39	6.6	200	G6.35	1200	4700

Product reference		d max. [mm]	l1 [mm]	l2 [mm]	a [mm]			No.
64322	s 90 ¹⁾	13.5	max. 44.5	—	25.4	4.4x5.5	12	4
64311	s 90	11	max. 50	—	33	1.1x2.6	40	1
64320	s 90	11.5	max. 44.5	—	25.4	1.4x3.3	12	4
64321	s 90	11	max. 50	—	33	1.25x3.0	40	1
64346	s 90 ¹⁾	13.5	max. 47	—	33	4.6x3.0	40	2
58798	s 90	13	65	—	39.1	6.5x3.1	12	4
64354	s 90 ¹⁾	13.5	max. 63.5	—	39.1	4.4x5.5	12	4
58746	universal	13	60.3	20.6	27	5.5x3.8	100	2
58750	s 90	13	65	—	39.1	5.5x3.8	12	3
64386	s 90 ¹⁾	13.5	max. 47	—	33	7.2x4.4	40	2



Connector A, female
as per DIN 46247

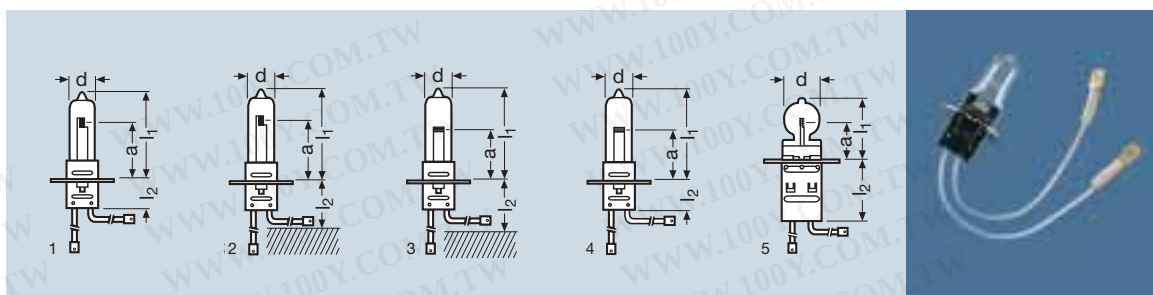


Connector B, female
round for contacts Ø 4 mm



Connector C, male
as per DIN 46248

Halogen lamps, current-controlled with PK30d base



Product reference	Product number	LIF	A	W		t[h]	Im
Halogen lamps, current controlled, with PK30d base							
64317 C 45-10 ¹⁾	4050300 206844	J1/76	6.6	45	PK30d	1000	800
64317 IRC-A 45-30	4008321 012326		6.6	45	PK30d	3000	800
64317 IRC-C 45-30 ¹⁾	4050300 785004	J1/76	6.6	45	PK30d	3000	800
64318 A 45-10	4050300 245843	J1/77	6.6	45	PK30d	1000	800
64318 Z 45-10 ¹⁾	4050300 258324	J1/77	6.6	45	PK30d	1000	800
64319 A 45-10	4008321 012289		6.6	45	PK30d	1000	800
64319 Z 45-10 ¹⁾²⁾	4050300 440729		6.6	45	PK30d	1000	800
64319 IRC-A 45-30	4008321 012265		6.6	45	PK30d	3000	800
64319 IRC-C 45-30 ¹⁾	4008321 012289		6.6	45	PK30d	3000	800
64328 HLX-A 65-10	4050300 440804		6.6	65	PK30d	1000	1450
64328 HLX-Z 65-10 ¹⁾	4050300 302362		6.6	65	PK30d	1000	1450
64341 HLX-A 100-10	4050300 446301	J1/79	6.6	100	PK30d	1000	2700
64341 HLX-Z 100-10 ¹⁾	4050300 258348		6.6	100	PK30d	1000	2700
64342 HLX-A 100-10	4050300 308135	J1/80	6.6	100	PK30d	1000	2700
64342 HLX-C 100-10 ¹⁾	4050300 442433	J1/80	6.6	100	PK30d	1000	2700
64361 HLX-A 150-10	4050300 271866	J1/83	6.6	150	PK30d	1000	3600
64361 HLX-Z 150-10 ¹⁾	4050300 431642	J1/83	6.6	150	PK30d	1000	3600
64382 HLX-A 200-10	4050300 771649	J1/84	6.6	200	PK30d	1000	4800
64382 HLX-C 200-10 ¹⁾	4050300 431680	J1/84	6.6	200	PK30d	1000	4800

Product reference		d max. [mm]	l1 [mm]	l2 [mm]	a [mm]			
64317 C 45-10 ¹⁾	s 90	13.5	max. 37	max. 21	16	1.4x3.6	100	1
64317 IRC-A 45-30	s 90	13.5	max. 37	max. 21	16	1.4x3.6	100	5
64317 IRC-C 45-30 ¹⁾	s 90	13.5	max. 37	max. 21	16	1.4x3.6	100	5
64318 A 45-10	s 90	13.5	max. 28	min. 27	16	1.4x3.6	100	2
64318 Z 45-10 ¹⁾	s 90	13.5	max. 28	min. 27	16	1.4x3.6	100	2
64319 A 45-10	s 90	13.5	max. 32	min. 23	20	1.4x3.6	100	2
64319 Z 45-10 ¹⁾²⁾	s 90	13.5	max. 32	min. 23	20	1.4x3.6	100	2
64319 IRC-A 45-30	s 90	13.5	max. 32	min. 23	20	1.4x3.6	100	5
64319 IRC-C 45-30 ¹⁾	s 90	13.5	max. 32	min. 23	20	1.4x3.6	100	5
64328 HLX-A 65-10	s 90 ³⁾	13.5	max. 32	min. 27	20	3.8x3.2	100	3
64328 HLX-Z 65-10 ¹⁾	s 90 ³⁾	13.5	max. 32	min. 27	20	3.8x3.2	100	3
64341 HLX-A 100-10	s 90 ³⁾	13.5	max. 32	min. 23	20	5.4x3.0	100	3
64341 HLX-Z 100-10 ¹⁾	s 90 ³⁾	13.5	max. 32	min. 23	20	5.4x3.0	100	3
64342 HLX-A 100-10	s 90 ³⁾	13.5	max. 41	max. 17	20	5.4x3.0	100	4
64342 HLX-C 100-10 ¹⁾	s 90 ³⁾	13.5	max. 41	max. 17	20	5.4x3.0	100	4
64361 HLX-A 150-10	s 90 ³⁾	13.5	max. 35	min. 23	20	6.9x3.6	100	3
64361 HLX-Z 150-10 ¹⁾	s 90 ³⁾	13.5	max. 35	min. 23	20	6.9x3.6	100	3
64382 HLX-A 200-10	s 90 ³⁾	13.5	max. 43	max. 21	20	7.1x3.9	100	4
64382 HLX-C 200-10	s 90 ³⁾	13.5	max. 43	max. 21	20	7.1x3.9	100	4

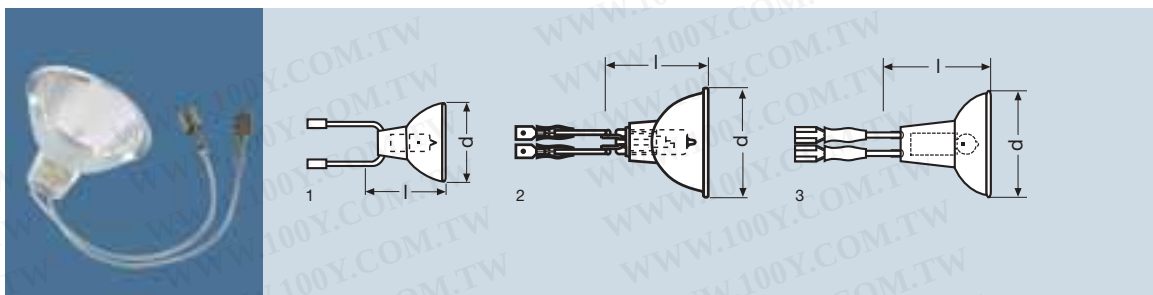
For a summary of connectors see page 10.32

1) With Z/C connector to DIN 46248

2) Version 64319 Z replaces 64316; 64316 has been withdrawn

3) Despite transverse filament, can be inclined at any angle in s 90 position

Halogen lamps, current controlled, with reflectors

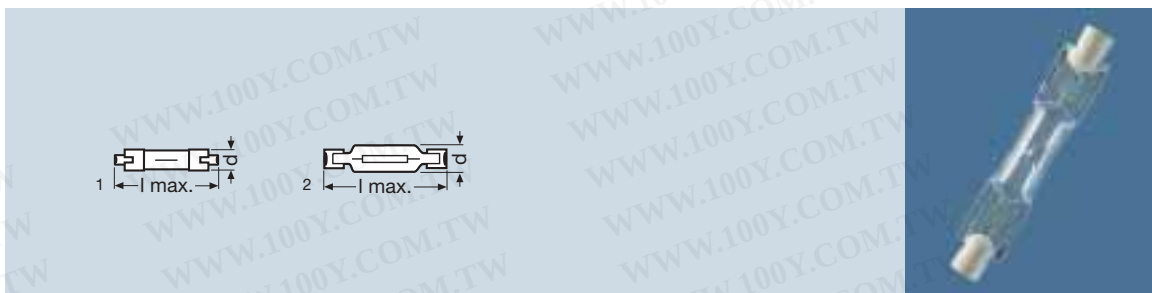


Product reference	Product number	A	W		t _(h)
Halogen reflector lamps, current controlled, with dichroic coating					
64331 SP-A 30-10 ¹⁾	4008321102560	6.6	30	Connector A	1000
64331 FL-AC 30-10 ²⁾	4008321102584	6.6	30	Connector AC	1000
64333 B 40-15	4008321104731	6.6	40	Connector B	1500
64333 C 40-15	4008321104885	6.6	40	Connector C	1500
64337 A 45-15	4008321102515	6.6	45	Connector A	1500
64337 B 45-15	4008321104700	6.6	45	Connector B	1500
64337 C 48-10	4006584425655	6.6	48	Connector C	1000
64337 A 48-15	4008321102737	6.6	48	Connector A	1500
64337 B 48-15	4008321105226	6.6	48	Connector B	1500
64337 C 48-15	4008321105240	6.6	48	Connector C	1500
64337 IRC-A 48-30	4008321102454	6.6	48	Connector A	3000
64337 IRC-B 48-30	4008321105264	6.6	48	Connector B	3000
64337 IRC-C 48-30	4008321102492	6.6	48	Connector C	3000
64338 A 48-10	4008321105301	6.6	48	Connector A	1000
64339 A 105-10	4008321101600	6.6	105	Connector A	1000
64339 AC 105-10	4008321105424	6.6	105	Connector AC	1000
64339 B 105-10	4008321105462	6.6	105	Connector B	1000
64339 C 105-10	4008321105486	6.6	105	Connector C	1000
64355	4050300361659	6.6	100	Connector B	1500

Product reference	kcd		d max. [mm]	I max. [mm]		No.
64331 SP-A 30-10 ¹⁾	min. 16	universal	50.2	45.6	20	1
64331 FL-AC 30-10 ²⁾	min. 3.7	universal	50.2	45.6	20	1
64333 B 40-15	min. 10	universal	35.3	37.0	20	1
64333 C 40-15	min. 10	universal	35.3	37.0	20	1
64337 A 45-15	min. 19	universal	50.2	45.6	20	1
64337 B 45-15	min. 19	universal	50.2	45.6	20	1
64337 C 48-10	min. 23	universal	50.2	45.6	20	1
64337 A 48-15	min. 20	universal	50.2	45.6	20	1
64337 B 48-15	min. 20	universal	50.2	45.6	20	1
64337 C 48-15	min. 20	universal	50.2	45.6	20	1
64337 IRC-A 48-30	min. 20	universal	50.2	45.6	20	3
64337 IRC-B 48-30	min. 20	universal	50.2	45.6	20	3
64337 IRC-C 48-30	min. 20	universal	50.2	45.6	20	3
64338 A 48-10	min. 27	universal	50.2	45.6	20	1
64339 A 105-10	min. 30	universal	50.2	max.50.0	20	2
64339 AC 105-10	min. 30	universal	50.2	45.6	20	2
64339 B 105-10	min. 30	universal	50.2	45.6	20	2
64339 C 105-10	min. 30	universal	50.2	45.6	20	2
64355	min. 19	universal	55.5	45.6	50	1

For a summary of connectors see page 10.32

Halogen lamps, current controlled, double-ended



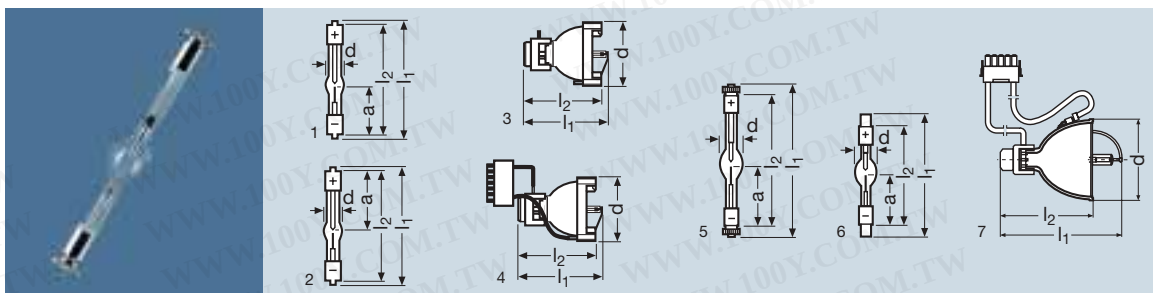
Product reference	Product number	LIF	A	W		t[h]
Halogen lamps, current controlled, double-ended						
64315	4050300206844	J1/78	6.6	45	R7s	1000
64340	4050300017266	J1/82	6.6	100	R7s	1000
64380	4050300209944	J1/40	6.6	200	R7s	1000

Product reference	Im		d max. [mm]	l max. [mm]			 No.
64315	750	universal	8.8	47.5	4x1.5	25	1
64340	2000	universal	12	60.2	6x2.6	25	2
64380	4400	universal	15	60.2	10x3	25	2



- For more information on airfield lamps see the brochure "The Reliable Guiding Stars – Effective solutions for airfield lighting: Tungsten halogen lamps and innovative IRC technology" (122 D04 10/03).
- All airfield lamps are available with connector combinations A, B, C/Z on request.

XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm	cd	cd/cm²	t[h]	t[h]	3)	4)	5)
XBO 75 W/2 ⁶⁾	4050300508801	75	14	5.4	1000	100	40000	400	400	s105	—	—
XBO 100 W OFR	4050300508429	100	14	7.2	1900	270	31000	500	500	s105	—	req.
XBO R 100 W/45 OFR ¹⁴⁾	4050300317205	100	13	7.2	—	—	—	—	500	p15	—	—
XBO 150 W/1 ⁶⁾⁷⁾	4050300015804	150	20	7.5	3000	300	15000	1200	—	s15	—	req.
XBO 150 W/CR OFR	4050300508788	150	17.5	8.5	2900	290	20000	3000	1200	s15 p15	req.	req.
XBO 150 W/S	4050300220208	150	20	7.5	2200	220	18000	1000	800	s15 p15	req.	req.
XBO R 180 W/45 OFR ¹⁴⁾	4050300432175	180	14	12	—	—	—	—	500	p15	—	—
XBO R 300 W/60 C OFR ⁵⁾	4050300857749	300	17.5	17.1	—	—	—	—	500	p15	—	—

Product reference	1)	2)	d [mm]	l1 max. [mm]	l2 max. [mm]	a [mm]	+	+	No.
XBO 75 W/2 ⁶⁾	—	0.25x0.5	10	90	82	37	SFa9-2	SFa7.5-2	1
XBO 100 W OFR	req.	0.4x0.8	11	90	82	44.5	SFa9-2	SFa7.5-2	2
XBO R 100 W/45 OFR ¹⁴⁾	req.	—	67	83	77	—	—	—	3/4
XBO 150 W/1 ⁶⁾⁷⁾	—	0.5x2.2	20	150	127	57	SFc12-4	SFcX12-4	5
XBO 150 W/CR OFR	req.	0.5x1.6	20	150	127	57	SFc12-4	SFcX12-4	5
XBO 150 W/S	req.	0.5x1.7	20	117	96	47.5	SFa12-11	SFa12-11	6
XBO R 180 W/45 OFR ¹⁴⁾	req.	—	67	90.5	81.5	—	—	—	3/4
XBO R 300 W/60 C OFR ⁵⁾	req.	—	82.5	110	80	—	—	—	7

OFR = Ozone-free version
S = Short

W = Watts
req. = required

XBO® are short arc lamps in which the discharge arc burns in an atmosphere of pure xenon gas at high pressure.

Their main characteristics and advantages are as follows:

- High luminance
- Daylight colour temperature of approx. 6000 K
- Continuous spectrum in the visible range
- High colour rendering index ($R_a > 95$)
- Constant light colour throughout the life of the lamp
- High arc stability
- DC operation
- Hot restart capability
- Instant light on starting

Literature:

Further information can be found in the following brochures, obtainable on request from OSRAM:

- “Ready for your ideas!” Specialty lamps for innovative applications in medicine and industry

10.36

- 1) Lamp also available with connecting cable and plug contact.
Product reference XBO R 100 W/45 C or XBO R 180 W/45 C
- 2) Distance from end of base to tip of electrode (cold)
- 3) For vertical burning position: anode (+) on top



- 4) The focus lies 45 mm in front of the mounting rim on the lamp axis (working distance)
- 5) The focus lies 60 mm in front of the mounting rim on the lamp axis (working distance)
- 6) Also available in ozone-free version with the same data: XBO 75 W/2 OFR, XBO 150 W/1 OFR
- 7) Also available in Suprasil quartz version: XBO 150 W/4

XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm	cd	cd/cm ²		t[h]	
XBO 250 W OFR ⁴⁾	4008321082657	250	13	18	4800	530	26000	14 ... 20	1200	s 15
XBO 450 W ³⁾⁴⁾	4008321082640	450	17	25	13000	1300	35000	17 ... 30	2000	s 30
XBO 450 W/1	4008321082510	450	17	25	13000	1300	45000	17 ... 30	800	s 100
XBO 450 W/2 OFR	4008321082626	450	17	25	13000	1300	35000	17 ... 30	2000	s 30

Product reference										
XBO 250 W OFR ⁴⁾	req.	—	0.7x1.7	25	226	192	93	SFa16-8	SFa16-10	1
XBO 450 W ³⁾⁴⁾	req.	—	0.9x2.7	29	260	212	95.5	SFa20-8	SFa20-10	1
XBO 450 W/1	req.	req.	0.7x2.2	29	260	212	95.5	SFa20-8	SFa20-10	1
XBO 450 W/2 OFR	req.	—	0.9x2.7	29	177	—	79	SK19/36	SK19/36	2

OFR = Ozone-free version
req. = required

XBO® lamps are double-ended short-arc discharge lamps in which the discharge arc burns between the two electrodes in an atmosphere of pure xenon gas.

Their main characteristics and advantages are as follows:

- Very high luminance (point light source)
- Daylight colour temperature of approx. 6000 K
- High colour rendering index ($R_a > 95$)
- Continual colour quality, irrespective of lamp type and lamp wattage
- Hot restart
- DC operation
- Dimmable
- Long life

Applications:

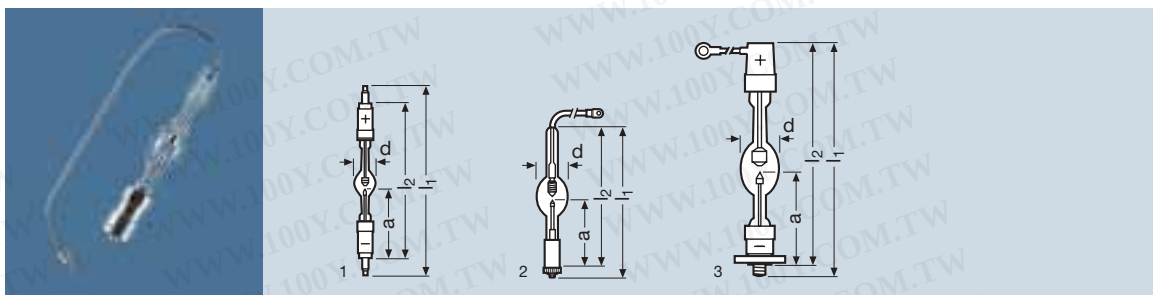
- Classic film projection
- Digital film and video projection
- Architecture lighting and effect lighting ("light finger")
- Solar simulation



XBO® xenon short-arc lamps have a particularly high luminance.

1) Distance from end of base to tip of electrode (cold)
2) For vertical burning position: anode (+) on top
3) Also available in ozone-free version with the same data: XBO 450 W OFR
4) Also available in Suprasil quartz version: XBO 250 W/4, XBO 450 W/4

XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm ³⁾	cd ³⁾	cd/cm ² ³⁾	A	t[h]	
XBO 500 W/H OFR	4008321082503	500	17	28	14500	1450	40000	17...30	2000	s30 p30
XBO 550 W/HTC OFR	4008321082480	550	22	25	16000	1600	34000	17...27	600	s15 p15
XBO 700 W/HSC OFR	4008321082428	700	18	37	20000	2000	40000	30...45	1500	s20 p20

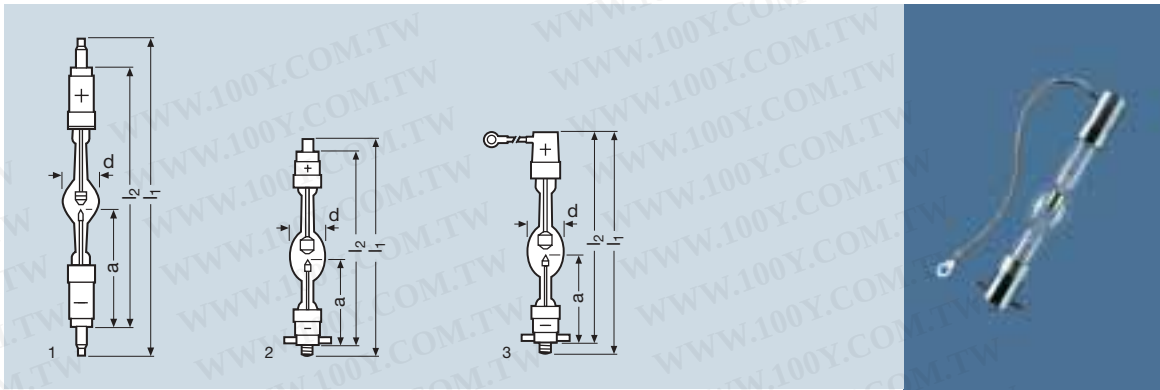
Product reference											
XBO 500 W/H OFR	req.	req.	req.	0.9x2.5	35	190	165	75	SFa16-8	SFa15-10	1
XBO 550 W/HTC OFR	—	req.	req.	0.9x3.1	25	143	129	65	Cable	SFc15-6	2
XBO 700 W/HSC OFR	—	req.	req.	1.1x2.9	40	236	222	95	SK27/50	SFcX27-8	3

C = Base with cable	S = Short
H = Suitable for horizontal burning position	TC = Thread and cable
OFR = Ozone-free version	req. = required



A spectacle in light with XBO® 3 and 4 kW.
Roof-mounted spotlights create colourful effects on the
200 metre high façade of the Bogotá Tower in Columbia.

XBO®
xenon short-arc lamps

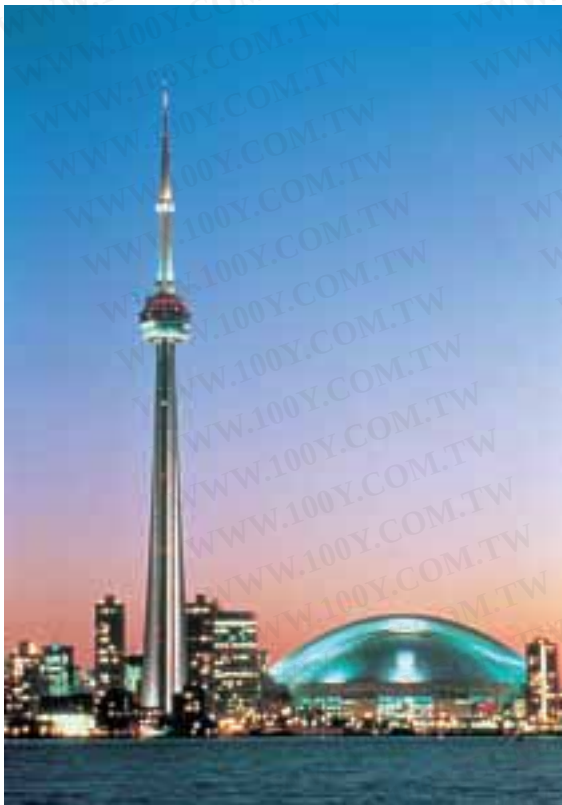
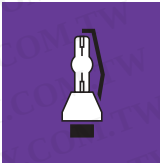


Product reference	Product number	W	V	A	lm ³⁾	cd ³⁾	cd/cm ² ³⁾	A	t [h]	 ²⁾
XBO 900 W OFR	4008321081346	900	19	45	30000	3000	50000	30...53	2400	s30
XBO 1000 W/HS OFR	4008321082114	1000	19	50	32000	3000	60000	30...55	2000	s20 p20
XBO 1000 W/HSC OFR	4008321082107	1000	19	50	32000	3000	60000	30...55	2000	s20 p20

Product reference										
XBO 900 W OFR	—	—	—	1.1x3.3	40	325	277	123	SFa25-10	SFa25-12 1
XBO 1000 W/HS OFR	—	req.	req.	1.1x2.8	40	235	205	95	SFa27-11	SFcX27-8 2
XBO 1000 W/HSC OFR	—	req.	req.	1.1x2.8	40	236	222	95	SK27/50	SFcX27-8 3

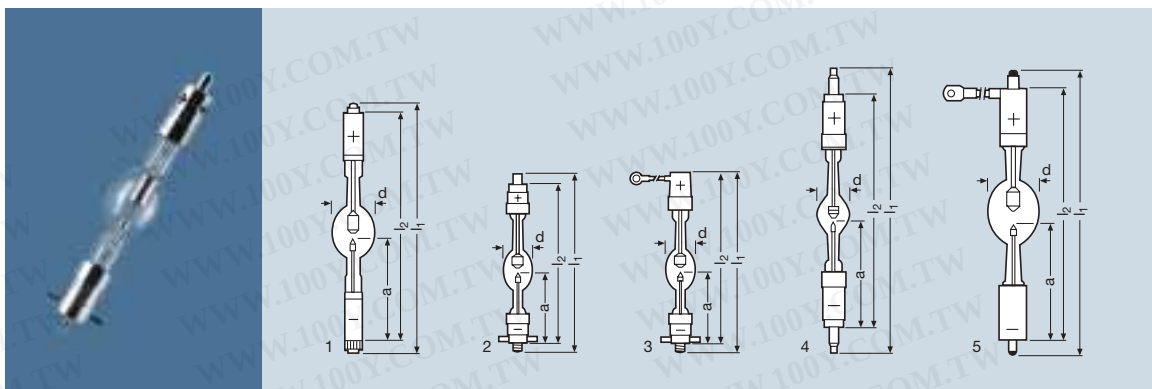
C = Base with cable
H = Suitable for horizontal burning position
req. = required

OFR = Ozone-free version
S = Short



1) Distance from end of base to tip of electrode (cold)
2) For vertical burning position: anode (+) on top
3) Measured in the vertical burning position

XBO® xenon short-arc lamps



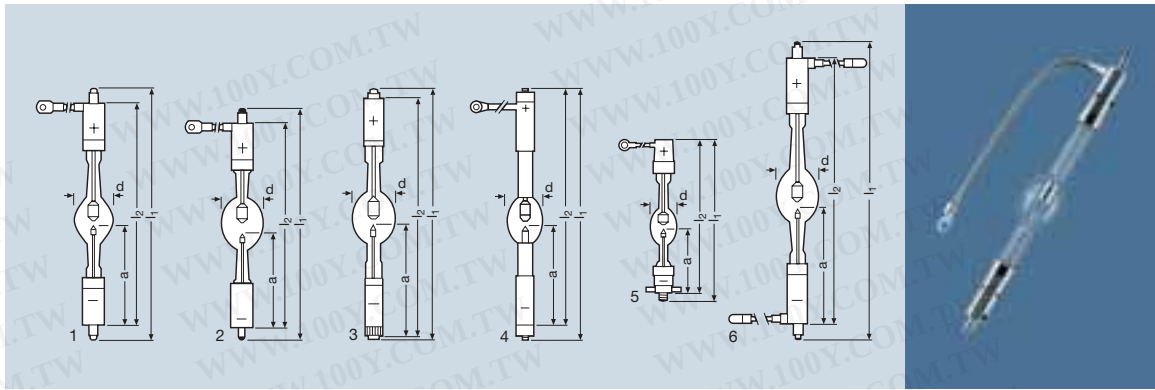
Product reference	Product number	W	V	A	lm ³⁾	cd ³⁾	cd/cm ² ³⁾	A	t[h]	
XBO 1000 W/HTP OFR	4008321 081353	1000	21	45	35000	3200	45000	30...55	2400	s30 p30
XBO 1600 W/HS OFR	4008321 082091	1550	23	65	70000	5500	70000	50...75	2000	s20 p20
XBO 1600 W/HSC OFR	4008321 082084	1550	23	65	60000	5500	70000	50...75	2000	s20 p20
XBO 1600 W OFR	4008321 064721	1600	24	65	60000	6000	65000	45...75	2400	s30
XBO 1600 W/CA OFR	4008321 064738	1600	24	65	60000	6000	65000	45...75	2400	s30

Product reference					d [mm]	l ₁ max. [mm]	l ₂ max. [mm]	a ¹⁾ [mm]			No.
XBO 1000 W/HTP OFR	req.	—	—	1.0x4.0	46	330	277	123	SFa25-14	SFc25-14	1
XBO 1600 W/HS OFR	—	req.	req.	1.0x3.2	46	235	205	95	SFa27-11	SFcX27-8	2
XBO 1600 W/HSC OFR	—	req.	req.	1.0x3.2	47	236	222	95	SK27/50	SFcX27-8	3
XBO 1600 W OFR	—	—	—	1.4x4.0	52	370	322	143	SFa27-10	SFa27-12	4
XBO 1600 W/CA OFR	—	—	—	1.4x4.0	52	370	322	143	SFaX27-10	SFa27-12	5

C = Base with cable	S = Short
CA = Cable with anode base	TP = Cable with threaded pin
H = Suitable for horizontal burning position	req. = required
OFR = Ozone-free version	



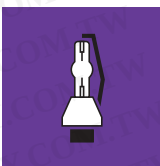
XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm ⁴⁾	cd ⁴⁾	cd/cm ² ⁴⁾	A	t[h]	
XBO 2000 W/H OFR®	4008321 064745	2000	28	70	80000	7500	75000	50...85	2400	s30 p30
XBO 2000 W/HS OFR	4008321 081360	2000	24	80	80000	7500	80000	50...85	2400	s30 p30
XBO 2000 W/HTP OFR®	4008321 064752	2000	27	70	80000	7500	75000	50...85	2400	s30 p30
XBO 2000 W/HTT OFR	4008321 064769	2000	24	80	80000	7500	75000	50...85	2400	s30 p30
XBO 2000 W/SHSC OFR®)	4008321 082077	2000	27	70	80000	7500	80000	50...85	2000	s20 p20
XBO 2500 W OFR	4008321 064783	2500	29	85	100000	9500	61000	60...95	2000	s30

Product reference											
XBO 2000 W/H OFR	req.	–	–	1.3x4.8	52	370	322	142.5	SFaX27-10	SFaX27-12	1
XBO 2000 W/HS OFR	–	req.	req.	1.3x4.0	60	342	302	145	SFaX27-9.5	SFa27-7.9	2
XBO 2000 W/HTP OFR ⁵⁾	req.	–	–	1.3x4.8	52	375	322	142.5	SFa25-14	SFc25-14	3
XBO 2000 W/HTT OFR	req.	–	–	1.3x4.8	52	370	322	142.5	SFcX25-10	SFcX25-10	4
XBO 2000 W/SHSC OFR ³⁾	–	req.	req.	1.3x4.0	46	236	222	95	SK27/50	SFcX27-8	5
XBO 2500 W OFR	–	–	–	1.5x6.0	60	428	382	167.5	SFaX27-13	SFaX27-14	6

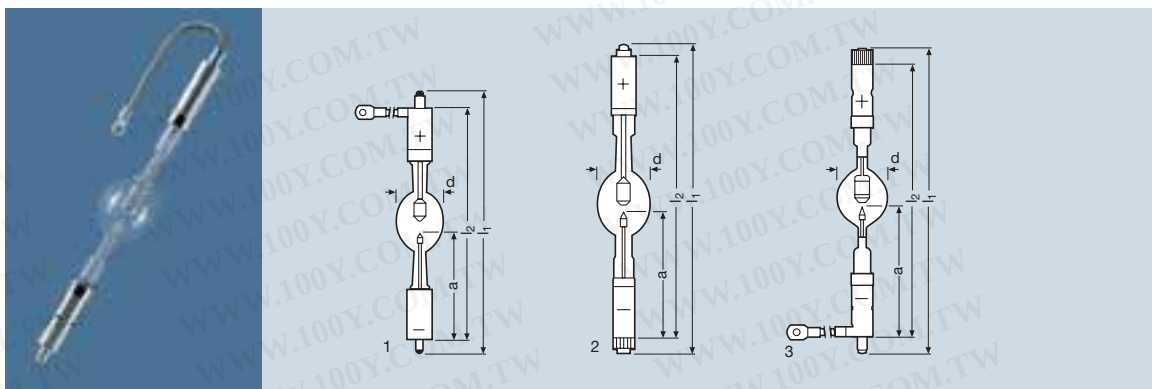
H = Suitable for horizontal burning position
 OFR = Ozone-free version
 S = Short
 SHSC = Extra short version for horizontal burning position, anode connection via cable (super short)
 TP = Cable with threaded pin
 TT = Two threaded pins
 req. = required



1) Distance from end of base to tip of electrode (cold)
 2) For vertical burning position: anode (+) on top
 3) Similar dimensions to XBO® 1600 W/HSC OFR
 4) Measured in the vertical burning position

5) Also available as XBO 2001 W/HTP OFR with 25 V at 80 A
 6) Available as XBO 2000 W/HCC with 2nd cable on cathode base

XBO® xenon short-arc lamps



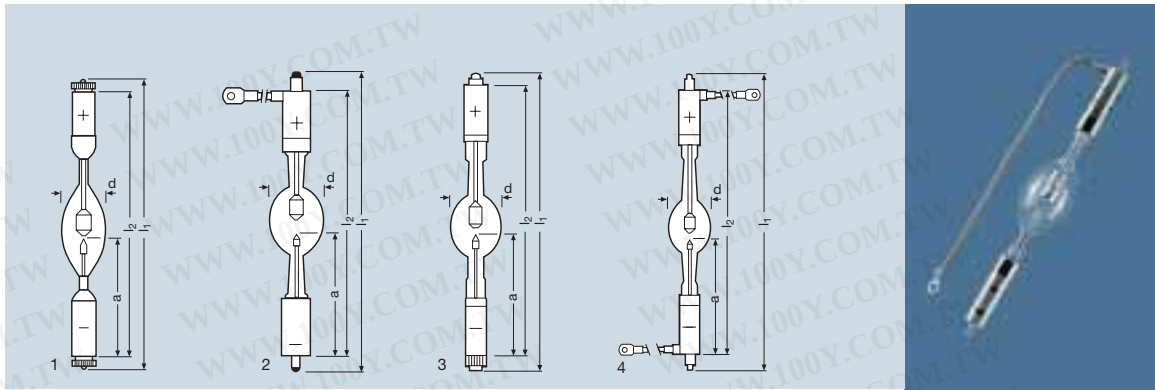
Product reference	Product number	W	V	A	lm ³⁾	cd ³⁾	cd/cm ² ³⁾	A	t [h]	
XBO 2500 W/HTP OFR	4008321 064790	2500	28	90	100000	9500	60000	70...100	1500	s30 p30
XBO 2500 W/HS OFR	4008321 081377	2500	28	90	100000	10000	80000	70...100	1500	s30 p30
XBO 3000 W/HTP OFR	4008321 064813	3000	29	100	130000	12000	85000	60...110	1500	s30 p30
XBO 3000 W/H OFR	4008321 064806	3000	29	100	130000	12000	85000	60...110	1500	s30 p30
XBO 3000 W/HS OFR	4008321 081384	3000	29	100	130000	12000	90000	60...110	1500	s30 p30
XBO 3000 W/HTC OFR	4008321 064820	3000	29	100	130000	12000	85000	60...110	1500	s30 p30

Product reference											
XBO 2500 W/HTP OFR	req.	req.	req.	1.5x6.0	60	398	357	165	SFa27-14	SFc27-14	2
XBO 2500 W/HS OFR	—	req.	req.	1.5x4.5	60	342	302	145	SFaX27-9.5	SFa27-7.9	1
XBO 3000 W/HTP OFR	req.	req.	req.	1.7x5.0	66	405	357	162.5	SFa27-14	SFc27-14	2
XBO 3000 W/H OFR	req.	req.	req.	1.7x5.0	66	428	382	167.5	SFaX27-13	SFaX27-14	1
XBO 3000 W/HS OFR	—	req.	req.	1.7x5.0	60	342	302	145	SFaX27-9.5	SFa27-7.9	1
XBO 3000 W/HTC OFR	req.	req.	req.	1.7x5.0	66	398	350	165	SFc28-13	SFaX28-13	3

H	= Suitable for horizontal burning position	TP	= Cable with threaded pin
OFR	= Ozone-free version	S	= Short
TC	= Tread and cable	req.	= required



XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm	cd	cd/cm ²	A	t [h]	
XBO 3600 W/HTM OFR	4008321064837	3600	29	120	160000	16000	85000	80...130	1000	s15 p15
XBO 3600 W/HTC OFR	4008321064844	3600	29	120	160000	16000	85000	80...130	1000	s15 p15
XBO 4000 W/HS OFR	4008321040312	4000	28	135	155000	17000	90000	80...150	1000	s20 p20
XBO 4000 W/HTP OFR	4008321057983	4000	30	130	155000	16000	90000	100...140	1000	s20 p20
XBO 4000 W/HSA OFR	4008321057990	4000	29	135	160000	20000	105000	80...150	1000	s20 p20
XBO 4200 W/CA OFR	4008321057938	4200	29	140	190000	20000	100000	80...160	1000	s15
XBO 4200 W/GS OFR	4008321057884	4200	29	140	190000	20000	100000	80...160	1000	s15
XBO 4500 W/HS OFR	4008321058447	4500	32	135	190000	22000	105000	80...150	1000	s15 p15
XBO 4500 W/HTP OFR	4008321057860	4500	32	135	190000	22000	105000	80...150	1000	s15 p15

Product reference					d [mm]	l1 max. [mm]	l2 max. [mm]	a [mm]			No.
XBO 3600 W/HTM OFR	—	req.	req.	1.9x6.0	60	413	362	165	SFc28-13	SFc28-13	1
XBO 3600 W/HTC OFR	—	req.	req.	1.9x6.0	60	388	362	165	SFa28-14 ³⁾	SFc28-13	1
XBO 4000 W/HS OFR	—	req.	req.	1.9x6.0	70	410	370	171	SFaX30-9.5	SFa30-7.9	2
XBO 4000 W/HTP OFR	—	req.	req.	1.9x6.0	70	433	382	167.5	SFa27-14	SFc27-14	3
XBO 4000 W/HSA OFR	—	req.	req.	1.8x5.6	70	410	370	171	SFaX30-9.5	SFa30-7.9	2
XBO 4200 W/CA OFR	—	req.	—	2.1x6.0	70	428	382	167.5	SFaX27-13	SFaX27-14	4
XBO 4200 W/GS OFR	—	req.	—	2.1x5.7	60	428	382	167.5	SFaX27-13	SFaX27-14	4
XBO 4500 W/HS OFR	req.	req.	req.	1.9x6.0	70	410	370	171	SFaX30-9.5	SFa30-7.9	2
XBO 4500 W/HTP OFR	req.	req.	req.	1.9x6.0	70	433	382	165	SFa27-14	SFc27-14	3

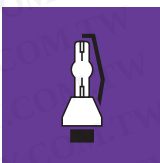
CA = Cable with anode base
GS = Gap short
H = Suitable for horizontal burning position
OFR = Ozone-free version
S = Short
SA = Short arc
TP = Cable with threaded pin
req. = required

Literature:

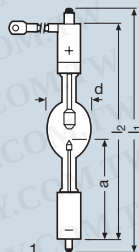
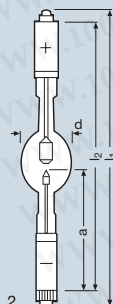
For further information on XBO® lamps and notes for manufacturers of control gear, please refer to the following publications, available on request from OSRAM:

- Guidelines for control gear and igniters: xenon short-arc lamps XBO®
- References for control gear
- Technology and applications, XBO® cinema lamps
- Technical information on magnetic stabilisation of XBO® lamps

1) Distance from end of base to tip of electrode (cold)
2) For vertical burning position: anode (+) on top
3) Base with axial cable (560 mm)
4) Measured in the vertical burning position



XBO® xenon short-arc lamps



Product reference	Product number	W	V	A	lm ³⁾	cd ³⁾	cd/cm ² ³⁾	A	t[h]	 ²⁾
XBO 5000 W/H OFR	4008321040428	5000	35	140	225000	27000	95000	100...150	1000	s15 p15
XBO 5000 W/HBM OFR	4008321057877	5000	34	140	225000	27000	95000	100...150	1000	s15 p15
XBO 5000 W/HTP OFR	4008321058454	5000	34	140	225000	27000	95000	100...150	1000	s15 p15
XBO 6000 W/HS OFR	4008321064851	6000	37	160	280000	40000	105000	110...165	750	s15 p15
XBO 6000 W/HTP OFR	4008321064868	6000	37	160	280000	40000	105000	110...165	750	s15 p15
XBO 7000 W/HS OFR	4008321064875	7000	42	160	350000	35000	100000	110...165	650	s15 p15
XBO 8000 W/HS OFR	4050300623061	8000	45	175	400000	40000	110000	150...180	400	s15 p15
XBO 10000 W/HS OFR	4050300624532	9800	50	195	500000	47500	90000	160...200	400	s15 p15
XBO 12000 W OFR	4050300654539	12000	56	205	550000	50000	90000	180...210	300	s115

Product reference															No.
XBO 5000 W/H OFR	req.	req.	req.	2.2x6.5	70	433	382	167.5	SFaX30-16	SFa28-18					1
XBO 5000 W/HBM OFR	req.	req.	req.	2.2x6.5	70	436	393	170.5	SFaX30-9.5	SFa30-7.9					1
XBO 5000 W/HTP OFR	req.	req.	req.	2.2x6.5	70	433	382	165	SFa27-14	SFc27-14					2
XBO 6000 W/HS OFR	req.	req.	req.	2.0x7.5	78	433	393	170.5	SFaX30-9.5	SFa30-7.9					1
XBO 6000 W/HTP OFR	req.	req.	req.	2.0x7.5	78	433	382	165	SFa30-14	SFc30-14					2
XBO 7000 W/HS OFR	req.	req.	req.	2.6x9.0	78	433	393	170.5	SFaX30-9.5	SFa30-7.9					1
XBO 8000 W/HS OFR	req.	req.	req.	2.5x10.5	90	433	393	170.5	SFaX30-9.5	SFa30-7.9					1
XBO 10000 W/HS OFR	req.	req.	req.	2.4x12.0	90	433	393	170.5	SFa30-9.5	SFa30-7.9					1
XBO 12000 W OFR	req.	req.	req.	2.6x14.0	90	483	434	200	SFaX30-9.5	SFa39-15/110					1

BM = Base modified	H = Suitable for horizontal burning position
OFR = Ozone-free version	req. = required
S = Short	

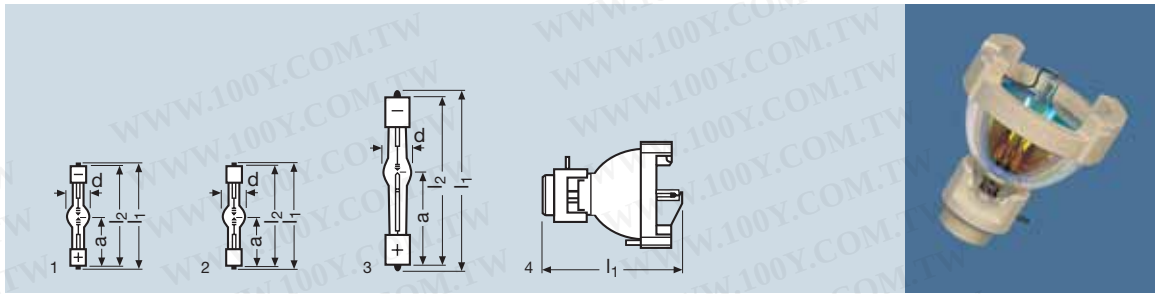
Safety:

Because of their high luminance, UV radiation and internal pressure in both the hot and cold state, XBO® lamps may only be operated in enclosed lamp casings specially constructed for the purpose.

Always use the protective jackets supplied when handling XBO® lamps. When handling the lamps without their protective jackets, always wear safety goggles, a face mask and gauntlets with wrist protectors.



HBO® short-arc mercury vapour lamps



Product reference	Product number	AC/DC	W	V	A	lm	lm/W	cd	cd/cm ²
HBO 50 W/3	4050300 506692	DC	50	23	2.2	1300	26	150	90000
HBO 50 W/AC	4050300 507132	AC	50	L ₁ : 39...45 L ₂ : 34...39	L ₁ : 1.3 L ₂ : 1.45	2000	40	230	30000
HBO 100 W/2	4050300 507095	DC	100	20.5	5.0	2200	22	260	170000
HBO 103 W/2	4050300 382128	DC	100	22.5	4.4	3000	30	300	170000
HBO R 103 W/45 ²⁾	4050300 405957	DC	100	22.5	4.4	—	—	—	—

Product reference		t [h]		d [mm]	l ₁ max. [mm]	l ₂ max. [mm]	a [mm]	¹⁾ 		 No.
HBO 50 W/3	0.2x0.35	200	s45	9.5	53	47	22	SFa6-2	SFa8-2	1
HBO 50 W/AC	0.3x1.0	100	s45	9.5	53	47	22	SFa6-2	SFa6-2	2
HBO 100 W/2	0.25x0.35	200	s90	10	90	82	43	SFa7.5-2	SFa9-2	3
HBO 103 W/2	0.25x0.25	300	s90	10	90	82	43	SFa7.5-2	SFa9-2	3
HBO R 103 W/45 ²⁾	—	300	p15	67	81.5	77	—	Pin	Pin	4

AC = Alternating current
DC = Direct current

HBO® are short arc lamps in which the discharge arc burns in an atmosphere of mercury vapour at high pressure.

Their main characteristics and advantages are as follows:

- High radiance
- Multi-line spectrum
- High radiant power in the UV and the visible range
- AC or DC operation

Applications:

Lamps rated at less than 200 W are predominantly used in scientific and technical applications such as:

- Fluorescence microscopy
- Fluorescence endoscopy
- Light guide applications
- Schlieren photography
- Hologram projection
- UV curing

Lamps rated at 350 W and above are used almost exclusively for the fabrication of electronic chips in microlithography.

Literature:

Further information can be found in the following brochure, obtainable on request from OSRAM:

- “Ready for your ideas!” Specialty lamps for innovative applications in medicine and industry

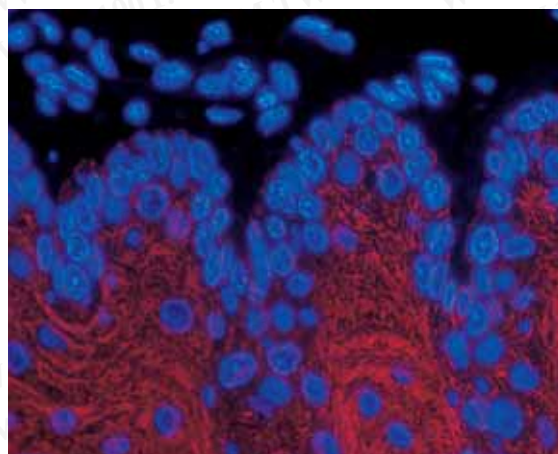
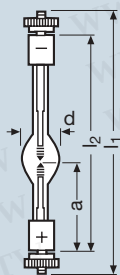


Photo: Zeiss, Fluorescence microscopy

1) Distance from end of base to tip of anode (cold)
2) The focus lies 45 mm in front of the mounting rim on the lamp axis (working distance)

HBO® short-arc mercury vapour lamps



Product reference	Product number	AC/DC	W	V	A	lm	lm/W	cd	cd/cm²
HBO 200 W/2 ¹⁾⁴⁾		DC	200	47...65	3.1...4.2	10000	50	1000	40000
	4050300508153	AC		L ₁ :57...65	L ₁ : 3.6				
	4050300508283	AC		L ₂ :49...57	L ₂ : 4.2				
HBO 200 W/DC	4050300506791	DC	200	57	3.5	10000	50	1100	40000
HBO 200 W/4 ³⁾	4050300506715	AC	200	55...67	3.6	9500	47.5	950	33000
HBO 500 W/2		DC	500	67...85	5.9...7.4	30000	60	2850	30000
	4050300208206	AC		L ₁ :77...85	L ₁ : 7.1				
	4050300219875	AC		L ₂ :69...77	L ₂ : 7.8				

Product reference		t [h]		d [mm]	l ₁ max. [mm]	l ₂ max. [mm]	a ²⁾ [mm]		
HBO 200 W/2 ¹⁾⁴⁾	0.6x2.2	400/200 ⁵⁾	s20	17	128	102	40	SFc10-4 ¹⁾	SFc10-4 ¹⁾
HBO 200 W/DC	0.75x2.3	1000	s15	17	128	102	40	SFc10-4/15	SFc10-4/15
HBO 200 W/4 ³⁾	0.6x2.2	200	s20	17	128	102	40	SFc10-4	SFc10-4
HBO 500 W/2	1.1x4.1	400/200 ⁵⁾	s20	26.5	170	142	65.5	SFc13-4	SFc13-4

AC = Alternating current
DC = Direct current

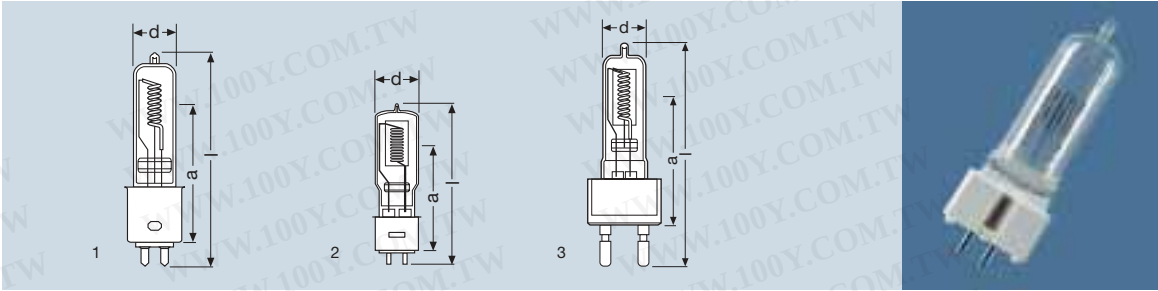
The lamps shown on the following pages are designed for the manufacture of semiconductors, LCDs and PCBs. The types listed are just a small selection of the most common types.

Literature:

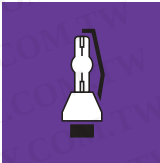
For detailed information see the "Technology and application guide, HBO® Mercury short arc lamps for microlithography". This brochure is available on request.



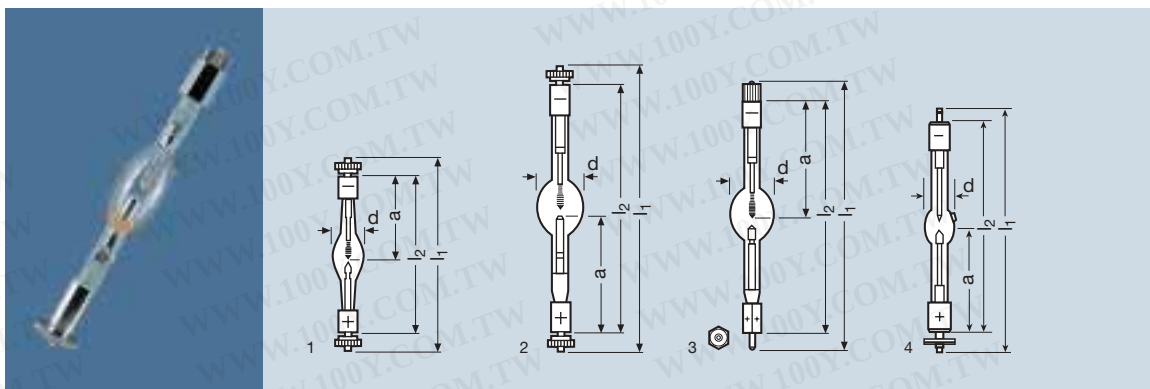
Special lamps for IR applications



Product reference	Product number							
Special lamps for IR applications								
64743 HT	4050300 506531	FEL	CP/77	1000	120	GX9.5	300	27500
93734	4050300 350073	FEP	CP/77	1000	240	G9.5	300	23000
64773	4050300 455280			2000	120	G9.5	300	65000
Product reference								
64743 HT		universal	20	101	60.3	7x18	20	1
93734		universal	20	102	60.3	5.7x27	12	3
64773		universal	20	125	77.5	7x30	12	2



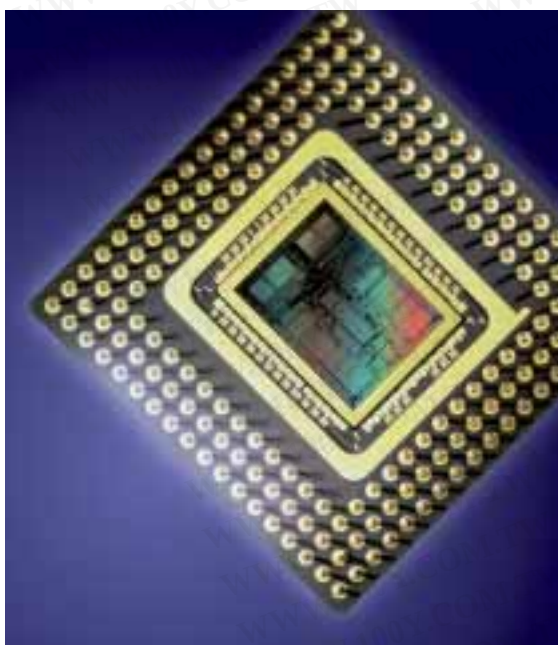
HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	W 350-450 nm	mW/Sr 350-450 nm	t[h]	
HBO 250 W/BY	4050300803432	DC	250	40	6.5	—	—	2000	Convection ³⁾
HBO 350 W	4050300351599	DC	350 ²⁾	67.5	5.3	46	4600	600	Convection ³⁾
HBO 350 W/S	4050300258041	DC	350	68	5.15	50	4700	600	Convection ³⁾
HBO 500 W/A	4050300021089	DC	500	60	8.3	61	6200	800	Convection ³⁾
HBO 500 W/B	4050300275819	DC	500	48.5	10.3	60	5800	800	Convection ³⁾

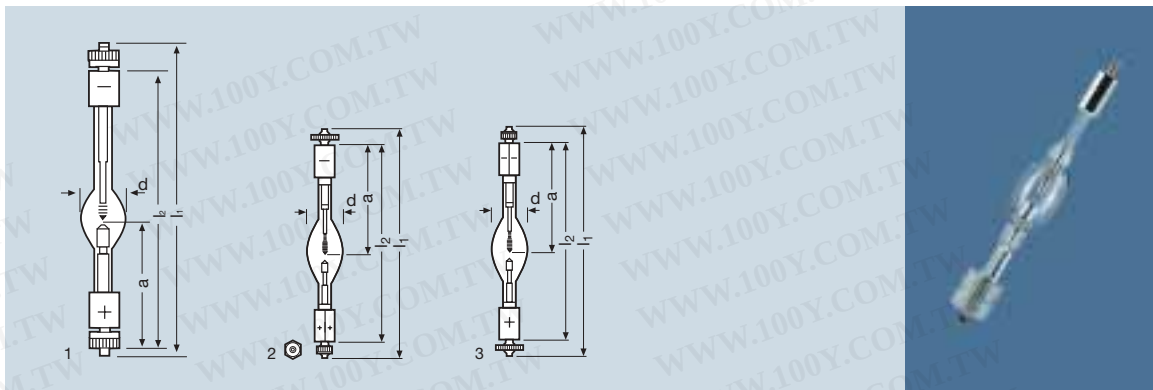
Product reference		d [mm]	l1 max. [mm]	l2 max. [mm]	a ¹⁾ [mm]			No.
HBO 250 W/BY	Vertical ⁴⁾	20	152	125	62	2	SFc13-5	4
HBO 350 W	Vertical ⁴⁾	20	128	102	45	2.9	SFcY10-4 ⁵⁾	1
HBO 350 W/S	Vertical ⁴⁾	20	127	103	52.5	3	SFcY10-4 ⁵⁾	1
HBO 500 W/A	Vertical ⁴⁾	29	190	161.5	73	4.5	SFcY13-5 ⁶⁾	2
HBO 500 W/B	Vertical ⁴⁾	29	180	151.5	78.5	3	SFcY13-5/20 ⁷⁾	3

DC = Direct current





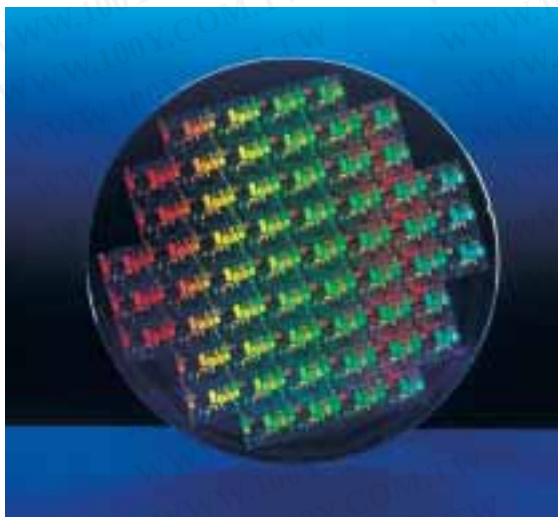
HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	W	mW/Sr	t[h]	
HBO 1000 W/D	4050300288857	DC	1000	37.7	26.5	105	10800	1000	
HBO 1000 W/CEL ³⁾	4050300412627	DC	750 (700/1000) ²⁾	47	16	85.4	8300	2500	Convection
HBO 1002 W/CEL ⁴⁾	4050300412634	DC	750 (700/1000) ²⁾	47	16	85	8300	2500	Convection

Product reference		d [mm]	l1 max. [mm]	l2 max. [mm]	a [mm]	1)				No.
HBO 1000 W/D	Vertical ⁵⁾	40	240	208	89.5	3	SFc15-6/25 ⁶⁾	SFc15-6/25 ⁶⁾		1
HBO 1000 W/CEL ³⁾	Vertical ⁵⁾	28	175	157	78.5	3	SFc15-6/25 ⁶⁾	SXFc15-6/20 ⁷⁾		2
HBO 1002 W/CEL ⁴⁾	Vertical ⁵⁾	28	175	157	78.5	3	SXFc15-6/25 ⁷⁾	SFc15-6/20 ⁶⁾		3

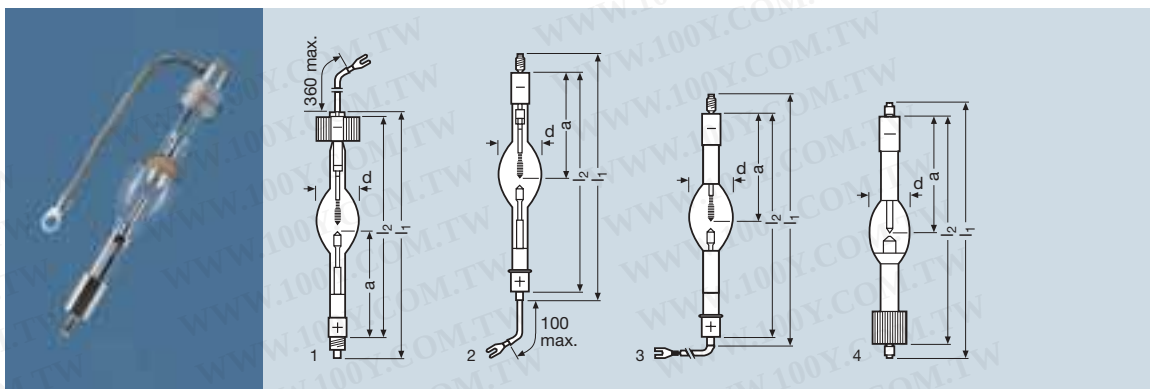
DC = Direct current



- 1) Distance from end of base to tip of anode or cathode (cold)
2) Lamp suitable for pulsed operation between 700 W and 1000 W
Maximum permissible power is 750 W for constant power operation
3) Also available as HBO 1000 W/CL with 1500 h life.
(Obtainable in Europe, Singapore and Japan only through Canon)
4) Also available as HBO 1002 W/CL with 1500 h life.
(Obtainable in Europe, Singapore and Japan only through Canon)

- 5) Anode underneath
6) With 8-32 UNC-3 A thread
7) Hexagon base with M 6 threaded pin

HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	W 350-450 nm	mW/Sr 350-450 nm	t[h]
HBO 1000 W/NEL	4050300412603	DC	750 (700/1000) ²⁾	47	16	82.3	8300	2500
HBO 1002 W/NEL	4050300412610	DC	750 (700/1000) ²⁾	47	16	82.3	8300	2500
HBO 1002 W/NIL	4050300461427	DC	750 (700/1000) ²⁾	25.8	27.1	18.7 ³⁾	2400 ³⁾	1500
HBO 1003 W/PI ⁴⁾	4050300739540	DC	700 (700/1000) ²⁾	25.8	27.1	18.7 ³⁾	2400 ³⁾	850

Product reference			d [mm]	l1 max. [mm]	l2 max. [mm]	a [mm]	¹⁾ [mm]			No.
HBO 1000 W/NEL	Convection	Vertical ⁶⁾	28	190	168	84.5	3	SFaX14-5/21 ⁷⁾	SFa15-5/16 ¹¹⁾	1
HBO 1002 W/NEL	Convection ⁵⁾	Vertical ⁶⁾	28	190	168	78.5	3	SFc15-6/25 ⁸⁾	SFaX14-5/21 ⁷⁾	2
HBO 1002 W/NIL	Forced base cooling	Vertical ⁶⁾	29	187	168	78.5	3	SFcX15-6/25 ⁹⁾	SFaX14-5/21 ¹²⁾	3
HBO 1003 W/PI ⁴⁾	Forced base cooling	Vertical ⁶⁾	29	195	167.5	85	3	SFc15-6/25 ⁹⁾	SFcX14-6/25 ¹⁰⁾	4

DC = Direct current

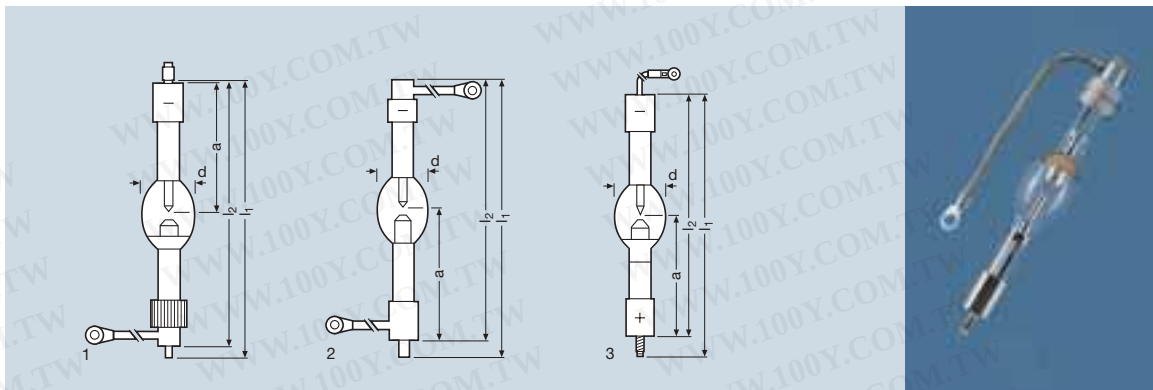


1) Distance from end of base to tip of anode or cathode (cold)
2) Lamp suitable for pulsed operation between 700 W and 1000 W
Maximum permissible power is 750 W for constant power operation
3) l-line values in the 365 ± 2.5 nm range
4) Also available as Longlife version HBO 1003 W/PIL with 1500 h life

5) Cooling fins on cathode base
6) Anode underneath
7) Sleeve base with cooling fins and cable connection (M 5)
8) Sleeve base with M 6 threaded pin
9) With M 6 threaded pin
10) With cooling fins
11) Sleeve base without thread
12) Sleeve base with cable connection (M 5)



HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	mW/sr 365 nm ± 2.5	t[h]		
HBO 1500 W/PI ³⁾	4050300585956	DC	1500	23	65.2	4850	850 ³⁾	Forced base cooling	Vertical ⁴⁾
HBO 1500 W/CIL	4050300461458	DC	1500	23	65.2	4850	1500	Forced base cooling	Vertical ⁴⁾
HBO 2001 W/NIL	4050300461489	DC	1750	26	67	5500	1500	Forced base cooling	Vertical ⁴⁾

Product reference	 d [mm]	 l ₁ max. [mm]	 l ₂ max. [mm]	 a [mm]				 No.
HBO 1500 W/PI ³⁾	46	263	242	118	4	SFc27-10/35	SFc30-6/25 ⁶⁾	1
HBO 1500 W/CIL	50	262	242	122	4	SFa27-20/22 ⁵⁾	SFa27-10/35 ⁷⁾	2
HBO 2001 W/NIL	52	251	231	112	4.5	SFcX27-7/35 ⁵⁾	SFc27-10/35	3

DC = Direct current

Safety:

Because of their high luminance, UV radiation and internal pressure, HBO® lamps may only be operated in enclosed lamp casings specially constructed for the purpose.

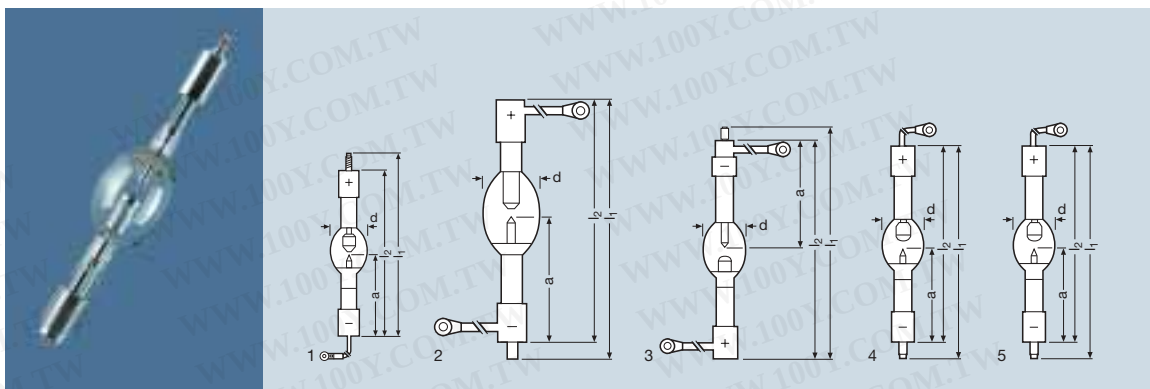
Mercury is released if the lamp breaks. **Special safety precautions must be taken.** Detailed information is available on request.



1) Distance from end of base to tip of anode or cathode (cold)
2) Maximum permissible base temperature: 200 °C
3) Also available as Longlife version HBO 1500 W/PIL with 1500 h life

4) Anode underneath
5) With cable connection (M 8)
6) Cooling fins with cable connection (M 8)
7) With cable connection (M 10)

HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	mW/sr 365nm±2.5	t[h]		2)
HBO 2000 W/NIL	4050300490212	DC	1750	26	67	5200	1500	Forced base cooling	
HBO 2001 W/CIL ⁴⁾	4050300947235	DC	2000	26	77	6000	1500	Forced base cooling	
HBO 2002 W/MA	4050300947259	DC	2000 ⁵⁾	37	54	4200	1000 ³⁾	Forced base cooling	
HBO 2002 W/NIL	4050300772714	DC	1750	26	67	5100	1500	Forced base cooling	
HBO 2011 W/NIL	4050300947556	DC	2000	25	80	5700	1500	Forced base cooling	

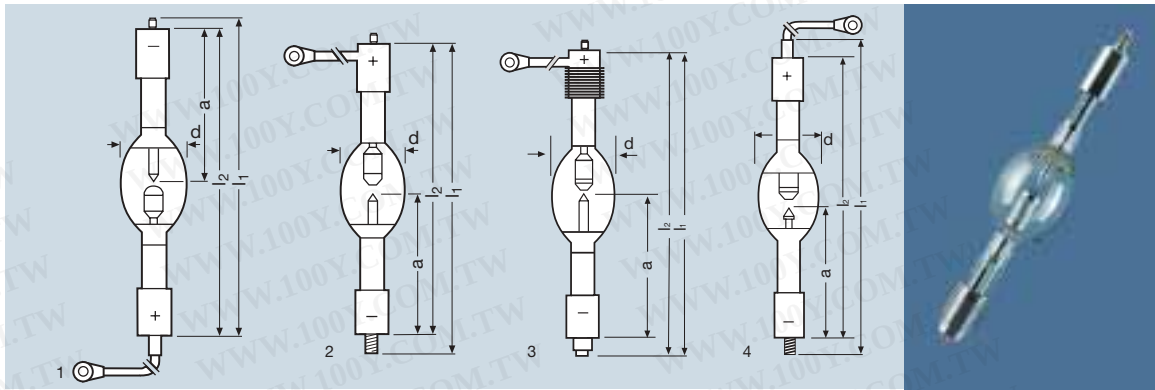
Product reference		d [mm]	l1 max. [mm]	l2 max. [mm]	a [mm] ¹⁾				
HBO 2000 W/NIL	Vertical ⁶⁾	55	251	219	112	4.5	SFc27-7/35 ⁹⁾	SFc27-12/35	1
HBO 2001 W/CIL ⁴⁾	Vertical ⁶⁾	62	329	309	149	4.5	SFa33.5-10/50 ⁹⁾	SF33.5/50 ⁹⁾	2
HBO 2002 W/MA	Vertical ⁷⁾	62	292	272	138.5	3	SFa27-10/35 ⁹⁾	SF27/35 ⁹⁾	3
HBO 2002 W/NIL	Vertical ⁶⁾	55	254	234	107.5	4.5	SFc27-10x1.25/35	SFc27-7/35 ⁹⁾	4
HBO 2011 W/NIL	Vertical ⁶⁾	55	256	234	107.75	4.5	SFc27-12x1.5/35	SFc27-7/35 ⁹⁾	5

DC = Direct current





HBO® short-arc mercury vapour lamps for microlithography



Product reference	Product number	AC/DC	W	V	A	mW/sr 365 nm ± 2.5	t[h]	
HBO 2500 W/PIL	4050300947396	DC	2500	28	90	8200	1500	Forced base cooling
HBO 2501 W/NIL	4050300947297	DC	2500	23	109	10600	1500	Forced base cooling
HBO 2510 W/NIL	4050300947433	DC	2500	23	109	7800	1500	Forced base cooling
HBO 3500 W/P ³⁾	4050300947495	DC	3400	23	148	9000	850	Forced base cooling
HBO 3501 W/P ³⁾	4050300947518	DC	3400	23	148	9000	850	Forced base cooling

Product reference		d [mm]	h max. [mm]	l max. [mm]	a ¹⁾ [mm]					No.
HBO 2500 W/PIL	Vertical ⁴⁾	62	350	315	149	6.7	SFc30-6.5/50	SFc30-6/50 ⁵⁾		2
HBO 2501 W/NIL	Vertical ⁵⁾	70	367	327	157.75	4.5	SFc33.5-14/50	SFa35.5-12/50 ⁷⁾		1
HBO 2510 W/NIL	Vertical ⁴⁾	70	367	327	157.75	4.5	SF9c33.5-14/50	SFc33.5-12/50 ⁷⁾		4
HBO 3500 W/P ³⁾	Vertical ⁴⁾	77	360	322	154	4.5	SFc32.5-6.7/50	SFaX40-6/50 ⁶⁾		3
HBO 3501 W/P ³⁾	Vertical ⁴⁾	77	360	322	154	4.5	SFc32.5-6.7/50	SFaX40-6/50 ⁶⁾		3

DC = Direct current

Disposal:

HBO® discharge lamps contain small quantities of materials (such as mercury) which are harmful to the environment. In Germany, they are classified as special waste (Code 35326 "Mercury, residue containing mercury, mercury vapour lamps, fluorescent lamps, fluorescent tubes"). In other countries the relevant national regulations must be followed.

Literature:

For further information on HBO® lamps and notes for manufacturers of control gear, please refer to the following publications, available on request from OSRAM:

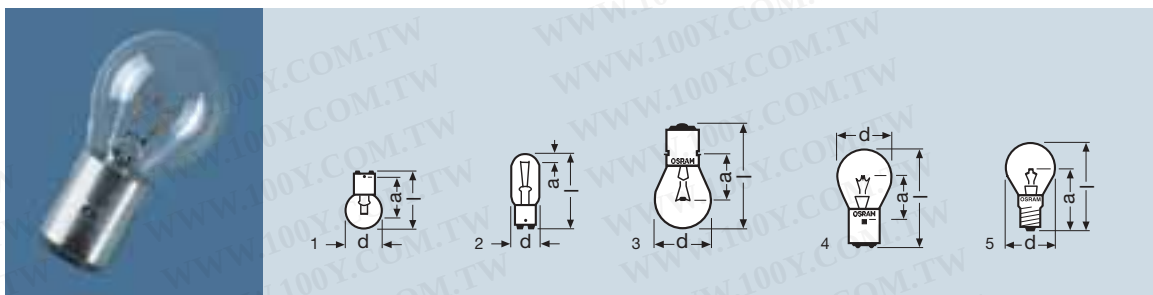
- "Specifications for power supply units for dc operated HBO® mercury short-arc lamps"
- "Specifications for power supply units for ac operated HBO® mercury short-arc lamps"
- "Specifications for igniters for HBO® mercury short-arc lamps"
- "Availability of power supplies and igniters"
- "Mercury short arc lamps HBO® for microlithography, Technology and Application"



1) Distance from end of base to tip of anode or cathode (cold)
2) Maximum permissible base temperature: 200 °C
3) Also available as Longlife version HBO 1500 W/PIL with 1500 h life
4) Anode on top

5) Anode underneath
6) With cooling fins and cable connection (M 10)
7) With cable connection (M 8)

Lamps without halogen, low voltage



Product reference	Product number	ANSI	LIF	V	W/A		t [h]
Lamps for optical and photo-electronic purposes							
8013	4050300206356			6	10 W	BA15d	200
8014	4050300206370			6	10 W	BA15s	600
8017	4050300017327			6	15 W	B15d	1000
8018	4050300206417	M/20		6	15 W	B15d	100
8022	4050300206677			12	50 W	BA20d	50
8024	4050300013817			12	40 W	BA20d	500
8100	4050300342122	F/74		6	5 A	E14	600
Product reference		 d [mm]	 l max. [mm]	 a [mm]			 No.
8013	h 105	25	46	30	1.7x0.9	100	1
8014	s 105	25	46	27	2.1x0.9	100	1
8017	universal	19	54	7	2.3x1.2	100	2
8018	h 30	19	52	5	1.5x1.9 ¹⁾	100	2
8022	h 15	35	69	39.5	3x2	100	3
8024	s 135	35	67	30	3x2.5	100	4
8100	s 105	35	65	45	2x2	100	5

These low-voltage lamps are characterised by their exact filament geometry. The glass bulb has high optical quality.

Caution: Discontinued, do not use for new designs.

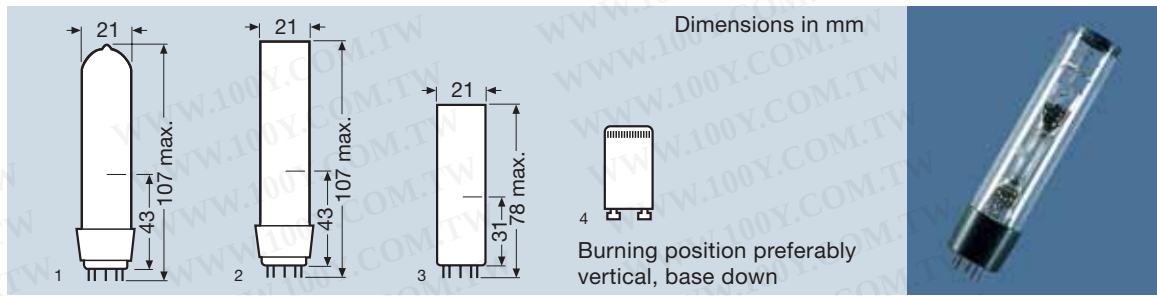
Applications:

- As replacements in old luminaires used in technical and scientific applications
- As film projector lamps





Spectral lamps



Product reference	Product number								
Spectral lamps									
Cd/10	4050300210353	Cadmium	15	1.0	AC	15	15x6	Pico 9	1
Cs/10	4050300213842	Caesium	10	1.0	AC	10	15x6	Pico 9	1
He/10	4050300212258	Helium	60	1.0	AC	55	15x8	Pico 9	1
Hg 100	4050300231310	Mercury	45	0.6...1	AC/DC	22...44	20x3	Pico 9	2
HgCd/10	4050300211459	Mercury/Cadmium	30	1.0	AC	25	20x8	Pico 9	1
K/10	4050300212197	Potassium	10	1.0	AC	10	15x6.5	Pico 9	1
Na/10	4050300210377	Sodium	15	1.0	AC	15	15x6.5	Pico 9	1
Na 10 FL	4050300006925	Sodium	16	0.57	AC	9	—	Pico 9	3
Ne/10	4050300212210	Neon	30	1.0	AC	30	15x8	Pico 9	1
Rb/10	4050300213866	Rubidium	10	1.0	AC	10	15x6	Pico 9	1
Tl/10	4050300211435	Thallium	15	1.0	AC	15	8x3	Pico 9	1
Zn/10	4050300212234	Zinc	15	1.0	AC	15	15x6	Pico 9	1
Accessories		Starter St 191							4
AC = Alternating current DC = Direct current									

Spectral lamps are discharge lamps that emit the line spectrums of inert gases and metal vapours with high luminance or radiance. They are used wherever a line spectrum or monochromatic radiation is required.

Applications:

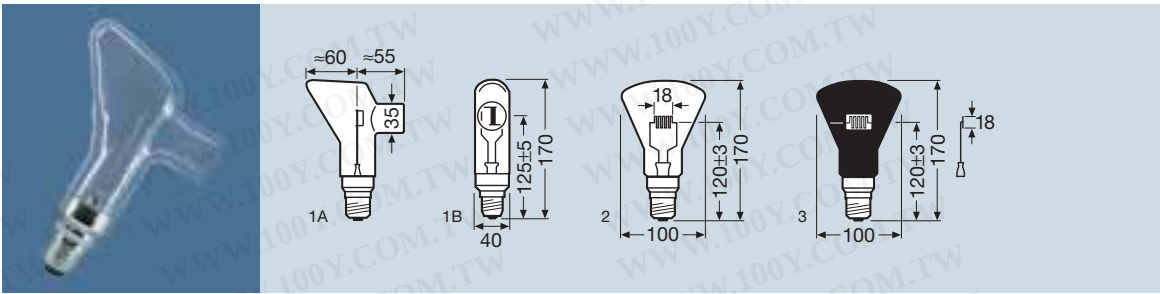
Optics, radiation physics, spectroscopy, chemical engineering and medicine.

Safety:

Because of the high-intensity light, the UV radiation and the high internal pressure during operation, spectral lamps may only be used in enclosed purpose-built housings. Suitable filters should be used to ensure that the UV radiation is reduced to an acceptable level.



Lamps for scientific purposes



Product reference	Product number	V ⁵⁾	A ⁵⁾	K max. ¹⁾	BLACK TEMP.				No.
Lamp types									
WI 17/G	4050300209104	9	16	—	2600	1.6 x 20	s	E27/51x39	1 ⁴⁾
WI 40/G	4050300206783	31	6	2856	—	18 x 18	s + h	E27/51x39	2
WI 41/G	4050300206806	31	6	2856	—	18 x 18	s + h	E27/51x39	3
Product reference		cd	lm		BLACK TEMP.	K max.			
Parameters									
WI 17/G		—	—	+		(+)	+ 250–800 nm		
		—	—	+		(+)	+ 250–2500 nm		
WI 40/G		(+)	+	—		(+)	—		
WI 41/G		+	—	—		+	—		

Lamps for scientific purposes

Lamps for scientific purposes are used mainly as comparison standards and calibration lamps for variables and measurements in photometry, colorimetry and radiation physics.

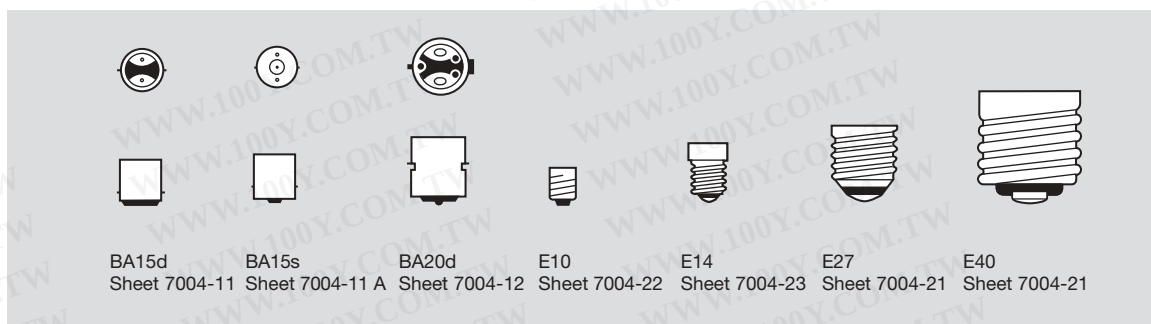
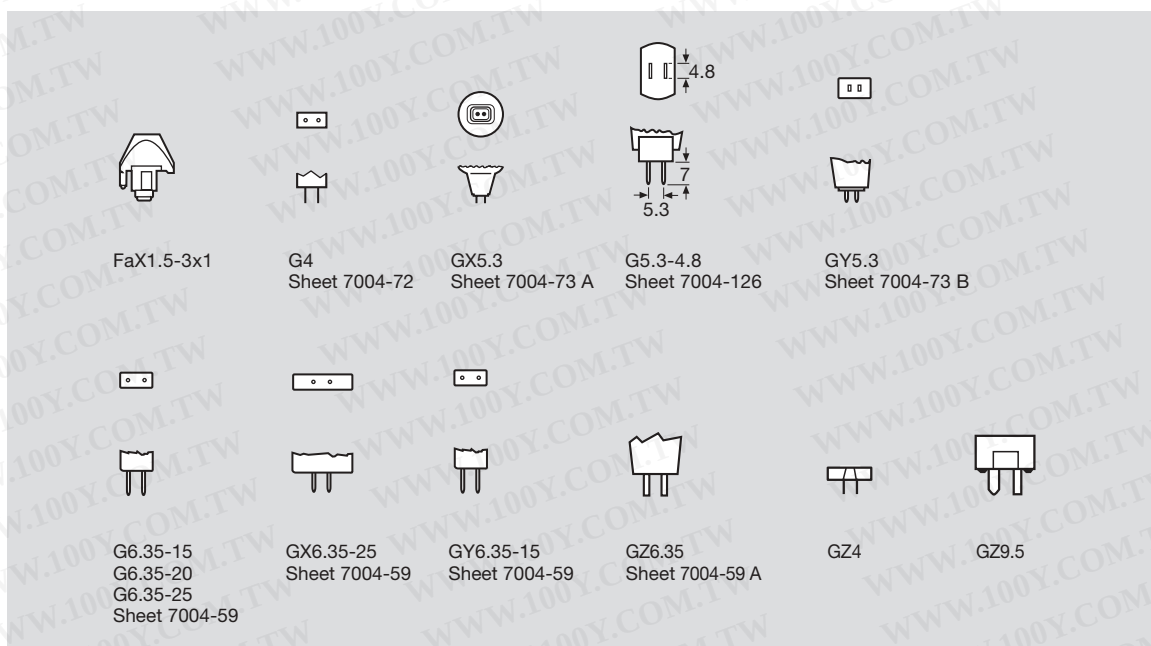
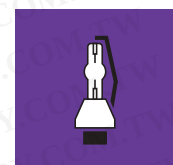
They are gas-filled incandescent lamps which are suitable for calibrating the following variables: luminous intensity, luminous flux, black body temperature, colour temperature and spectral radiance distribution.

Parameters

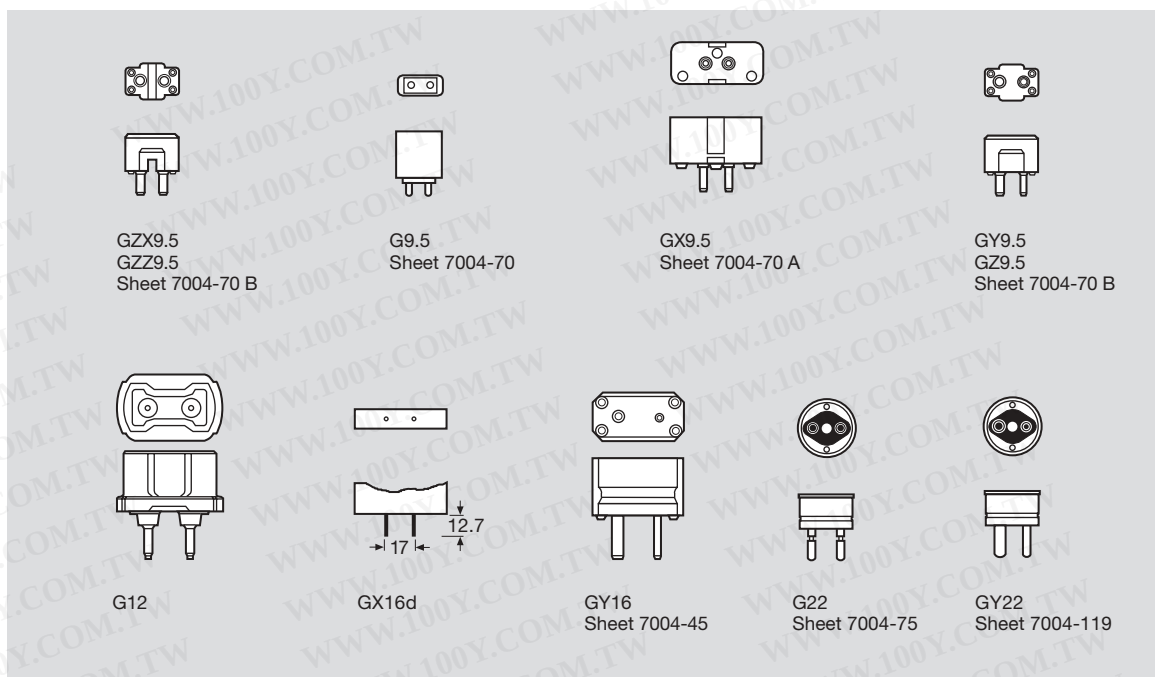
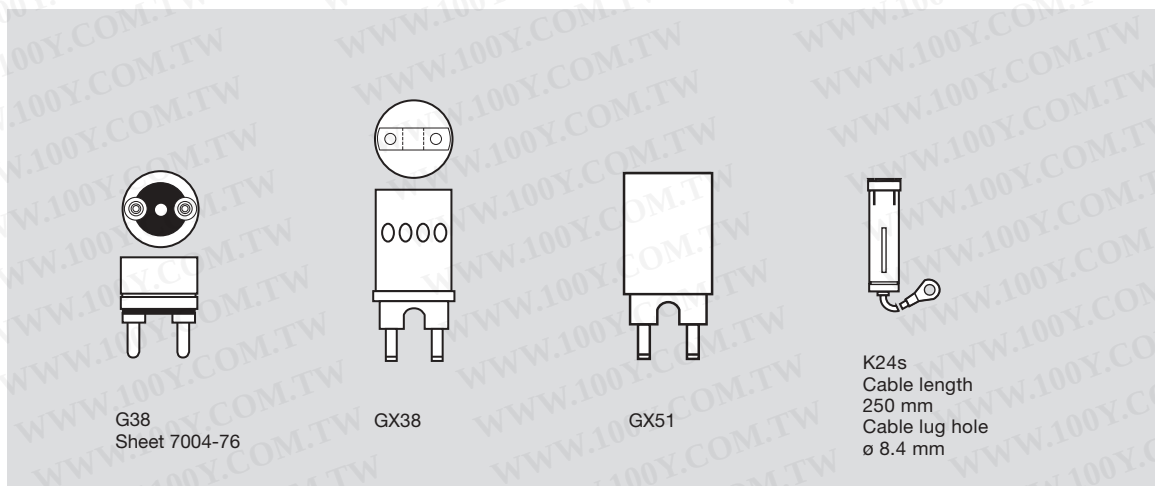
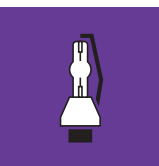
Parameters for which test certificates can be provided are marked + in the following table. Test certificates can also be provided for parameters marked (+) but the lamps have not been specifically designed for that parameter.

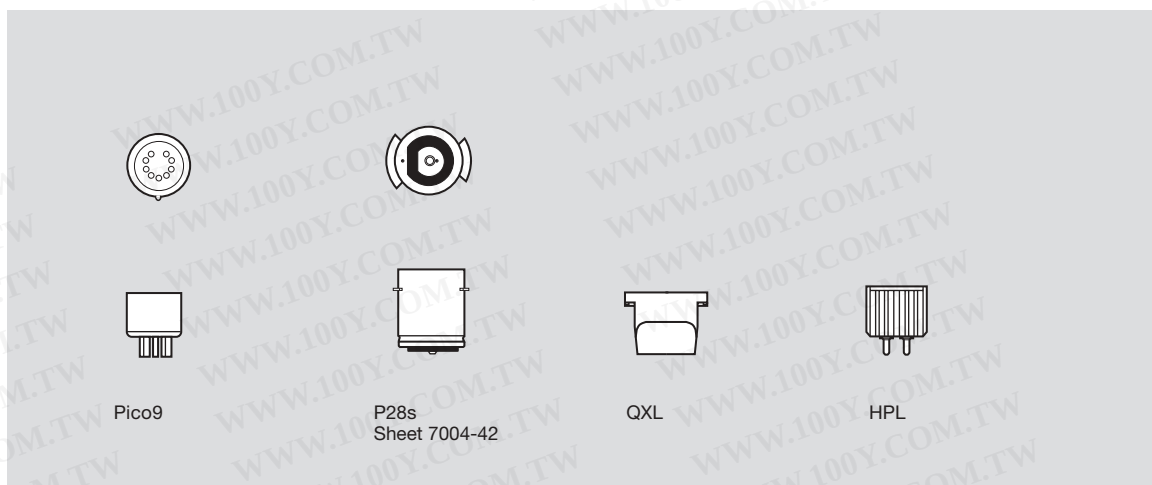
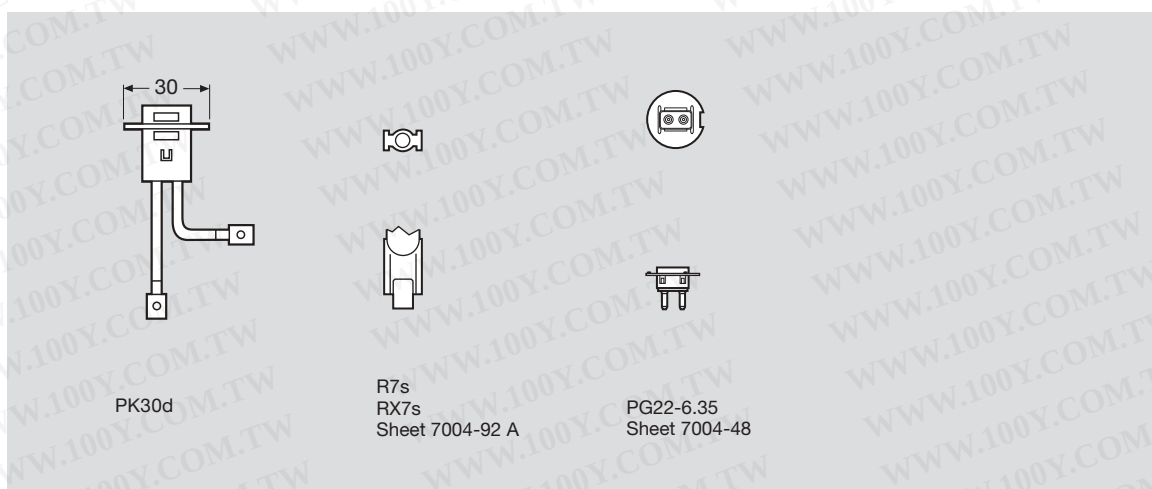
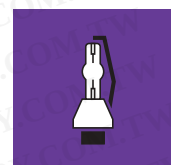
1) The colour temperature of 2856 K corresponds to light type A (DIN 5035)
2) s = standing (base down); h = hanging (base up)
3) Only in addition to measuring the black temperature or the colour temperature

4) Side view Fig. 1A; front view Fig. 1B
5) Upper limit values for electrical data

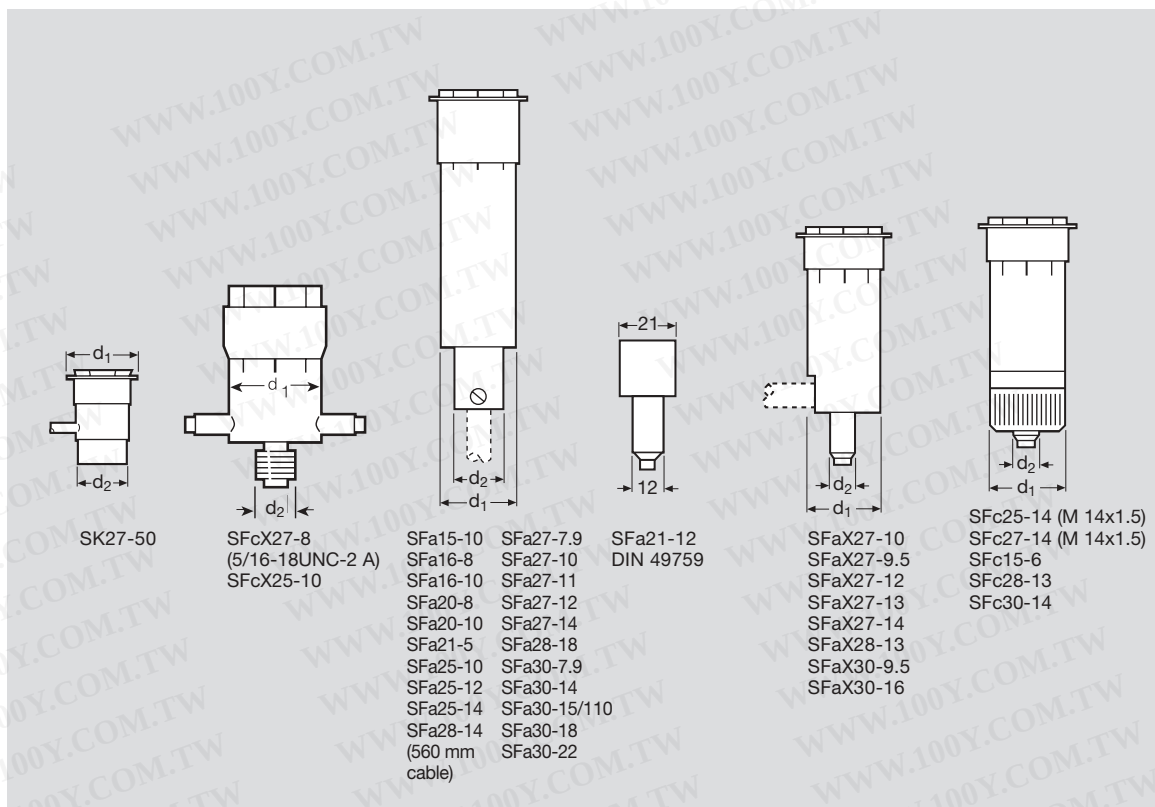
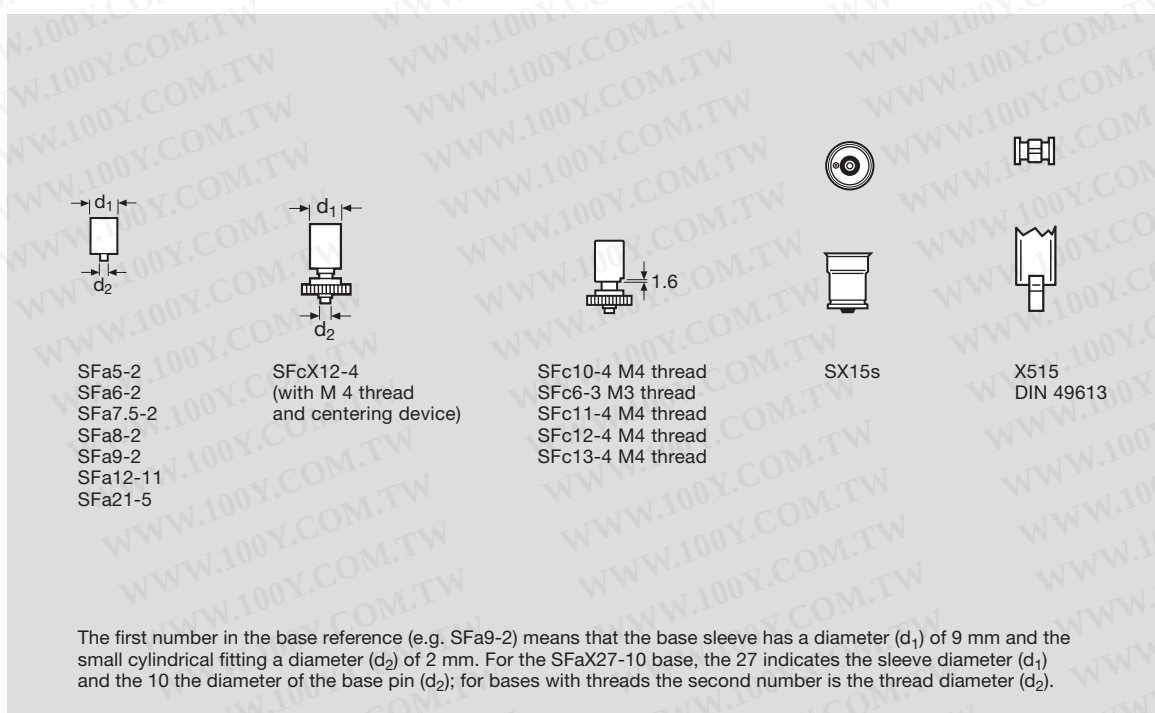


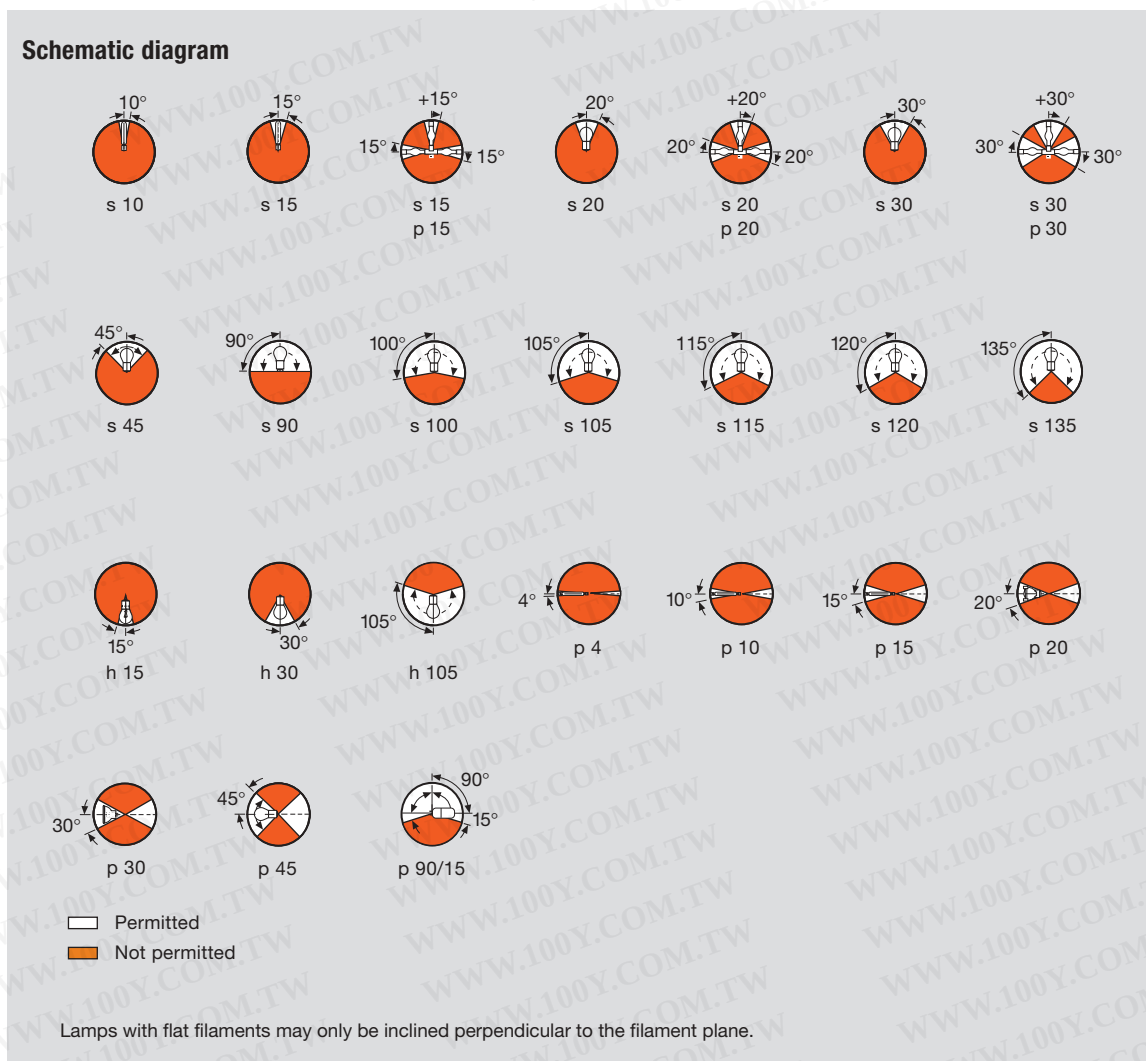
Bases IEC/EN 60061-1





Bases





The lamps are guaranteed only if they are operated with approved control gear or with control gear declared to be suitable. A list of sources of control gear and igniters is available on request. With the exception of the XBO® product family, all discharge lamps contain small quantities of materials

which are harmful to the environment (such as mercury). In Europe, they therefore have to be disposed of under EEC Code 06 04 04*, Waste containing mercury, or 20 01 21*, Fluorescent tubes and other waste containing mercury. In other countries the relevant national regulations must be followed.



勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

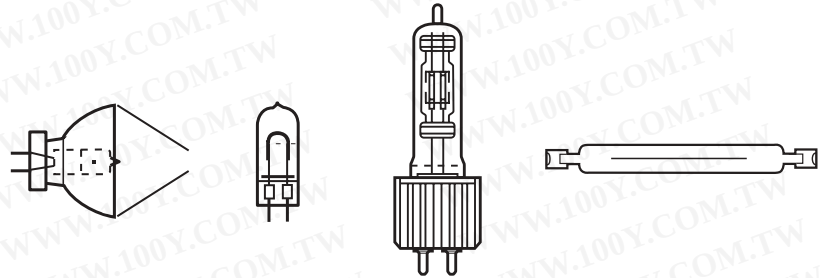
OSRAM BRAND PHOTO-OPTIC LIGHT SOURCES

Lighting to provide solutions in diverse applications such as effect lighting, stage, studio, TV, projection systems, microlithography, lightguide, technical, and industrial.

Photo-Optic Lamp Types

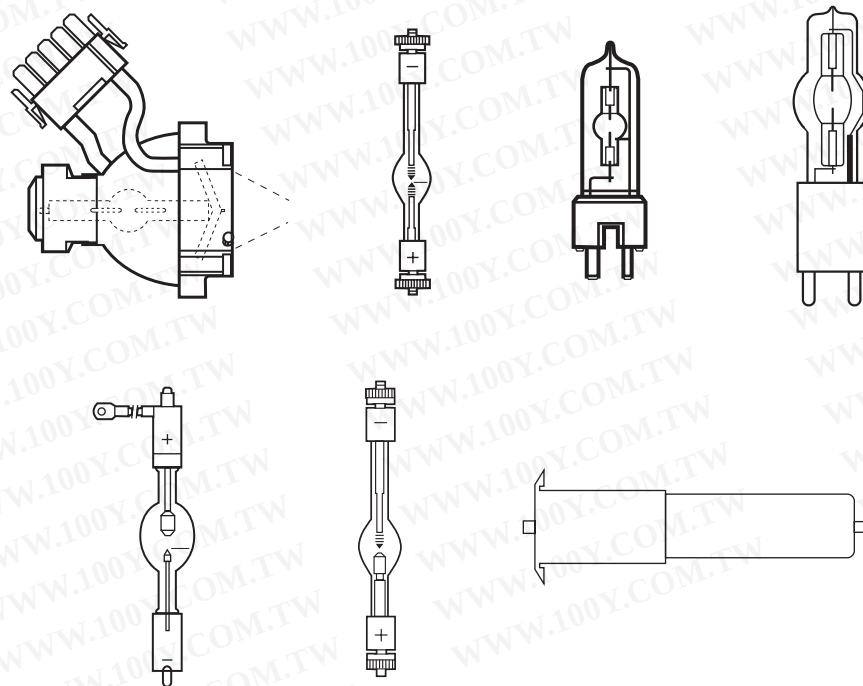
HALOGEN

Airfield/Aircraft
Audio Visual
Special Purpose Heat Lamps
Studio, Theatre, TV & Video
OSRAM STUDIOLINE®



DISCHARGE

HBO®
HMD®
HMI®
HMP®
HSD®
HSR®
HTI™
LINEX™
PLANON®
VIP®
XBO®
XERADEX™



IMPORTANT! PHOTO-OPTIC WARNINGS

In accordance with ANSI/IESNA Standard RP-27, all Photo-Optic Discharge lamps are Risk Group 3 products, and all Photo-Optic Incandescent and Tungsten Halogen lamps are Risk Group 2 products.

Please read and understand the Safety and Warning Instructions for each lamp type before use. Safety and Warning Instructions can be found at the end of this Photo-Optic section.

AUDIOVISUAL

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
BAA	54924	BAA	Projector	75	28	GX5.3		2000	T3.15	24	
BBA	11619	BBA	Photoflood No.1/Enlarger & Printer	250	118	Med		12	A21	12	
BCA	11626	BCA	Photoflood No. B1 Blue	250	118	Med		12	A21	12	
BCK	54576	BCK	Projector - Slide	500	120	G17t		50	T6	24	1,2
BHC/DYS/DYV	54836	BHC/DYS/DYV	Projector, Microfilm, Stage & Studio	600	120	GZ9.5	17500	75	T6	24	2
BHC/DYS/DYV/X	54868	BHC/DYS/DYV/X	Projector, Microfilm, Stage & Studio	600	120	GZ9.5	14500	250	T6	24	2
BHC/DYS/DYV-5	54835	BHC/DYS/DYV-5	Projector, Microfilm, Stage & Studio	600	125	GZ9.5	17500	75	T6	24	2,3
BRJ/EVB	54039	BRJ/EVB 64633 HLX	Projector, Microfilm, Microscope, Studio	150	15	G6.35	5600	50	T3.25	100	2
BRL	54034	BRL 64610 HLX	Projector, Microfilm, Microscope, Studio	50	12	G6.35	1600	50	T3	100	2
BRN	54698	BRN	Projector	1200	120	G17q		20	T7	24	2,4
BVA	54673	BVA	Projector	900	120	GY9.5		75	T7	24	
BVE	54812	BVE	Projector, Microfilm, Stage & Studio	625	120	GY9.5		50	T6	24	2
CAX	58831	CAX	Projector, Microfilm, Microscope, Studio	50	120	DC Bayonet	750	250	T4	24	
CBA	54580	CBA	Projector - Slide	500	120	G17t		50	T6	24	1,2
CEM/BFB	71076	CEM/BFB	Projector - Wheel Alignment	110	120	SC Bayonet			T8	24	
DAY/DAK	74460	DAY/DAK	Projector - Slide	500	120	Trufocus			T10	24	
DDK	54729	DDK	Projector	80	19	GX5.3	150	50	T3.15	24	5
DDL	54660	DDL	Projector - Microfilm	150	20	GX5.3		500	T3.15	24	
DDM	54737	DDM	Projector - Slide	80	19	GX5.3	400	50	T3.15	24	5
DDS	54944	DDS	Projector - Microfilm	80	21	GX5.3		1000	T3.15	24	
DED	54726	DED	Projector - Microfilm	85	13.8	GX5.3	150	1000	T3.15	24	5,6
DNE	54409	DNE	Projector	150	120	GX7.9	100	15	T3.15	24	5,6
DNF	54411	DNF	Projector - 8mm	150	21	GX7.9	300	25	T3.15	24	6
DVY	54528	DVY	Projector, Stage & Studio	650	120	G5.3	20000	25	T6	12	
DXH	14483	DXH	Reflector Super Photoflood -Handy Pack	375	115	Med		15	BR40	12	
DYH	54561	DYH	Projector, Stage & Studio	600	120	G5.3	17000	75	T5	24	
DYR	54839	DYR 64686	Projector, Microfilm, Stage & Studio	650	230	GY9.5	16500	50	T7	25	7
DZE	54755	DZE	Projector, Microfilm, Stage & Studio	150	24	GZ9.5	4000	100	T4	24	
EBV	11558	EBV	Super Photoflood/ No.2	500	118	Med Brass	17800	8	PS25	24	
ECA	13365	ECA	Super Photoflood	250	120	Med Brass	6500	20	A23	24	
ECT	11560	ECT	Photoflood	500	120	Med Brass	13650	60	PS25	24	
EFM	54151	EFM 64607	Projector - 8mm	50	8	GZ6.35		50	T3.5	50	6
EFN	54158	EFN 64615 HLX	Projector - 8mm	75	12	GZ6.35		50	T3.5	50	6
EFP	54160	EFP 64627 HLX	Projector - 8mm	100	12	GZ6.35		50	T3.5	50	6

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ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
EFR	54161	EFR 64634 HLX	Projector - 8mm	150	15	GZ6.35		50	T3.5	50	6
EHA	54585	EHA	Projector, Microfilm, Stage & Studio	500	120	GY9.5		50	T6	24	2,4
EHE	54038	EHE 64626 HLX	Projector	100	12	PG22	3600	50	T4	30	2
EHJ	54045	EHJ 64655 HLX	Projector, Microfilm, Microscope, Studio	250	24	G6.35	10000	50	T4	100	2
EJA	54753	EJA	Projector - Fiber optics	150	21	GX5.3	354	40	T3.15	24	
EJL	54730	EJL	Projector - 16mm Color printer	200	24	GX5.3	725	50	T3.5	24	5
EJM	54747	EJM	Projector - 8mm	150	21	GX5.3	170	40	T3.25	24	5
EJV	54732	EJV	Projector - 8mm, Printer	150	21	GX5.3	270	100	T3.15	24	5
EKE	54842	EKE	Projector - 8mm, Fiber-Optics	150	21	GX5.3	80	200	T3.15	24	2,5
EKP/ENA	54734	EKP/ENA	Projector - 8mm	80	30	GX5.3	115	25	T3.15	24	5
ELC	54840	ELC	Projector - Enlarger, Color printer	250	24	GX5.3	800	50	T3.5	24	5,6,8
ELC/HLX	54163	ELC 64653 HLX	Projector - Enlarger, Color printer	250	24	GX5.3		50	T3.5	50	
ELC-3/X	54841	ELC-3/X	Projector, Stage Studio - Disco	250	24	GX5.3	550	300	T3	24	5
ELD	54745	ELD	Projector - Microfilm	150	21	GX5.3	350	40	T3.15	24	5
ELH	54776	ELH	Projector - Overhead	300	120	GY5.3	525	35	T3.5	24	2,5
ELS	54810	ELS	Projector	50	16	GX7.9	20	650	T3.15	24	2,5
ELV	54765	ELV	Projector	150	21.5	GX7.9	225	100	T3.15	24	5,6
ELZ	54816	ELZ	Projector	150	21	GX7.9	350	60	T3.15	24	5,6
EMG	54828	EMG	Projector	500	220	GY9.5		75	T6	24	2
EMM/EKS	54960	EMM/EKS	Projector - 16mm	250	24	GX7.9	725	50	T3.15	24	5,6
ENG	54957	ENG	Projector	300	120	GY5.3	690	15	T3.5	24	2,5
ENH	54986	ENH	Projector - Slide	250	120	GY5.3	340	175	T3.5	24	2,5
ENH-5	54988	ENH-5	Projector - Overhead	250	125	GY5.3	340	175	T3.5	24	2,5
ENL	58786	ENL	Projector - Display, Fiber-Optics	50	12	GX5.3	85	3000	T3.15	24	
ENX	54984	ENX	Projector - Overhead	360	82	GY5.3	460	75	T3.5	24	2,5
ENX-5	54913	ENX-5	Projector - Overhead	360	86	GY5.3	540	75	T3.5	24	5
ENX-7	54916	ENX-7	Projector - Overhead	360	87.5	GY5.3	540	75	T3.5	24	5
EPR	54829	EPR	Projector	500	120	G17t		50	T6	24	1,2
EPS/230	54975	EPS/230	Projector	500	230	G17t		50	T6	24	2,4,7
EPS	54977	EPS	Projector	500	240	G17t		50	T6	24	1,2,4
EPT	58782	EPT	Projector - Fiber-Optics	42	10.8	GX5.3		8000	T3.15	24	
EPV	54926	EPV	Projector - Microfilm	90	14.5	GX5.3	36	500	T3.15	24	5,6
EPX	54927	EPX	Projector - Microfilm	90	14.5	GX5.3	43	500	T3.15	24	5,6
EPZ	54743	EPZ	Projector - Microfilm	50	13.8	GX5.3	80	3000	T3.15	24	5,6
ERB	54996	ERB BULK	Projector	12	12	Wedge		150	T2.25	500	
ERC	55001	ERC BULK	Projector	25	14	Wedge		200	T3.25	500	

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ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
ERK	55050	ERK BULK	Projector	12	6	Wedge		150	T2.25	500	
ERM	55054	ERM BULK	Projector	7	6	Wedge		30	T2.25	500	
ERN	55056	ERN BULK	Projector	10	6	Wedge		50	T2.25	500	
ESA/FHD	54025	ESA/FHD 64225	Projector	10	6	G4	200	100	T3	100	
ESB	54019	ESB 64250 HLX	Projector	20	6	G4	480	100	T3.5	100	
ESG	55075	ESG WEDGE/28	Projector	25	28	Wedge		200	T3.25	500	
ETJ	54928	ETJ	Projector	250	120	GY5.3	600	175	T3.5	24	2,5
EVA	54052	EVA 64623 HLX	Projector, Microfilm, Microscope, Studio	100	12	GY6.35	2800	2000	T4	100	2
EVC	54047	EVC 64657 HLX	Projector, Microfilm, Microscope, Studio	250	24	G6.35	9000	300	T4	100	2
EVD	54100	EVD 64663 HLX	Projector, Microfilm, Studio	400	36	G6.35	16000	50	T6	24	2,9
EVW	54723	EVW	Projector	250	82	GY5.3	390	50	T3.5	24	2,5
EXR	54392	EXR	Projector - Slide	300	82	GX5.3	925	35	T3.5	24	2,5
EXW	54388	EXW	Projector - Slide	300	82	GX5.3	1050	15	T3.5	24	2,5
EXY	54394	EXY	Projector - Slide	250	82	GX5.3	400	200	T3.5	24	2,5
EYB	54446	EYB	Projector, Stage & Studio	360	82	G5.3	10000	75	T3.5	24	2
EYB-5	54448	EYB-5	Projector, Microfilm, Stage & Studio	360	85.5	G5.3	10000	75	T3.5	24	2
EYB-7	54455	EYB-7	Projector, Microfilm, Stage & Studio	360	87.5	G5.3	10000	75	T3.5	24	2
EZE	54386	EZE	Projector, Stage & Studio	150	82	GX5.3	350	150	T3.5	24	2,5
FBV	54568	FBV	Projector, Microfilm, Stage & Studio	250	30	E10	7000	6	T3	12	
FCR	54036	FCR 64625 HLX	Projector, Microfilm, Microscope, Studio	100	12	GY6.35	3600	50	T3.5	100	2
FCS	54041	FCS 64640 HLX	Projector	150	24	G6.35	6000	50	T4	100	2
FDS	54456	FDS	Projector	150	24	GZ9.5	4450	50	T4	24	
FDS/DZE	54055	FDS/DZE 64643	Projector, Microfilm, Microscope, Studio	150	24	GY9.5	5000	100	T4	30	2
FDT	54709	FDT	Projector, Microfilm, Stage & Studio	100	12	GY9.5	2900	100	T3	24	
FDT 64628	54031	FDT 64628	Projector, Stage & Studio	100	12	GY9.5	3000	50	T4	30	2
FDV	54054	FDV 64642 HLX	Projector, Microfilm, Microscope, Studio	150	24	G6.35	5000	300	T4	100	2
FHS	54979	FHS	Projector - Slide	300	82	GX5.3	650	70	T3.5	24	2,5
FKT/EYH	54547	FKT/EYH	Projector - Video Camera	250	120	G5.3	5400	200	T6	24	
FLE	54383	FLE	Projector	360	82	GY5.3	1250	75	T3.5	24	5,10
FLT	54440	FLT	Projector - Video Camera, Microfilm	25	13.8	G4		500	T2.5	24	11
FNS	58635	FNS 64512	Projector, Stage & Studio	300	120	GX6.35	9500	15	T5	25	2
FNT	54044	FNT 64656PT HLX	Projector, Microfilm, Microscope, Studio	275	24	G6.35	10000	75	T4	100	2

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ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
FSG	54899	FSG	Projector	1200	120	P28s	28000	100	T7	12	2
FSX	54897	FSX/230	Projector	400	230	GY9.5		75	T6	24	2,4
FSY	54898	FSY	Projector	400	240	GY9.5		75	T6	24	2,4
FXL	54912	FXL	Projector - Overhead	410	82	GY5.3	640	75	T3.5	24	2
FXL-HL	54904	FXL-HL	Projector - Overhead	410	82	GY5.3	850	40	T3.5	24	2,5
GCB	54430	GCB	Projector, Stage & Studio, Video	200	30	G5.3	5300	200	T3	24	
GCC	54432	GCC	Projector, Stage & Studio	100	12	G5.3	3100	200	T3	24	
GCD	54824	GCD BULK	Projector, Microfilm, Stage & Studio	590	50	GZ9.5	21500	50	T6	100	2
GCD	54845	GCD	Projector, Microfilm, Stage & Studio	590	50	GZ9.5	21500	50	T6	24	2
GKT	54439	GKT 410T3	Projector, Stage & Studio, Video	410	82	G5.3	13500	35	T3.5	24	
	11614	211	Enlarger & Printer	75	118	Med	1215	200	A21	12	
	11615	212	Enlarger & Printer	150	118	Med	2700	200	A21	12	
	53998	64638 HLX	Projector	100	24	G6.35	2900	300	T3	100	
	53999	64265 HLX	Projector	30	6	G4	700	100	T2	100	
	54021	64251 HLX	Projector	20	6	PG22	500	100	T3	30	
	54022	64260	Projector	30	12	PG22	800	50	T3	30	
	54023	64261	Projector	30	12	G6.35	750	50	T3.25	100	
	54026	62138 HLX	Projector	100	12	GZ6		25	T3	100	
	54027	64275	Projector	35	6	G4	780	50	T3	100	
	54028	64611 HLX	Projector	50	12	G6.35	1350	100	T3.25	100	2
	54032	64621 HLX	Projector, Microfilm, Stage & Studio	100	12	PG22	2750	2000	T3	30	2
	54050	64223	Projector	10	6	G4	150	300	T3	100	
	54056	64650	Projector, Microfilm, Microscope, Studio	50	22.8	G6.35	1000	1300	T4	100	
	54057	64664 HLX	Projector, Microfilm, Microscope, Studio	400	36	G6.35	14500	150	T6	25	2,12
	54058	64665 HLX	Projector, Microfilm, Microscope, Studio	400	36	G6.35	12200	300	T6	25	2
	54131	64617S	Projector	75	12	G5.3-4.8		25	T2.5	10	
	54136	64654 HLX	Projector, Microfilm, Microscope, Studio	250	24	GY9.5	9000	300	T6	30	2
	54138	64602	Projector, Microfilm, Microscope, Studio	50	12	G6.35	1000	1100	T3.25	100	2
	54150	64255	Projector	20	8	GZX4		50	T2.5	10	6
	54152	64614	Projector	75	12	G5.3-4.8		25	T2.5	10	6
	54154	64617	Projector	75	12	G5.3-4.8		25	T2.5	10	6
	54156	64624	Projector	100	12	G5.3-4.8		25	T2.5	10	6
	54159	64613 HLX	Projector	75	12	G5.3-4.8		25	T2.5	10	6,13
	54162	64635 HLX	Projector	150	15	GZ6.35		50	T3.5	50	6,14
	54165	64637	Projector	100	12	GZ6.35		1500	T3.5	50	2
	54400	85T3/RM	Projector	85	82	GX5.3		40	T3.5	24	

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ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
	54466	120/T4/SPECIAL	Projector	120	24	Special	2750	500	T4	24	
	54917	410W/MR16/Fiber Optic	Fiber optic	410	82	GY5.3	43	75	T3.5	24	5
	58729	60T4QCL	Medical Overhead Illumination	60	24	BA15d	1280	500	T4	12	
	58939	220T4Q/2PPF	Medical Overhead Illumination	220	22	GY9.5	6200	200	T4	12	
	58941	235T4Q/2PPF	Medical Overhead Illumination	235	33	GZ9.5	5800	200	T4	12	
	76302	70335 BULK	Special Purpose	27	6	Special				200	
	76304	70314 (390153)	Special Purpose	25	6	P47D				100	
	76305	70313 (390158)	Special Purpose	30	6	P47D				100	
	76306	70302 (380018)	Special Purpose	60	12	BA20d				100	
	76311	8013	Projector	10	6	BA15d		200		100	15
	76313	8017	Projector	15	6	B15d		1000		100	
	76314	8018	Projector	15	6	B15d		100		100	15,16
	76316	8024	Projector	40	12	BA20d		500		100	2
	76317	8025	Projector		6	BA20d		300		100	15
	76319	8029	Projector	60	15	BA20d		25		100	2
	76320	8032	Projector	100	12	P28s		100		50	2
	76321	8100	Projector		5	E14		600		100	2
	76362	91645	Special Purpose	50	110	PY280				100	

STUDIO, THEATRE, TV & VIDEO

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
BCM	54694	BCM	Stage & Studio	20000	230	G38	580000	350	T32	1	2
BTL	54685	BTL	Stage & Studio	500	120	P28s	11000	750	T6	12	
BTM	54686	BTM	Stage & Studio	500	120	P28s	13000	100	T6	12	2
BTN	54687	BTN	Stage & Studio	750	120	P28s	17000	500	T7	12	2
BTP	54688	BTP	Stage & Studio	750	120	P28s	20000	200	T7	12	
BTR	54689	BTR	Stage & Studio	1000	120	P28s	27500	250	T7	12	2
BVM	58638	BVM 64540	Stage & Studio	650	230	GX6.35	20000	15	T8	25	17
BVT	54690	BVT	Stage & Studio	1000	120	P40s	23000	500	T7	6	
BVV	54691	BVV	Stage & Studio	1000	120	P40s	27500	200	T7	6	
BVW	54692	BVW	Stage & Studio	2000	120	P40s	59000	280	T9.5	6	
CXZ	54717	CXZ	Stage & Studio	1500	120	G38	38500	325	T8	6	
CYV	54706	CYV	Stage & Studio	1000	120	G38	27500	200	T7	6	
CYX	54613	CYX	Stage & Studio	2000	120	G38	55000	300	T9	6	2
DNS/FMC	54655	DNS/FMC	Stage & Studio	500	120	P28s	11000	500	T6	24	
DNT/FMD	54658	DNT/FMD	Stage & Studio	750	120	P28s	17000	500	T7	24	15
DPY	54647	DPY	Stage & Studio	5000	120	G38	143000	500	T17	1	2
DTA	54716	DTA	Stage & Studio	1500	120	P40s	39000	100	T8	6	
DTY	54696	DTY	Stage & Studio	10000	120	G38	290500	350	T24	1	2
DWE	54500	DWE	Stage & Studio	650	120	Screw Term	24000	100	PAR36	12	

STUDIO, THEATRE, TV & VIDEO

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
DWT	58937	DWT	Stage & Studio	1000	120	RX7s	22000	2000	T6	12	
DXW	53997	DXW	Stage & Studio	1000	120	R7s	28000	150	T5	12	18
DXX	54564	DXX	Stage & Studio	800	240	R7s	20500	75	T4	12	19
ECR	54724	ECR	Stage & Studio	10000	230	G38	290500	300	T24	1	2,3
EFX	54787	EFX	Stage & Studio	500	120	G22	10000	2000	T5	12	
EGE	54648	EGE	Stage & Studio	500	120	P28s	10000	2000	T5	12	
EGG	54652	EGG	Stage & Studio	750	120	P28s	15000	2000	T5	12	
EGJ	54654	EGJ	Stage & Studio	1000	120	P28s	25500	400	T6	12	
EGK	54656	EGK	Stage & Studio	1000	120	P28s	24500	400	T6	12	
EGN	54659	EGN	Stage & Studio	500	120	G22	13000	100	T6	12	2
EGR	54662	EGR	Stage & Studio	750	120	G22	20000	200	T7	12	2
EGT	54664	EGT	Stage & Studio	1000	120	G22	27500	250	T7	12	2
EGW	58637	EGW 64535	Stage & Studio	650	120	GX6.35	20000	15	T8	25	
EHC/EHB	54506	EHC/EHB	Stage & Studio	500	120	G9.5	13000	300	T4	12	
EHD	54508	EHD	Stage & Studio	500	120	G9.5	10600	2000	T4	12	
EHF	54510	EHF	Stage & Studio	750	120	G9.5	20400	300	T5	12	
EHG	54512	EHG	Stage & Studio	750	120	G9.5	15400	2000	T5	12	
EHP	58942	EHP	Stage & Studio	300	120	R7s	5000	2500	T4	12	
EHR	58936	EHR	Stage & Studio	400	120	R7s	7500	2000	T4	12	
EHZ	54550	EHZ	Stage & Studio	300	120	R7s	5900	2000	T2.5	12	6,20
EJG	54598	EJG	Stage & Studio	750	120	R7s	20600	400	T3	12	6
EKB	54837	EKB	Stage & Studio	420	120	GZ9.5	11000	75	T6	24	2
FAD	54574	FAD	Stage & Studio	650	120	R7s	16500	100	T4	12	
FAL	58860	FAL	Projector, Stage & Studio	420	120	R7s	11000	75	T4	24	20
FCB	54483	FCB	Projector, Stage & Studio	600	120	R7s	16500	75	T4	24	
FCM	54442	FCM	Stage & Studio	1000	120	R7s	28000	400	T3	12	6
FDA	54471	FDA	Stage & Studio	400	120	R7s	10400	250	T4	12	20
FDB	54435	FDB	Stage & Studio	1500	120	R7s	41200	400	T4	12	6
FDN	54534	FDN	Stage & Studio	500	120	R7s	12800	400	T2.5	12	6
FEL	54570	FEL	Stage & Studio	1000	120	G9.5	27500	300	T6	12	
FEP/220	54636	FEP/220	Stage & Studio	1000	220	G9.5	23000	150	T6	12	
FEP/240	54515	FEP/240	Stage & Studio	1000	240	G9.5	23000	150	T6	12	21
FER	54571	FER	Stage & Studio	1000	120	RX7s	27500	500	T6	12	
FEV	54441	FEV	Stage & Studio	200	120	DC Bayonet	5500	50	T4	12	
FEX/230	54514	FEX/230	Stage & Studio	2000	230	RX7s	50000	300	T8	12	6,17
FEX/240	54518	FEX/240 64781	Stage & Studio	2000	240	RX7s	50000	300	T8	12	
FEY	54559	FEY	Stage & Studio	2000	120	RX7s	57400	400	T8	12	
FFJ	54488	FFJ	Stage & Studio	600	120	R7s	16500	75	T4	24	20
FFM	58862	FFM	Stage & Studio	420	120	R7s	11000	75	T4	24	20
FFT	54350	FFT	Stage & Studio	1000	120	R7s	27000	300	T3	12	
FHM	54532	FHM	Stage & Studio	1000	120	R7s	27300	300	T3	12	6
FKW	54711	FKW	Stage & Studio	300	120	GY9.5	7800	200	T6	24	2

STUDIO, THEATRE, TV & VIDEO

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
FLK	54589	FLK	Stage & Studio	575	115	G9.5	16500	300	T5	12	22
FMR	54412	FMR	Stage & Studio	600	120	GY9.5	12500	2000	T5	24	
FRG	54629	FRG	Stage & Studio	500	120	GY9.5	13000	150	T6	24	2
FRK	54631	FRK	Stage & Studio	650	120	GY9.5	16900	200	T6	24	2
FSH	54436	FSH	Projector, Stage & Studio	125	120	G5.3	2500	200	T3	24	
FTK	54875	FTK	Stage & Studio	500	120	GY9.5	12000	200	T6	24	2
FVA	54637	FVA	Stage & Studio	1000	220	GX9.5	25000	200	T7	12	2,17
FVL	54459	FVL	Stage & Studio	200	120	GX5.3	5200	200	T4	24	
FVM	54434	FVM	Stage & Studio	105	120	GX5.3	2250	250	T4	24	
GCA	54428	GCA	Projector - Video, Studio	250	120	G5.3	5700	200	T3	24	
GKV	54511	GKV	Stage & Studio	600	230	G9.5	14000	300	T6	25	7
GLA	54516	GLA 575/115/2000	Stage & Studio	575	115	G9.5	10500	2000	T6	12	23
GLC	54507	GLC 575/115/300	Stage & Studio	575	115	G9.5	15500	300	T6	12	23,24
GLF	54460	GLF	Stage & Studio	235	230	G5.3	5100	100	T4	24	
	20607	STUDIOLINE 55W/3200	Compact Fluorecent /Studio-TV	55		2G11	3800	8000	T5	10	
	20608	STUDIOLINE 55W/5600	Compact Fluorecent /Studio-TV	55		2G11	3800	8000	T5	10	
	54001	64501	Stage & Studio	150	120	GX6.35	4500	25	T4	25	
	54499	4515 PAR36 30W	Stage & Studio	30	6	Screw Term	67000	100	PAR36	12	
	54602	HPL750/115 (UCF)	Stage & Studio	750	115	Special	21900	300	T6	12	25
	54603	HPL750/230 (UCF)	Stage & Studio	750	230	Special	19750	300	T6	12	25
	54604	HPL550/77/X (UCF)	Stage & Studio	550	77	Special	12160	2000	T6	12	25
	54618	HPL575/230 (UCF)	Stage & Studio	575	230	Special	14900	400	T6	12	25
	54619	HPL575/240 (UCF)	Stage & Studio	575	240	Special	14900	400	T6	12	25
	54622	HPL575/115 (UCF)	Stage & Studio	575	115	Special	16520	300	T6	12	25
	54623	HPL550/77 (UCF)	Stage & Studio	550	77	Special	16170	300	T6	12	25
	54625	HPL375/115 (UCF)	Stage & Studio	375	115	Special	10540	300	T6	12	25
	54649	HPL375/115/X (UCF)	Stage & Studio	375	115	Special	8000	1000	T8	12	25
	54807	HPL575/115/X (UCF)	Stage & Studio	575	115	Special	12360	2000	T6	12	25
	54813	HPL550/64 (UCF)	Stage & Studio	550	64	Special	16340	300	T6	12	25
	54815	HPL575/120/X (UCF)	Stage & Studio	575	120	Special	12360	2000	T6	12	25
	54817	HPL575/120 (UCF)	Stage & Studio	575	120	Special	16460	300	T6	12	25
	54822	HPL575/100 (UCF)	Stage & Studio	575	100	Special	16730	300	T6	12	25
	54825	HPL750/77 (UCF)	Stage & Studio	750	77	Special	22950	300	T6	12	25
	58636	64515	Stage & Studio	300	230	GX6.35	8500	15	T5	25	2,17
	58639	64573	Stage & Studio	1000	120	GX6.35	33000	15	T8	25	
	58640	64575	Stage & Studio	1000	230	GX6.35	33000	15	T8	25	17

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 勝特力电子(上海) 86-21-54151736
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STUDIO, THEATRE, TV & VIDEO LARGE PAR

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
EXC/230	56280	EXC/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	26,27
EXC/240	56232	EXC/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	26,27
EXD/230	56281	EXD/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	26
EXD/240	56233	EXD/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	26
EXE/230	56283	EXE/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	26
EXE/240	56234	EXE/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	26
EXG	56282	EXG/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	26,28
FFN	56214	FFN	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	26,29
FFP	56215	FFP	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	26,27
FFR	56217	FFR	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	26,30
FFS	56216	FFS	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	26,28
	14974	350PAR56/SP	Train Ditch Light	350	75	MEP		750	PAR56	12	26
	56247	500PAR64Q/SP	Stage & Studio	500	240	Ext Mog End Pr		300	PAR64	6	26
	56248	500PAR64Q/FL	Stage & Studio	500	240	Ext Mog End Pr		300	PAR64	6	26
	56277	600PAR56Q/VNSP	Stage & Studio	600	120	Ext Mog End Pr		200	PAR56	12	26,29
	56278	600PAR64Q/MFL	Stage & Studio	600	120	Ext Mog End Pr		200	PAR64	6	26,30

SPECIAL PURPOSE HEAT LAMPS

ANSI Code	Product Number	Ordering Abbreviation	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
FRN	54588	FRN 2000T8Q	2000	120	G9.5	56500	200	T8	12	31,32
	54007	64514	300	120	GX6.35	7700	75	T6	25	31,32
	54008	64516/300T6/CL	300	230	GX6.35	7300	75	T6	25	17,31,32
	54560	1000TQ/RTP/CR/BULK	1000	120	G9.5	25000	2000	T6	15	31,32,33
	54572	850T6Q/RHP	850	80	1.125 Strand Ld		300	T6	12	31,32
	54577	2000/T8	2000	120	G22	56500	350	T8	12	31,32
	54584	1000Q/T6/RTPFS	1000	120	G9.5	27500	300	T6	12	31,32
	54590	1000Q/T6/RTP/2K	1000	120	G9.5	25000	2000	T6	12	31,32,34
	54752	1000T6QRTXP/X	1000	120	G9.5	25000	2000	T6	12	
	54884	1500T6Q/RTP	1550	230	G9.5	29000	2000	T6	12	31,32
	54895	410T3.5Q/JKT/2P	410	82	Special Bipin	10500	75	T3.5	12	31,32
	54896	1500T6Q/RTP	1550	230	G9.5	29000	2000	T6	12	31,32
	59803	2500T3Q/IR/7 480V	2500	480	RSC		5000	T3	12	31,32,35
	59822	500T3Q/IR/7 120V	500	120	RSC		5000	T3	12	31,32,35
	59841	1600T3Q/IR/7 240V	1600	240	RSC		5000	T3	12	31,32,35
	59850	500T3Q/IR 120V	500	120	Flex Nickel Leads		5000	T3	12	31,32,35
	59859	3650T3Q/IR/CL 480V	3650	480	Flex Nickel Leads		5000	T3	12	31,32,35
	59860	1000T3Q/IR 230-250V	1000	240	Flex Nickel Leads		5000	T3	12	31,32,35
	59864	1600T3Q/IR 240V	1600	240	Flex Nickel Leads		5000	T3	12	31,32,35
	59867	2500T3Q/IR 480V	2500	480	Flex Nickel Leads		5000	T3	12	31,32,35
	59870	3800T3Q/IR 570V	3800	570	Flex Nickel Leads		5000	T3	12	31,32,35
	59934	1200T3Q/IR/CL/HT 144V	1200	144	Flex Nickel Leads		3000	T3	12	31,35,36,37

SPECIAL PURPOSE HEAT LAMPS

ANSI Code	Product Number	Ordering Abbreviation	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
	59936	1600T3Q/IR 277V	1600	277	Flex Nickel Leads		5000	T3	12	31,32,35

AIRCRAFT

Watts	Bulb	Volts	Base	Product Number	Ordering Abbreviation	Application	Beam Type	CBCP	Filament	Avg Rated Life(hrs)	MOL (mm)	Pkg Qty	Footnotes
100	T3	28	Special	54936	1970X	Aircraft Lighting Wing-tip			CC-8	2000	57.15	100	
		10	Special	54937	1978X	Aircraft Lighting Wing-tip			C-8	2000	49	100	
250	PAR46	28	Screw Term	15399	4551	Aircraft Taxiing	VNSP	75,000	CC-6	25	95.25	12	29
450	PAR46	28	Screw Term	56229	Q4681	Aircraft Landing	VNSP	310,000	CC-6	50	63.5	12	26,29
600	PAR64	28	Screw Term	14936	4559	Aircraft Landing	VNSP	600,000	CC-8	25	101.6	6	29
				56222	Q4559	Aircraft Landing	VNSP	600,000	CC-8	100	101.6	6	26,29
				56223	Q4559X	Aircraft Landing - High Output	VNSP	765,000	CC-8	100	101.6	6	26,29
1000	PAR64	28	Screw Term	14988	4557	Aircraft Landing/Taxiway	VNSP	540,000	CC-8	25	101.6	6	29
				14994	5557	Aircraft Landing/Taxiway	VNSP	540,000	CC-8	50	101.6	6	29,38

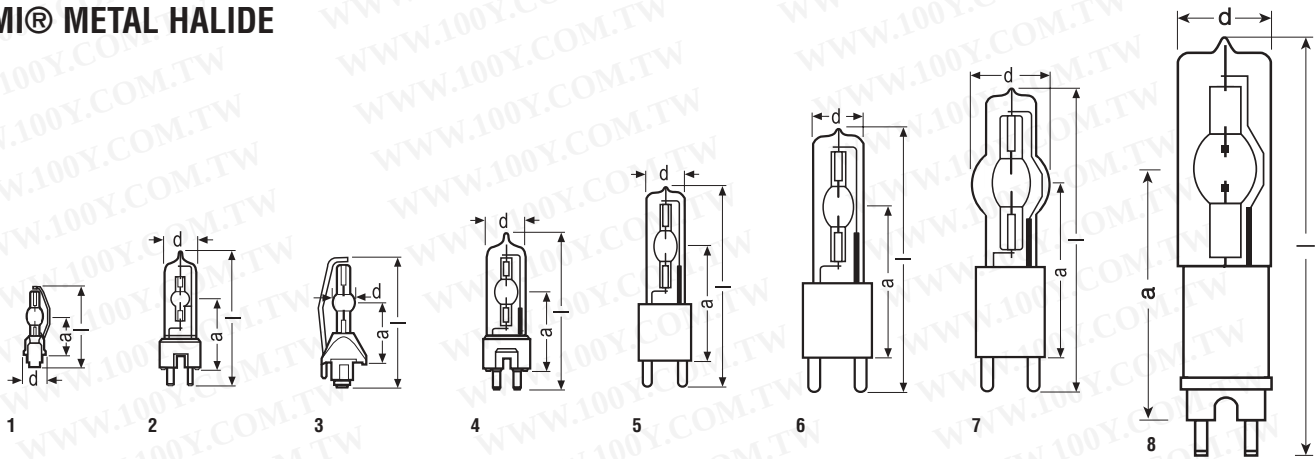
AIRFIELD

Watts	Bulb	Base	Product Number	Ordering Abbreviation	Application	Current (A)	Lumens	Filament	Avg Rated Life(hrs)	LCL (mm)	MOL (mm)	Pkg Qty	Footnotes
30	MR16	Special	58730	6.6A/30W/64331AC/FL	Airfield	6.6	1200		1500			10	
	T3.25	GZ9.5	55041	6.6A/30T3.25/EXL/HG-13	Airfield	6.6	375	C-8Z	1000			200	
	T10	Med Prefocus	17980	6.6A/30T10/1P	Airfield/Airport	6.6	400	C-2V	1000	38.1	100	60	
32	T2.5	1.75 Strand Ld	58807	6.6A/32T2.5Q/CL	Airfield/Airport	6.6	400	C-8	1000	20.8	50.3	100	
45	T3	R7s	58704	6.6A/45T3/CL/64315	Airfield/Airport	6.6	750	C-8	1000	23	47.5	25	
	T3.25	GZ9.5	55048	6.6A/45T3.25/EXM/HG-11	Airfield	6.6	650	C-8Z	1000			200	
	T4	PK30d	58697	6.6A/45T4/64319 FEMALE	Airfield/Airport	6.6	800	C-8	1000	20	53	100	2,39,40
			58705	6.6A/45T4/CL/64317	Airfield/Airport	6.6	800	C-8	1000	16	58	100	2,40
	Special		58722	6.6A/45T4/64319Z	Airfield/Airport	6.6	800	C-8	1000	20	53	100	2,41,42
65	T10	Med Prefocus	17981	6.6A/45T10/P	Airfield/Airport	6.6	675	C-2V	1000	38.1	100	60	
	T2.5	1.75 Strand Ld	58802	6.6A/65T2.5Q/CL BULK	Airfield/Airport	6.6	1350	C-8	1000	20.8	50.3	100	
	T4	PK30d	58721	6.6A/65T4/64328/HLX	Airfield/Airport	6.6	1450	C Bar 6	1000	20	53	100	2,40,43
		Special	58726	6.6A/65T4/64328Z/HLX	Airfield/Airport	6.6	1450	C Bar 6	1000	20	53	100	2,42,44
100	T4	Special	58703	6.6A/100T4/64341Z/HLX	Airfield/Airport	6.6	2700	C Bar 6	1000	20	55	100	2,42,45
		PK30d	58706	6.6A/100T4/64342/HLX	Airfield/Airport	6.6	2700	C Bar 6	1000	20	58	100	2,40
115	T4	DCR	58793	6.6A/115T4Q/DCR	Airfield/Airport	6.6	2900	C Bar 6	500	26.9	60.3	12	
		GZ9.5	58798	6.6A/115T4Q/CL/2PPF/EVV	Airfield/Airport	6.6	2500	C Bar 6	500	39.1	65	12	2,46
125	T4	1.125 Strand Ld	58809	6.6A/125T4Q/NL	Airfield/Airport	6.6	2500	C Bar 6	500	38	76.2	12	
150	T4	PK30d	58717	6.6A/150T4/64361/HLX	Airfield/Airport	6.6	3600	C Bar 6	1000	20	58	100	2,40,47
		Special	58724	6.6A/150T4Q/64361Z/HLX	Airfield/Airport	6.6	3600	C Bar 6	1000	20	58	100	2,42
175	T4	GZ9.5	58799	6.6A/175T4Q/2PPF	Airfield/Airport	6.6	4400	C Bar 6	500	39.1	65	12	2
200	PAR56	Ext Mog End Pr	56252	6.6A/200PAR56Q/4	Airfield/Airport	6.6		CC-6	1000			12	

AIRFIELD

Watts	Bulb	Base	Product Number	Ordering Abbreviation	Application	Current (A)	Lumens	Filament	Avg Rated Life(hrs)	LCL (mm)	MOL (mm)	Pkg Qty	Footnotes
200	PAR64	Ext Mog End Pr	14985	6.6A/200PAR64/2	Airfield/Airport	6.6		CC-6	1000		114.3	6	
			56220	6.6A/200PAR64Q/2P	Airfield/Airport	6.6		CC-6	2000		114.3	6	26,48
	T4	PK30d	58708	6.6A/200T4/64382/HLX	Airfield/Airport	6.6	4800	CC-6	1000	20	64	100	2,49
		DCR	58746	6.6A/200T4Q/CL/DCR	Airfield/Airport	6.6	4900	CC-6	500	26.97	60.3	12	
		GZ9.5	58750	6.6A/200T4Q/CL/2PPF/EZL	Airfield/Airport	6.6	4700	CC-6	500	39.1	65	12	2
		1.125 Strand Ld	58800	6.6A/200T4Q/CL BULK	Airfield/Airport	6.6	4700	CC-6	500	38	76.2	100	
		1.75 Strand Ld	58801	6.6A/200T4Q/5CL	Airfield/Airport	6.6	4700	CC-6	700	38	76.2	12	6,50
	T5	R7s	58707	6.6A/200T5/CL/64380	Airfield/Airport	6.6	4400	CC-8	1000	21.3	60.2	25	
	T14	Med Prefocus	17983	6.6A/204T14/2P	Airfield/Airport	6.6	4220	C-13	500	55.5	146	24	

HMI® METAL HALIDE



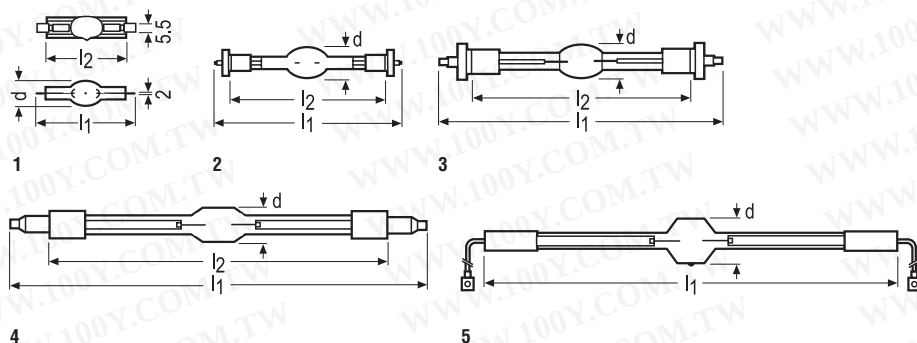
HMI® SINGLE-ENDED

Ordering Abbreviation	HMI 123 W	HMI 200 W/SE	HMI 250 W/SE	HMI 400 W/SE	HMI 575 W/SE
Product Number	54059	54061	54062	54137	54063
Watts (W)	125	200	270	400	575
Volts (V)	80	70	50	70	95
Current (A)	1.7	3.0	5.0	6.9	7.0
Lumens (lm)	8500	16000	16200	33000	49000
Color Temp (K)	6000	6000	6000	6000	6000
Length l max (mm)	64	80	84	110	145
Distance a (mm)	26.7	39	35	60	70
Diameter d (mm)	10	20	12	23	30
Electrode Gap - cold (mm)	4	5	5	6	7
Avg Rated Life (hrs)	150	200	250	650	750
Operating Position	Any	Any	p 45	Any	Any
Base	Special	GZY9.5	FaX1.5	GZZ9.5	G22
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	1	2	3	4	5
Symbols & Footnotes	1	1,2	1,2,3,4	2,5	2,5

HMI® SINGLE-ENDED

Ordering Abbreviation	HMI 1200 W/SE	HMI 2500 W/SE	HMI 4000 W/SE	HMI 6000 W/SE	HMI 12000 W/SE
Product Number	54067	54070	54072	54099	54113
Watts (W)	1200	2500	4000	6000	12000
Volts (V)	100	115	200	123	160
Current (A)	13.8	25.6	24.0	55	84
Lumens (lm)	110000	240000	380000	600000	1150000
Color Temp (K)	6000	6000	6000	6000	6000
Length l max (mm)	200	225	250	360	450
Distance a (mm)	107	127	142	210	255
Diameter d (mm)	42	60	75	75	100
Electrode Gap - cold (mm)	10	14	20	23	27
Avg Rated Life (hrs)	750	500	500	500	300
Operating Position	Any	Any	Any	s 135	s 135
Base	G38	G38	G38	GX38	GX38
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	6	7	7	8	8
Symbols & Footnotes	2,5	2,5	2,5	2,5,6	2,5,6

HMI® METAL HALIDE



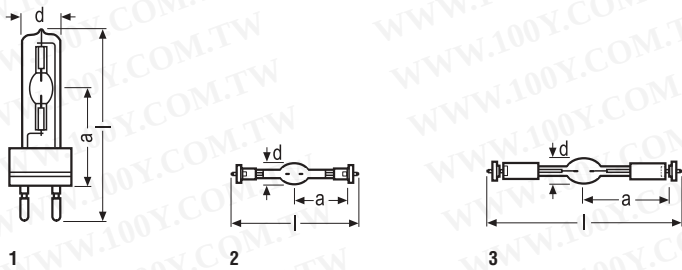
HMI® DOUBLE-ENDED

Ordering Abbreviation	HMI 200 W	HMI 575 W/GS	HMI 1200 W/GS	HMI 1200 W/S	HMI 2500 W/GS
Product Number	54060	54064	54066	54088	54069
Watts (W)	200	575	1200	1200	2500
Volts (V)	80	95	100	100	115
Current (A)	3.1	7.0	13.8	13.8	25.6
Lumens (lm)	14000	49000	110000	110000	240000
Color Temp (K)	6000	6000	6000	6000	6000
Length l ₁ max (mm)	75	135	220	135	355
Length l ₂ max (mm)	60	115	180	115	290
Diameter d (mm)	14	21	27	21	31.5
Electrode Gap - cold (mm)	10	7	10	7	14
Avg Rated Life (hrs)	300	750	750	750	500
Operating Position	p 15	Any	Any	Any	p 30
Base	X515	SFc10-4	SFc15.5	SFc10-4	SFa21
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	1	2	3	2	4
Symbols & Footnotes	3,5	5,7	5,7	5,8,9	3,5,7

HMI® DOUBLE-ENDED

Ordering Abbreviation	HMI 2500 W/S	HMI 4000 W	HMI 6000 W	HMI 12000 W/GS	HMI 18000 W
Product Number	54068	54071	54073	54074	54075
Watts (W)	2500	4000	6000	12000	18000
Volts (V)	115	200	123	160	225
Current (A)	25.6	24.0	55.0	84.0	88.0
Lumens (lm)	240000	380000	570000	1150000	1700000
Color Temp (K)	6000	6000	6000	6000	6000
Length l ₁ max (mm)	210	405	450	470	500
Length l ₂ max (mm)	150	340			
Diameter d (mm)	31.5	36	54	64	70
Electrode Gap - cold (mm)	14	34	21	25	44
Avg Rated Life (hrs)	500	500	500	500	250
Operating Position	p 30	p 15	p 15	p 15	p 15
Base	SFa21	SFa21	S25.5	S30	S30
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	4	4	5	5	5
Symbols & Footnotes	3,5,8,9	3,5,10	3,5	3,5,7	3,5,10

HMP® METAL HALIDE



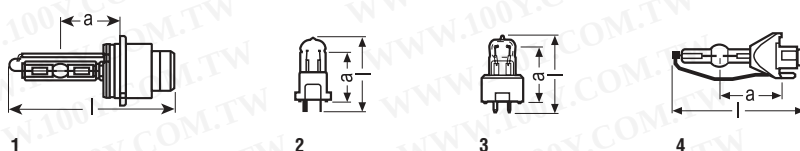
HMP® SINGLE-ENDED

Ordering Abbreviation	HMP 575 SE
Product Number	54145
Watts (W)	575
Volts (V)	100
Current (A)	6.7
Lumens (lm)	49000
Color Temp (K)	6000
Length l (mm)	145
Distance a (mm)	70
Diameter d (mm)	30
Electrode Gap - cold (mm)	7
Avg Rated Life (hrs)	1000
Operating Position	Any
Base	G22
Hot Restart	Yes
Fig No	1
Symbols & Footnotes	2,5,11

HMP® DOUBLE-ENDED

Ordering Abbreviation	HMP 400 DE	HMP 575 DE
Product Number	54146	54144
Watts (W)	400	575
Volts (V)	100	100
Current (A)	4.8	6.7
Lumens (lm)	33000	49000
Color Temp (K)	6000	6000
Length l (mm)	92	135
Distance a (mm)	35	57.5
Diameter d (mm)	16	21.5
Electrode Gap - cold (mm)	5.5	7
Avg Rated Life (hrs)	750	1000
Operating Position	p 45	Any
Base	SFXc10-4	SFXc10-4
Hot Restart	Yes	Yes
Fig No	2	3
Symbols & Footnotes	3,5,12,13,14	2,5,11

HTI™ METAL HALIDE



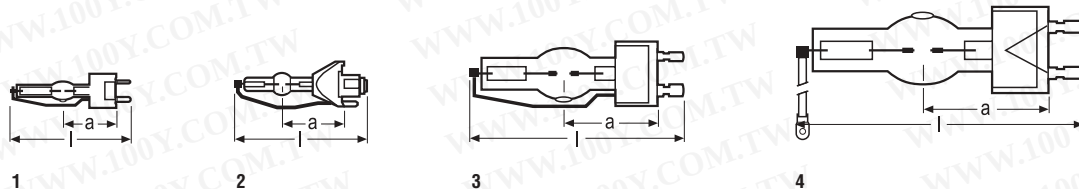
HTI™ SINGLE-ENDED

Ordering Abbreviation	HTI S 35/12	HTI 150 W	HTI 152 W
Product Number	69000	54078	54079
Watts (W)	35	150	150
Volts (V)	85	90	95
Current (A)	2.5	1.8	1.8
Lumens (lm)	3200	9500	9500
Average Luminance (cd/cm ²)	6500	5000	4200
Color Temp (K)	4250	6500	5000
Length l max (mm)	79.5	46	48
Distance a (mm)	27.1	30	30
Electrode Gap - cold (mm)	4.2	5.0	6.75
Avg Rated Life (hrs)	3000	750	2000
Operating Position	p 10	Any	Any
Base	P32d-2	GY9.5	GY9.5
Hot Restart	Yes	No	No
Fig No	1	2	3
Symbols & Footnotes	1,3,15	5,15,16	5,15

HTI™ SINGLE-ENDED

Ordering Abbreviation	HTI 250 W/SE	HTI 400 W/SE	HTI 404 W/SE
Product Number	54091	54084	54106
Watts (W)	270	400	400
Volts (V)	45	55	55
Current (A)	6	7.3	7.3
Lumens (lm)	10000	28000	28000
Average Luminance (cd/cm ²)	40000	30000	40000
Color Temp (K)	4900	4800	6000
Length l max (mm)	80	84	84
Distance a (mm)	35	35	35
Electrode Gap - cold (mm)	2.5	4.0	3.0
Avg Rated Life (hrs)	250	250	500
Operating Position	p 45	p 45	p 45
Base	FaX1.5	FaX1.5	FaX1.5
Hot Restart	Yes	Yes	Yes
Fig No	4	4	4
Symbols & Footnotes	1,2,3,4,15,17	1,2,3,4,15,17,18	1,2,3,15,17,18

HTI™ METAL HALIDE



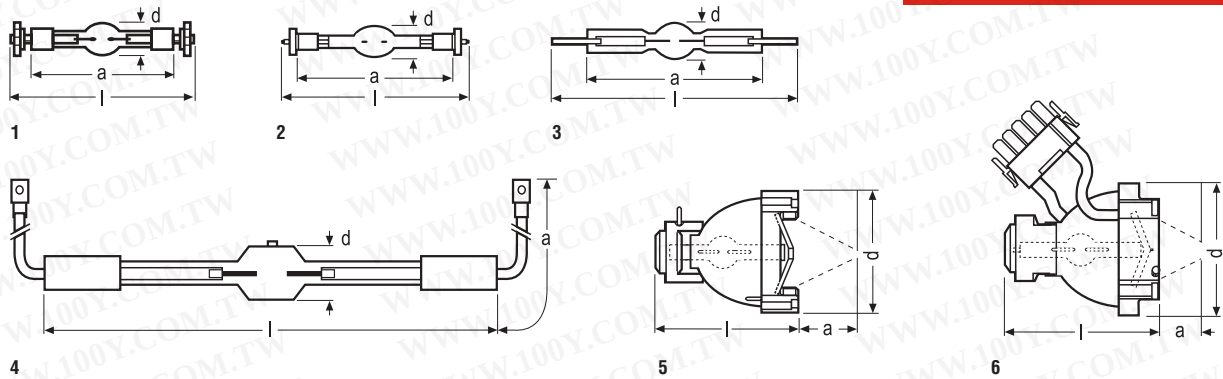
HTI™ SINGLE-ENDED

Ordering Abbreviation	HTI 405 W/SE	HTI 600 W/SE	HTI 705 W/SE
Product Number	54139	54087	54130
Watts (W)	400	600	700
Volts (V)	55	95	70
Current (A)	7.3	7.7	10
Lumens (lm)	28000	48000	59000
Average Luminance (cd/cm²)	40000	25000	
Color Temp (K)	5800	5300	5700
Length l max (mm)	80	84	85
Distance a (mm)	36.5	35	39
Electrode Gap - cold (mm)	3.0	5.5	4
Avg Rated Life (hrs)	500	300	500
Operating Position	p 45	p 45	p 45
Base	GY9.5	FaX1.5	GY9.5
Hot Restart	No	Yes	No
Fig No	1	2	1
Symbols & Footnotes	1,2,3,15,17	2,3,4,5,15,17,18	2,3,15,17

HTI™ SINGLE-ENDED

Ordering Abbreviation	HTI 1200 W/SE	HTI 2500 W/SE
Product Number	54141	54142
Watts (W)	1200	2500
Volts (V)	100	115
Current (A)	13.8	25.6
Lumens (lm)	99000	240000
Average Luminance (cd/cm²)	26000	30000
Color Temp (K)	4500	6000
Length l max (mm)	135	180
Distance a (mm)	59	85
Electrode Gap - cold (mm)	7	14
Avg Rated Life (hrs)	600	600
Operating Position	s 135	s 135
Base	GY22	G22+ Cable
Hot Restart	Yes	Yes
Fig No	3	4
Symbols & Footnotes	2,5,6,15,17,19	2,5,6,15,20

HTI™ METAL HALIDE



HTI™ DOUBLE-ENDED

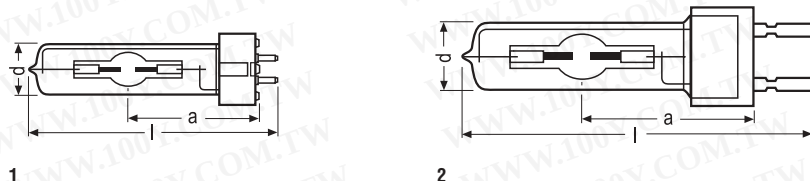
Ordering Abbreviation	HTI 300 W/DEL	HTI 300 W/DX	HTI 600 W/D	HTI 4000 W/DE
Product Number	54112	54143	54140	54133
Watts (W)	300	300	600	4000
Volts (V)	85	100	95	115
Current (A)	4.3	3.6	7.7	39.0
Lumens (lm)	20000	22000	48000	360000
Average Luminance (cd/cm ²)		20000	25000	35000
Color Temp (K)	5700	6500	5300	6300
Length L max (mm)	92	92	75	270
Distance a (mm)	70	70	59	140
Diameter d (mm)	16	16	16	40
Electrode Gap - cold (mm)	5.5	5.5	5.5	15
Avg Rated Life (hrs)	3000	750	300	500
Operating Position	p 45	p 45	p 45	p 30
Base	SFc10-4	SFc10-4	Special	S25.5
Hot Restart	Yes	Yes	Yes	Yes
Fig No	1	2	3	4
Symbols & Footnotes	3,5,15	3,5,15,21	3,5,15	3,5,12,15

HTI™ WITH DICHROIC REFLECTOR

Ordering Abbreviation	HTI 250 W/22	HTI 250 W/32	HTI 250 W/32C	HTI 400 W/24	HTI 403 W/24
Product Number	54080	54081	54089	54083	54104
Watts (W)	270	270	270	400	400
Volts (V)	45	45	45	55	55
Current (A)	6	6	6	7.3	7.3
Color Temp (K)	5600	5600	5600	5600	5600
Length L max (mm)	73	73	73	73	73
Working Distance a (mm)	22	32	32	24	24
Diameter d (mm)	67	67	67	67	67
Electrode Gap - cold (mm)	2.5	2.5	2.5	4.0	4.0
Avg Rated Life (hrs)	250	250	250	250	750
Operating Position	P 20	P 20	P 20	P 20	P 20
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	5	5	6	6	6
Symbols & Footnotes	1,3,15	1,3,15,22,23	3,5,15,23	1,3,15	1,3,15

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HSR® METAL HALIDE



HSR® WITH OUTER JACKET

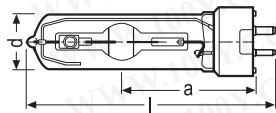
Ordering Abbreviation	HSR 400	HSR 575/2	HSR 575/60
Product Number	54102	54169	54115
Watts (W)	400	575	575
Volts (V)	67	95	95
Current (A)	6.9	7	7
Lumens (lm)	33000	49000	49000
Average Luminance (cd/cm ²)	20000	10000	10000
Color Temp (K)	5900	6000	6000
Length l (mm)	110	125	125
Distance a (mm)	62	65	65
Diameter d (mm)	23	30	30
Electrode Gap - cold (mm)	5	7	7
Avg Rated Life (hrs)	650	1000	1000
Operating Position	Any	Any	Any
Base	GX9.5	GX9.5	GX9.5
Hot Restart	No	No	No
Fig No	1	1	1
Symbols & Footnotes	5	5	5

HSR® WITH OUTER JACKET

Ordering Abbreviation	HSR 575/72	HSR 700	HSR 1200/2
Product Number	54116	54107	54168
Watts (W)	575	700	1200
Volts (V)	95	72	100
Current (A)	7	11	13.8
Lumens (lm)	49000	58000	110000
Average Luminance (cd/cm ²)	10000	10000	20000
Color Temp (K)	7200	6300	6000
Length l (mm)	125	155	175
Distance a (mm)	65	75	85
Diameter d (mm)	30	30	40
Electrode Gap - cold (mm)	7	8	10
Avg Rated Life (hrs)	1000	1000	1000
Operating Position	Any	Any	Any
Base	GX9.5	G22	G22/28x50
Hot Restart	No	No	No
Fig No	1	2	2
Symbols & Footnotes	5	5	5

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HSD® METAL HALIDE

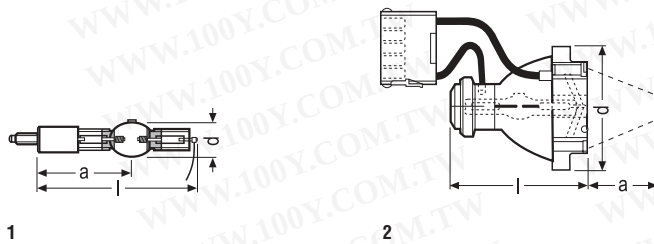


1

HSD® WITH OUTER JACKET

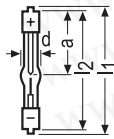
Ordering Abbreviation	HSD 200	HSD 250	HSD 575
Product Number	54167	54170	54129
Watts (W)	200	250	575
Volts (V)	70	90	88
Current (A)	3.3	3.1	7.4
Lumens (lm)	13000	17000	45000
Color Temp (K)	6000	5600	7200
Length l (mm)	108	110	135
Distance a (mm)	55	55	65
Diameter d (mm)	23	23	30
Electrode Gap - cold (mm)	5	5	7
Avg Rated Life (hrs)	2000	2000	3000
Operating Position	Any	Any	Any
Base	GY9.5	GY9.5	GX9.5
Hot Restart	No	No	No
Fig No	1	1	1
Symbols & Footnotes	5	5,24	5

VIP® VIDEO AND DATA PROJECTION

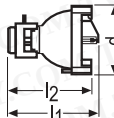


Ordering Abbreviation	VIP S 170/13	VIP R 273/45
Product Number	69320	69327
Watts (W)	170	270
Volts (V)	85	38
Current (A)	2.0	7.1
Lumens (lm)	11900	17000
Average Luminance (cd/cm ²)	30000	100000
Color Temp (K)	9000	5800
Length l (mm)	62	73
Distance a (mm)	35	45
Diameter d (mm)	13	67
Arc Length (mm)	5	1.9
Avg Rated Life (hrs)	4000	1000
Operating Position	Horizontal, tip-off up	Horizontal, tip-off up
Base	SFc10-4	
Hot Restart	Yes	Yes
Fig No	1	2
Symbols & Footnotes	1,25,26	1,25,26,27,28

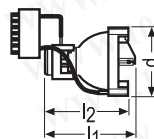
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1



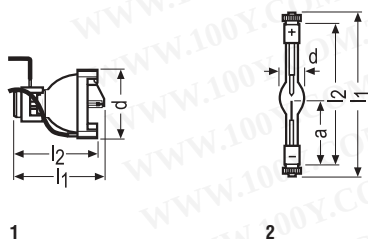
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3

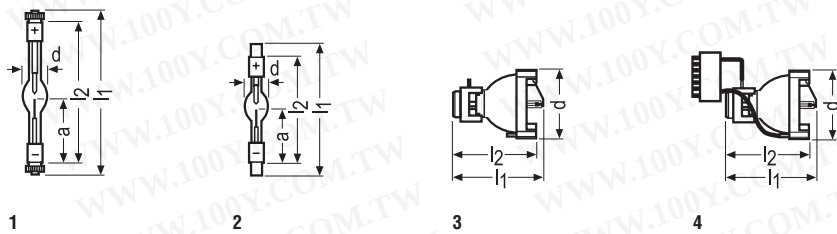
Ordering Abbreviation	XBO 75 W/2	XBO 75 W/2 OFR	XBO 100 W OFR	XBO R 100 W/45 OFR	XBO R 100 W/45C OFR
Product Number	69231	69232	69233	69197	69191
Watts (W)	75	75	100	100	100
Volts (V)	14	14	14	13	13
Type of Current	DC	DC	DC	DC	DC
Current (A)	5.4	5.4	7.0	7.0	7.0
Current Control Range (A)					
Lumens (lm)	1000	1000	1900		
Luminous Intensity (cd)	100	100	270		
Average Luminance (cd/cm ²)	40000	40000	31000		
Luminous Area -- w x h (mm)	0.25 x 0.5	0.25 x 0.5	0.4 x 0.8	0.4 x 0.9	0.4 x .09
Length l ₁ max (mm)	90	90	90	83	83
Length l ₂ max (mm)	82	82	82	75	75
Distance a (mm)	43	43	44.5		
Diameter d (mm)	10	10	11	67	67
Avg Rated Life Vertical (hrs)	400	400	500		
Avg Rated Life Horizontal (hrs)	400	400		500	500
Operating Position	s 100	s 100	s 20	p 15	p 15
Forced Cooling			Required	Required	Required
Base Anode	SFa9-2	SFa7.5-2	SFa9-2		
Base Cathode	SFa7.5-2	SFa7.5-2	SFa7.5-2		
Fig No	1	1	1	2	3
Symbols & Footnotes	6,23,29,30,31	6,23,30,31	6,23,30,31,32,33	3,23,30,31,32,33,34,35	3,23,30,31,32,33,35

XBO® ≤ 450W XENON SHORT ARC



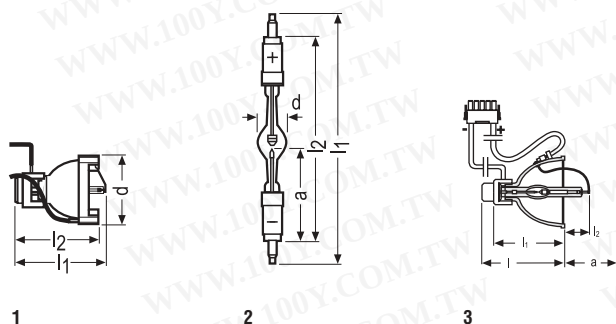
Ordering Abbreviation	XBO R 101 W/45C OFR	XBO 150 W/1	XBO 150 W/1 OFR	XBO 150 W/4
Product Number	69190	69234	69235	69238
Watts (W)	100	150	150	150
Volts (V)	13	20	20	20
Type of Current	DC	DC	DC	DC
Current (A)	7.0	7.5	7.5	7.5
Current Control Range (A)				
Lumens (lm)		3000	3000	3000
Luminous Intensity (cd)		300	300	300
Average Luminance (cd/cm²)		15000	15000	15000
Luminous Area -- w x h (mm)		0.5 x 2.2	0.5 x 2.2	0.5 x 2.2
Length l ₁ max (mm)	83	150	150	150
Length l ₂ max (mm)	75	127	127	127
Distance a (mm)		57	57	57
Diameter d (mm)	67	20		20
Avg Rated Life Vertical (hrs)		1200	1200	1200
Avg Rated Life Horizontal (hrs)	500			
Operating Position	p 15	s 15	s 15	s 15
Forced Cooling	Required	Required	Required	Required
Base Anode		SFc12-4	SFc12-4	SFc12-4
Base Cathode		SFcX12-4	SFcX12-4	SFcX12.4
Fig No	1	2	2	2
Symbols & Footnotes	3,32,33,35,36,37	6,23,30,31,38,39	6,23,30,31,39	23,30,31,39,40

XBO® ≤ 450W XENON SHORT ARC



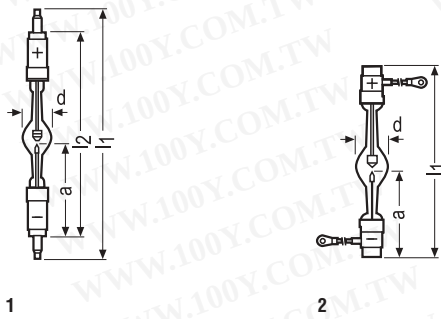
Ordering Abbreviation	XBO 150 W/CR OFR	XBO 150 W/S	XBO R 180 W/45/OFR	XBO R 180 W/45C OFR
Product Number	69237	69236	69186	69183
Watts (W)	150	150	180	180
Volts (V)	17.5	20	14	14
Type of Current	DC	DC	DC	DC
Current (A)	8.5	7.5	12	12
Current Control Range (A)				
Lumens (lm)	2900	2200		
Luminous Intensity (cd)	290	220		
Average Luminance (cd/cm²)	20000	18000		
Luminous Area -- w x h (mm)	0.5 x 1.6	0.5 x 1.9		
Length l1 max (mm)	150	117	90	90
Length l2 max (mm)	127	96	75	75
Distance a (mm)	57	47.5		
Diameter d (mm)	20	20	67	67
Avg Rated Life Vertical (hrs)	3000	1000	500	500
Avg Rated Life Horizontal (hrs)	1200	800		
Operating Position	s15 p15	s15 p15	p 15	p 15
Forced Cooling	Required	Required	Required	Required
Base Anode	SFc12-4	SFa12-11		
Base Cathode	SFcX12-4	SFa12-11		
Fig No	1	2	3	4
Symbols & Footnotes	3,6,23,30,31,32,41,42	3,6,8,23,30,31,41	3,32,35,43	3,32,35,36

XBO® <= 450W XENON SHORT ARC



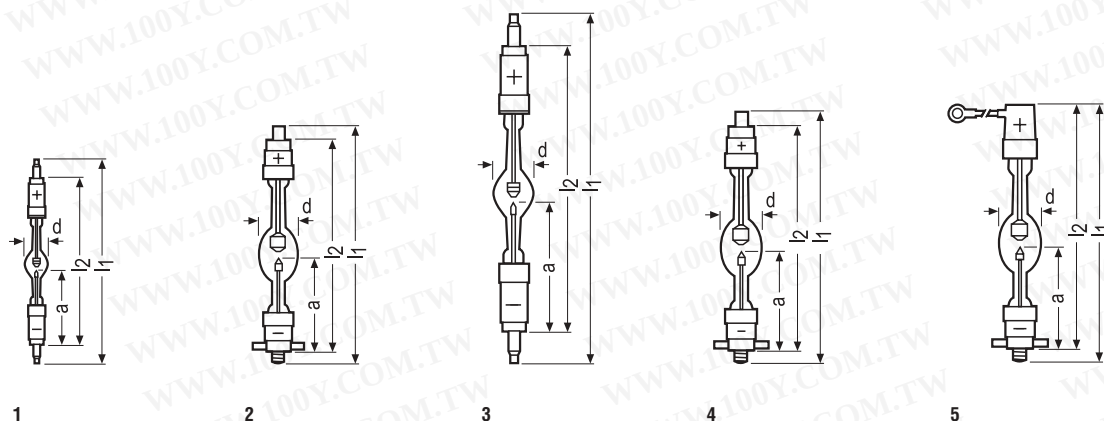
Ordering Abbreviation	XBO R 181 W/45C OFR	XBO 250 W OFR	XBO R 300 W/60C OFR	XBO 450 W
Product Number	69184	69239	69167	69241
Watts (W)	180	250	300	450
Volts (V)	14	13	17	17
Type of Current	DC	DC	DC	DC
Current (A)	12	18	16	25
Current Control Range (A)		14-20	14 - 19	17-30
Lumens (lm)		4800		13000
Luminous Intensity (cd)		530		1300
Average Luminance (cd/cm²)		26000		35000
Luminous Area -- w x h (mm)		0.7 x 1.7		0.9 x 2.7
Length l1 max (mm)	90	226	62	260
Length l2 max (mm)	75	192	30	212
Distance a (mm)		93	60	95.5
Diameter d (mm)	67	25	82.5	29
Avg Rated Life Vertical (hrs)	500	1200		2000
Avg Rated Life Horizontal (hrs)			1000	
Operating Position	p 15	s 15	p20	s 30
Forced Cooling	Required	Required	Required	Required
Base Anode		SFa16-8		SFa20-8
Base Cathode		SFa16-10		SFa20-10
Fig No	1	2	3	2
Symbols & Footnotes	3,32,35,36,37	6,23,30,32,44	3,32,36	6,23,30,44,45,46

XBO® ≤ 450W XENON SHORT ARC



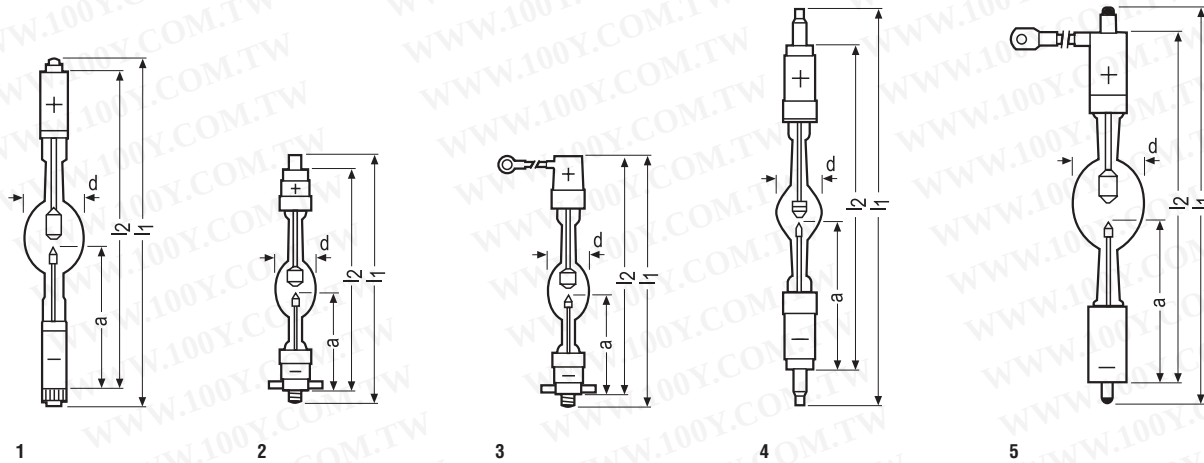
Ordering Abbreviation	XBO 450 W OFR	XBO 450 W/1	XBO 450 W/2 OFR	XBO 450 W/4
Product Number	69245	69242	69243	69244
Watts (W)	450	450	450	450
Volts (V)	17	17	17	17
Type of Current	DC	DC	DC	DC
Current (A)	25	25	25	25
Current Control Range (A)	17-30	17-30	17-30	17-30
Lumens (lm)	13000	13000	13000	13000
Luminous Intensity (cd)	1300	1300	1300	1300
Average Luminance (cd/cm²)	35000	45000	35000	35000
Luminous Area -- w x h (mm)	0.9 x 2.7	0.7 x 2.2	0.9 x 2.7	0.9 x 2.7
Length L1 max (mm)	260	260	177	260
Length L2 max (mm)	212	212		212
Distance a (mm)	95.5	95.5	79	95.5
Diameter d (mm)	29	29	29	29
Avg Rated Life Vertical (hrs)	2000	800	2000	2000
Avg Rated Life Horizontal (hrs)		800		
Operating Position	s 30	s 100	s 30	s 30
Forced Cooling	Required	Required	Required	Required
Base Anode	SFa20-8	SFa20-8	SK19/36	SFa20-8
Base Cathode	SFa20-10	SFa20-10	SK19/36	SFa20-10
Fig No	1	1	2	1
Symbols & Footnotes	23,30,44	6,23,30,44	6,23,30,32,44	6,23,30,40,44

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



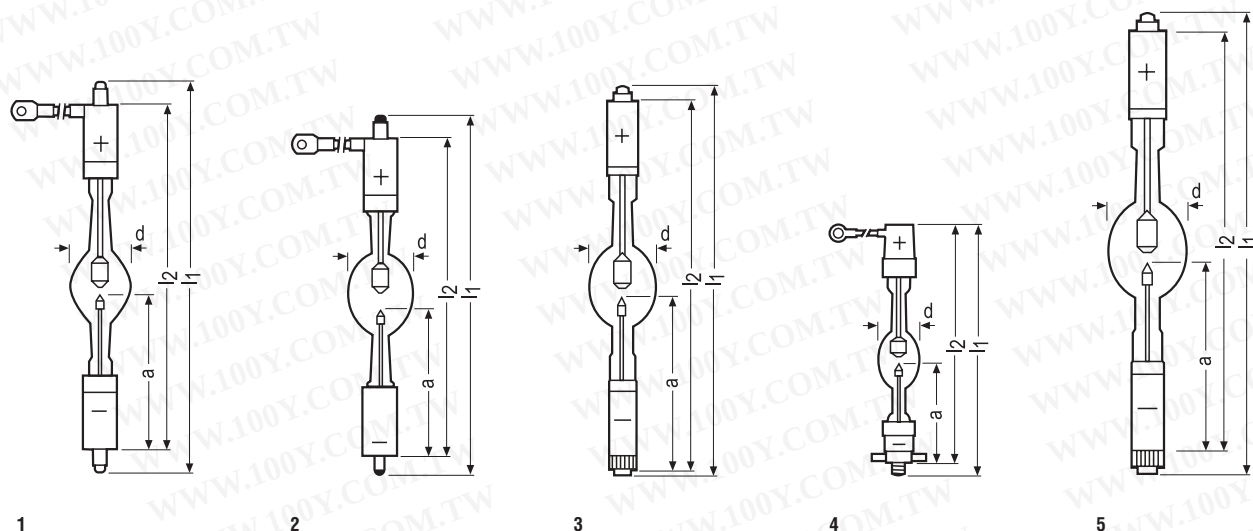
Ordering Abbreviation	XBO 500 W/H OFR	XBO 700 W/HS OFR	XBO 900 W OFR	XBO 1000 W/HS OFR	XBO 1000 W/HSC OFR
Product Number	69257	69260	69261	69263	69264
Watts (W)	500	700	900	1000	1000
Volts (V)	17	18	19	19	19
Type of Current	DC	DC	DC	DC	DC
Current (A)	28	37	45	50	50
Current Control Range (A)	17-30	30-45	30-53	30-55	30-55
Lumens (lm)	14500	20000	30000	32000	32000
Luminous Intensity (cd)	1450	2000	3000	3000	3000
Average Luminance (cd/cm ²)	40000	40000	50000	60000	60000
Luminous Area -- w x h (mm)	0.9 x 2.5	1.1 x 2.9	1.1 x 3.3	1.1 x 2.8	1.1 x 2.8
Length l ₁ max (mm)	190	235	325	235	236
Length l ₂ max (mm)	165	205	277	205	222
Distance a (mm)	75	95	123	95	95
Diameter d (mm)	35	40	40	40	40
Avg Rated Life Vertical (hrs)	2000	1500	2000	1500	1500
Avg Rated Life Horizontal (hrs)	2000	1500		1500	1500
Operating Position	s30 p30	s20 p20	s 30	s20 p20	s20 p20
Forced Cooling	Required	Required	Required	Required	Required
Magnetic Arc Stabilization	Required				
Base Anode	SFa16-8	SFa27-11	SFa25-10	SFa27-11	SK27/50
Base Cathode	SFa15-10	SFcX27-8	SFa25-12	SFcX27-8	SFcX27-8
Fig No	1	2	3	4	5
Symbols & Footnotes	3,6,23,30,32,41,44	3,6,8,23,30,32,44,47	6,23,30,32,44	3,6,8,23,30,32,44,47	3,6,8,23,30,32,36,44,47

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



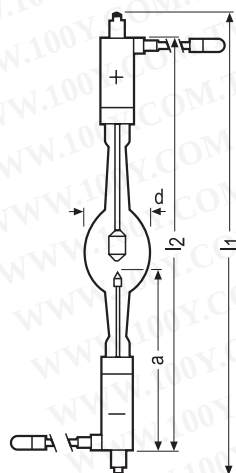
Ordering Abbreviation	XBO 1000 W/HTP OFR	XBO 1600 W/HS OFR	XBO 1600 W/HSC OFR	XBO 1600 W OFR	XBO 1600 W/CA OFR
Product Number	69265	69268	69269	69266	69267
Watts (W)	1000	1550	1550	1600	1600
Volts (V)	21	23	23	24	24
Type of Current	DC	DC	DC	DC	DC
Current (A)	45	65	65	65	65
Current Control Range (A)	30-55	50-70	50-70	45-75	45-75
Lumens (lm)	35000	60000	60000	60000	60000
Luminous Intensity (cd)	3200	5500	5500	6000	6000
Average Luminance (cd/cm²)	45000	70000	70000	65000	65000
Luminous Area -- w x h (mm)	1.0 x 4.0	1.5 x 3.3	1.5 x 3.3	1.4 x 4.0	1.4 x 4.0
Length l ₁ max (mm)	330	235	236	370	370
Length l ₂ max (mm)	277	205	222	322	322
Distance a (mm)	123	95	95	142.5	143
Diameter d (mm)	46	46	47	52	52
Avg Rated Life Vertical (hrs)	2000	1500	1500	2000	2000
Avg Rated Life Horizontal (hrs)	2000	1500	1500		
Operating Position	s30 p30	s20 p20	s20 p20	s 30	s 30
Forced Cooling	Required	Required	Required	Required	Required
Magnetic Arc Stabilization	Required				
Base Anode	SFa25-14	SFa27-11	SK27/50	SFa27-10	SFaX27-10
Base Cathode	SFc25-14	SFcX27-8	SFcX27-8	SFa27-12	SFa27-12
Fig No	1	2	3	4	5
Symbols & Footnotes	3,6,23,30,32,41,44,47,48	3,6,8,23,30,32,44,47	3,6,8,23,30,32,36,44,47	6,23,30,32,44	6,23,30,32,44,49

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION

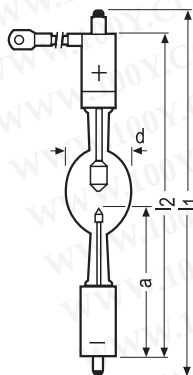


Ordering Abbreviation	XBO 2000 W/H OFR	XBO 2000 W/HS OFR	XBO 2000 W/HTP OFR	XBO 2000 W/SHSC OFR	XBO 2001 W/HTP OFR
Product Number	69258	69270	69247	69256	69310
Watts (W)	2000	2000	2000	2000	2000
Volts (V)	27	24	27	27	25
Type of Current	DC	DC	DC	DC	DC
Current (A)	70	80	70	70	80
Current Control Range (A)	50-85	50-85	50-85	50-85	50-85
Lumens (lm)	80000	80000	80000	80000	80000
Luminous Intensity (cd)	7500	7500	7500	7500	7500
Average Luminance (cd/cm ²)	75000	80000	75000	80000	75000
Luminous Area -- w x h (mm)	1.3 x 4.8	1.2 x 4.0	1.3 x 4.8	1.3 x 4.0	1.3 x 4.8
Length l ₁ max (mm)	370	342	375	245	375
Length l ₂ max (mm)	322	302	322	232	322
Distance a (mm)	142.5	145	142.5	95	142.5
Diameter d (mm)	52	60	52	46	52
Avg Rated Life Vertical (hrs)	2000	2000	2000	1500	2000
Avg Rated Life Horizontal (hrs)	2000	2000	2000	1500	2000
Operating Position	s30 p30	s30 p30	s30 p20	s20 p20	s30 p30
Forced Cooling	Required	Required	Required	Required	Required
Magnetic Arc Stabilization	Required		Required		Required
Base Anode	SFaX27-10	SFaX27-9.5	SFa25-14	SK27/50	SFa25-14
Base Cathode	SFaX27-12	SFa27-7.9	SFc25-14	SK27/50	SFc25-14
Fig No	1	2	3	4	5
Symbols & Footnotes	3,6,23,30,32,41,44,47	3,6,8,23,30,32,44,47	6,23,30,32,41,44,47,48,50	3,6,23,30,32,36,44,47,51,52	6,23,30,32,41,44,47,48,50

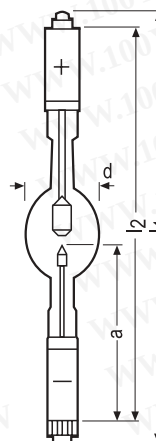
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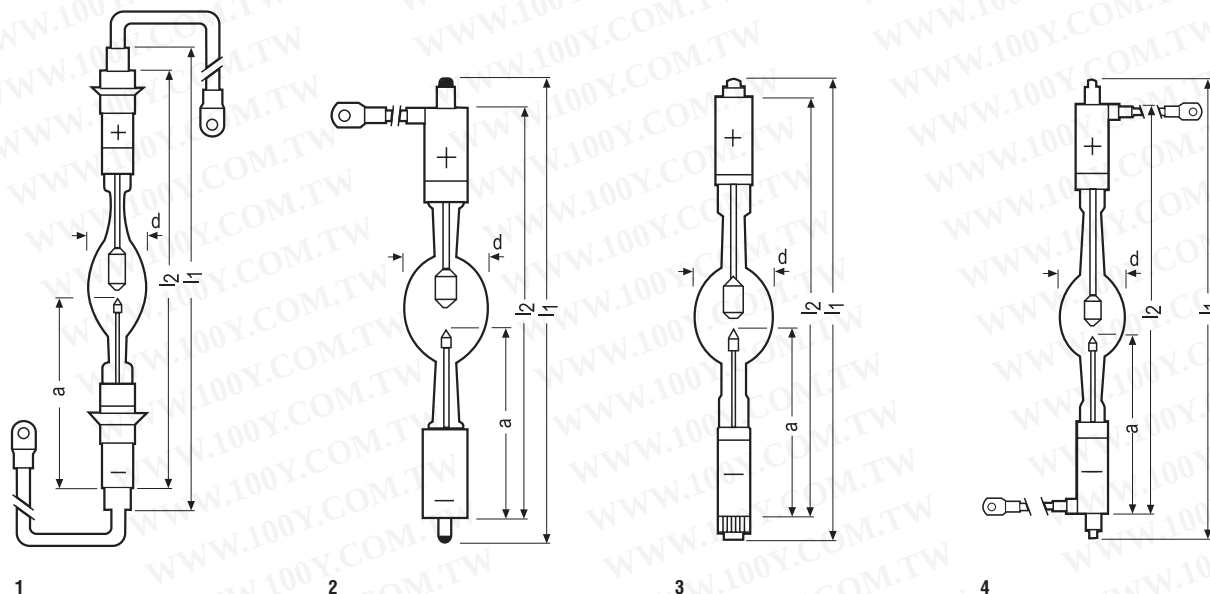
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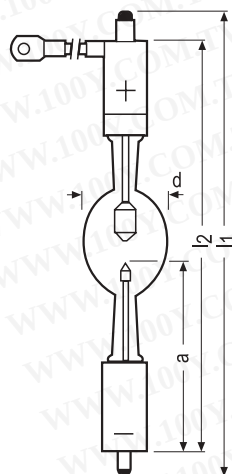
Ordering Abbreviation	XBO 2500 W OFR	XBO 2500 W/HS OFR	XBO 3000 W/H OFR	XBO 3000 W/HS OFR	XBO 3000 W/HTP OFR
Product Number	69248	69249	69251	69250	69252
Watts (W)	2500	2500	3000	3000	3000
Volts (V)	29	28	29	29	29
Type of Current	DC	DC	DC	DC	DC
Current (A)	83	90	100	100	100
Current Control Range (A)	60-95	70-100	60-110	60-110	60-110
Lumens (lm)	100000	100000	130000	130000	130000
Luminous Intensity (cd)	9500	10000	12000	12000	12000
Average Luminance (cd/cm²)	61000	80000	85000	90000	85000
Luminous Area -- w x h (mm)	1.5 x 6.0	1.5 x 4.5	1.7 x 5.7	1.7 x 5.0	1.7 x 5.7
Length l ₁ max (mm)	428	342	428	342	405
Length l ₂ max (mm)	382	302	382	302	357
Distance a (mm)	167.5	145	167.5	145	162.5
Diameter d (mm)	60	60	66	60	66
Avg Rated Life Vertical (hrs)	1500	1500	1500	1500	1500
Avg Rated Life Horizontal (hrs)		1200	1200	1200	1200
Operating Position	s 30	s30 p20	s30 p30	s30 p30	s30 p30
Forced Cooling	Required	Required	Required	Required	Required
Magnetic Arc Stabilization				Required	Required
Base Anode	SFaX27-13	SFaX27-9.5	SFaX27-13	SFaX27-9.5	SFa27-14
Base Cathode	SFaX27-14	SFa27-7.9	SFa27-14	SFa27-7.9	SFa27-14
Fig No	1	2	2	2	3
Symbols & Footnotes	6,23,30,32,44	3,6,8,23,30,32,44,47	3,6,23,30,32,41,44,47	3,6,8,23,30,32,44,47	3,6,23,30,32,41,44,47,48

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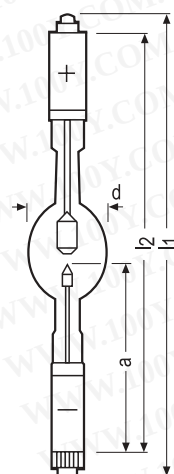


Ordering Abbreviation	XBO 4000 W OFR	XBO 4000 W/HS OFR	XBO 4000 W/HTP OFR	XBO 4200 W/CA OFR
Product Number	69253	69254	69296	69294
Watts (W)	4000	4000	4000	4200
Volts (V)	32	29	30	29
Type of Current	DC	DC	DC	DC
Current (A)	120	135	130	140
Current Control Range (A)	80-140	80-150	100-140	80-160
Lumens (lm)	180000	155000	155000	190000
Luminous Intensity (cd)	19000	17000	16000	20000
Average Luminance (cd/cm²)	70000	90000	90000	100000
Luminous Area -- w x h (mm)	2.0 x 7.5	1.9 x 6.0	1.9 x 6.0	2.1 x 5.6
Length l ₁ max (mm)	432	410	433	428
Length l ₂ max (mm)	384	370	382	382
Distance a (mm)	176	171	167.5	167.5
Diameter d (mm)	60	70	70	70
Avg Rated Life Vertical (hrs)	1000	800	1200	1000
Avg Rated Life Horizontal (hrs)		800	900	
Operating Position	s 15	s20 p20	s20 p20	s 15
Forced Cooling	Required	Required	Required	Required
Magnetic Arc Stabilization				
Base Anode	SFa30-18	SFaX30-9.5	SFa27-14	SFaX27-13
Base Cathode	SFa30-20	SFa30-7.9	SFc27-14	SFaX27-14
Fig No	1	2	3	4
Symbols & Footnotes	6,23,30,32,44	3,6,8,23,30,32,44,47	3,6,23,30,32,44,47,48	6,23,30,32,44,49,53

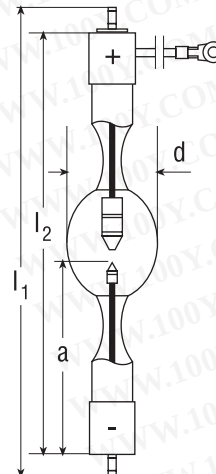
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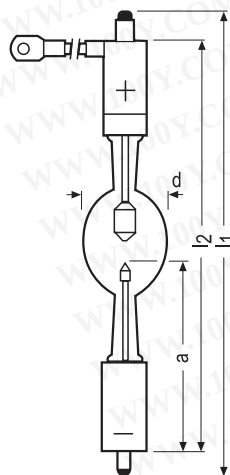
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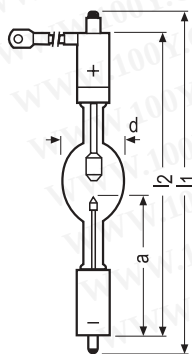
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Ordering Abbreviation	XBO 5000 W/H OFR	XBO 5000 W/HTP OFR	XBO 6000 W/HS OFR	XBO 6000 W/HTP OFR
Product Number	69315	69336	69339	69340
Watts (W)	5000	5000	6000	6000
Volts (V)	33	34	37	37
Type of Current	DC	DC	DC	DC
Current (A)	140	140	160	160
Current Control Range (A)	100-150	100-150	110 - 165	110 - 165
Lumens (lm)	225000	225000	300000	300000
Luminous Intensity (cd)	27000	27000	30000	30000
Average Luminance (cd/cm²)	95000	95000	100000	100000
Luminous Area -- w x h (mm)	2.2 x 6.5	2.2 x 6.5	2.0 x 7.0	2.0 x 7.0
Length L1 max (mm)	433	433	422	430
Length L2 max (mm)	382	382	382	382
Distance a (mm)	168	168	167.5	165
Diameter d (mm)	70	70	78	78
Avg Rated Life Vertical (hrs)	800	800	600	600
Avg Rated Life Horizontal (hrs)	800	800	600	600
Operating Position	s15 p15	s15 p15	s15 p15	s15 p15
Forced Cooling	Required	Required	Required	Required
Magnetic Arc Stabilization	Required	Required	Required	Required
Base Anode	SFaX30-16	SFa27-14	SFaX30-9.5	SFa27-14
Base Cathode	SFa28-18	SFc27-14	SFa30-8	SFc27-14
Fig No	1	2	3	2
Symbols & Footnotes	3,6,23,30,32,41,44,47,54	3,6,23,30,32,41,44,47,54,55,56,57,58	3,6,8,23,30,32,44,47	3,6,8,23,30,32,44,47

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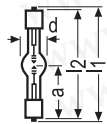
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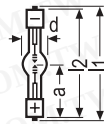
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Ordering Abbreviation	XBO 6500 W	XBO 7000 W/HS OFR	XBO 7000 W/HS OFR	XBO 10000 W/C OFR
Product Number	69298	69295	69301	69297
Watts (W)	6500	6880	7000	9600
Volts (V)	40	41	43	59
Type of Current	DC	DC	DC	DC
Current (A)	160	160	160	160
Current Control Range (A)	80-160	110-165	110-165	110-170
Lumens (lm)	325000	350000	350000	500000
Luminous Intensity (cd)	32000	35000	35000	47500
Average Luminance (cd/cm ²)	95000	100000	100000	80000
Luminous Area -- w x h (mm)	2.3 x 9.0	2.6 x 10	2.6 x 7.5	2.7 x 14.0
Length l ₁ max (mm)	483	433	433	483
Length l ₂ max (mm)	434	393	393	434
Distance a (mm)	200	170.5	170.5	200
Diameter d (mm)	60	78	78	78
Avg Rated Life Vertical (hrs)	500	500	500	500
Avg Rated Life Horizontal (hrs)		500	500	
Operating Position	s 10	s15 p15	s 15, p15	s 15
Forced Cooling	Required	Required	Required	Required
Magnetic Arc Stabilization		Required	Required	
Base Anode	SFa30-20	SFaX30-9.5	SFaX 30-9.5	SK30-20
Base Cathode	SFa30-22	SFa30-7.9	SFa30-8	SFa30-22
Fig No	1	1	1	2
Symbols & Footnotes	3,6,23,30,44	3,6,8,23,30,32,41,44,47	2,3,6,23,30,44	6,23,30,32,36,44,59

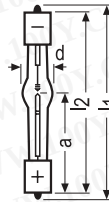
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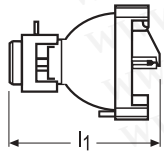
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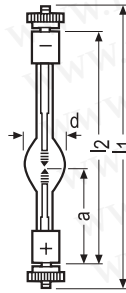
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Ordering Abbreviation	HBO 50 W AC L1	HBO 50 W AC L2	HBO 50 W/3	HBO 100 W/2	HBO 103 W/2
Product Number	69213	69214	69215	69217	69182
Watts (W)	50	50	50	100	100
Volts (V)	37	42	23	20	23
Type of Current	AC	AC	DC	DC	DC
Current (A)	1.45	1.3	2.3	5.0	4.3
Lumens (lm)	2000	2000	1300	2200	3000
Luminous Intensity (cd)	230	230	150	260	300
Average Luminance (cd/cm ²)	30000	30000	90000	170000	170000
Luminous Area – w x h (mm)	0.3 x 1.0	0.3 x 1.0	0.2 x 0.35	0.25 x 0.25	0.25 x 0.25
Luminous Efficacy (lm/W)	40	40	26	22	30
Length l ₁ max (mm)	53	53	53	90	90
Length l ₂ max (mm)	47	47	47	82	82
Distance a (mm)	22	22	22	43	43
Diameter d (mm)	8.5	8.5	9	10	10
Avg Rated Life (hrs)	100	100	200	200	300
Operating Position	s 45, anode down	s 45, anode down	s 45, anode down	s 90, anode down	s 90, anode down
Cooling	Convection	Convection	Convection	Convection	Convection
Base Anode	SFa6-2	SFa6-2	SFa6-2	SFa7.5-2	SFa7.5-2
Base Cathode	SFa6-2	SFa6-2	SFa8-2	SFa9-2	SFa9-2
Fig No	1	1	2	3	3
Symbols & Footnotes	6,60	6,60	6,60	6,60	6,60,61

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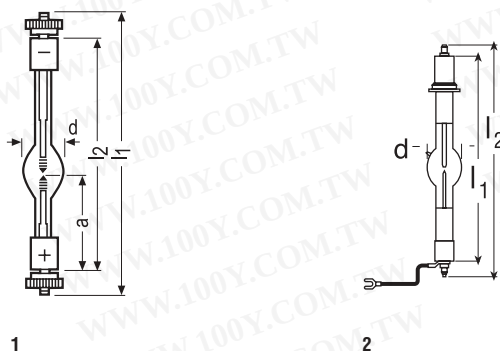
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Ordering Abbreviation	HBO R 103 W/45	HBO 200 W/2 L1	HBO 200 W/2 L2	HBO 200 W/2 TM L1	HBO 200 W/2 TM L2
Product Number	69311	69198	69222	69221	69223
Watts (W)	100	200	200	200	200
Volts (V)	23	61	53	47	47
Type of Current	DC	DC or AC	DC or AC	DC or AC	DC or AC
Current (A)	4.3				
Lumens (lm)		9500	9500	9500	9500
Luminous Intensity (cd)		1000	1000	1000	1000
Average Luminance (cd/cm ²)		40000	40000	40000	40000
Luminous Area – w x h (mm)		0.6 x 2.2	0.6 x 2.2	0.6 x 2.2	0.6 x 2.2
Luminous Efficacy (lm/W)		47.5	47.5	47.5	47.5
Length l ₁ max (mm)	81.50	128	128	128	128
Length l ₂ max (mm)		102	102	102	102
Distance a (mm)		40	40	40	40
Diameter d (mm)		17	17	17	17
Avg Rated Life (hrs)	300	400	400	400	200
Operating Position	p 15	s 45, anode down	s 45, anode down	s 45, anode down	s 45, anode down
Cooling	Convection	Convection	Convection	Convection	Convection
Base Anode	Pin	SFc10-4	SFc10-4	SFc10-4	SFc10-4
Base Cathode	Pin	SFc10-4	SFc10-4	SFc10-4	SFc10-4
Fig No	1	2	2	2	2
Symbols & Footnotes	35,62	6,60,63,64,65	6,60,63,64,65	6,60,66,67,68	6,60,66,67,68

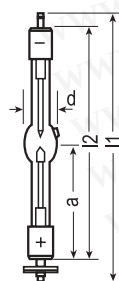
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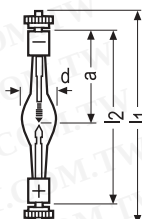
Ordering Abbreviation	HBO 200 W/4	HBO 200 W/DC	HBO 201 W/HS-D2	HBO 202 W/4
Product Number	69224	69225	69168	69316
Watts (W)	200	200	200	200
Volts (V)	61	57	25	61
Type of Current	AC	DC	DC	AC
Current (A)	3.6	3.5	8	3.6
Lumens (lm)	9500	10000		
Luminous Intensity (cd)	1000	1100		1000
Average Luminance (cd/cm ²)	40000	40000		40000
Luminous Area – w x h (mm)	0.6 x 2.2	0.75 x 2.3		0.6 x 2.2
Luminous Efficacy (lm/W)	47.5	50		47.5
Length l ₁ max (mm)	128	128	150	128
Length l ₂ max (mm)	102	102	127	102
Distance a (mm)	40	40		40
Diameter d (mm)	17	17	20	17
Avg Rated Life (hrs)	200	1000	1000	200
Operating Position	s 45, anode down	s 15, anode down	Vertical, anode up	s 45, anode down
Cooling	Convection	Convection	Convection	Convection
Base Anode	SFc10-4	SFc10-4	SFcX32-22	SFc10-4
Base Cathode	SFc10-4	SFc10-4	SFcX12-4/15	SFc10-4
Fig No	1	1	2	1
Symbols & Footnotes	6,60,69	6,70	71	6,60,72

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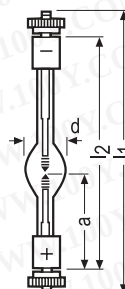
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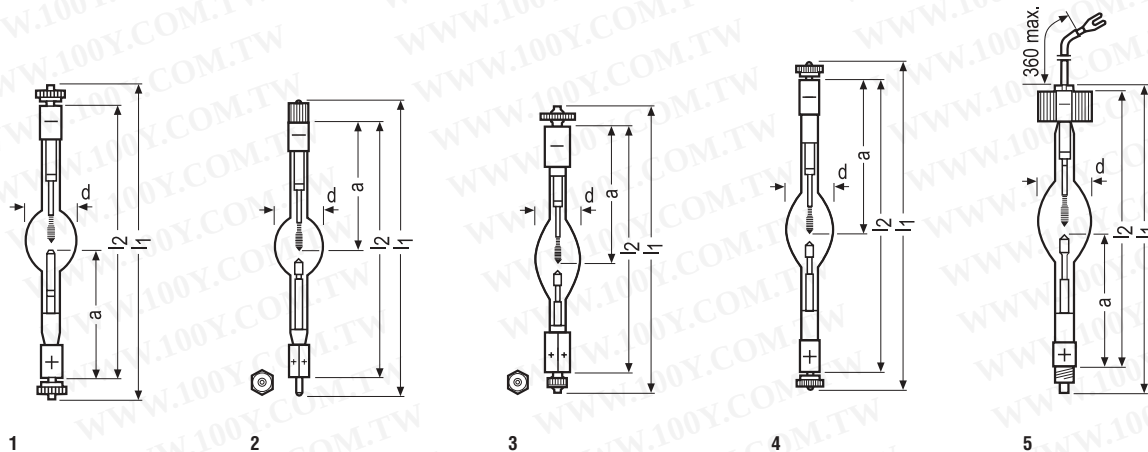
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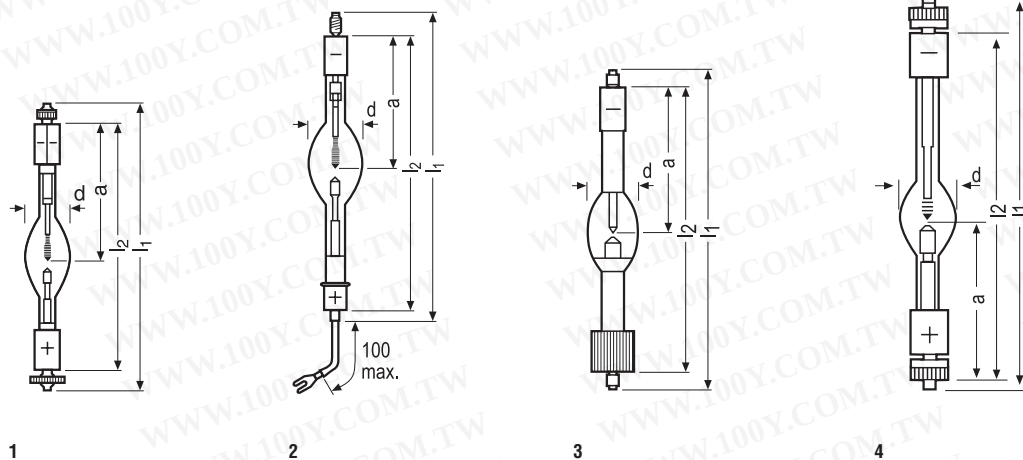
Ordering Abbreviation	HBO 250 W/BY	HBO 350 W	HBO 350 W/S	HBO 500 W/2 L1	HBO 500 W/2 L2
Product Number	69246	69226	69228	69203	69204
Watts (W)	250	350	350	500	500
Volts (V)	40	67.5	68	76	76
Type of Current	DC	DC	DC	DC or AC	DC or AC
Current (A)	6.5	5.3	5.15		
Radiant Intensity 350..450 nm (mW/sr)		4600	4700		
Length L1 max (mm)	152	128	127	170	170
Length L2 max (mm)	125	102	103	142	142
Distance a (mm)	62	45	52.5	65.5	65.5
Diameter d (mm)	20	20	20	26.5	26.5
Electrode Gap – cold (mm)	2	2.9	3		
Avg Rated Life (hrs)	1000	600	600	400	200
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	s 20, anode down	s 20, anode down
Cooling	Forced Base	Convection	Convection	Convection	Convection
Base Anode	SFc13-5/20	SFcY 10-4	SFcY10-4	SFc13-4	SFc13-4
Base Cathode	SFc13-5/20	SFcY 10-4	SFcY10-4	SFc13-4	SFc13-4
Fig No	1	2	2	3	3
Symbols & Footnotes	70	70,73,74,75,76	70,73,76	6,60,77	6,60,77

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



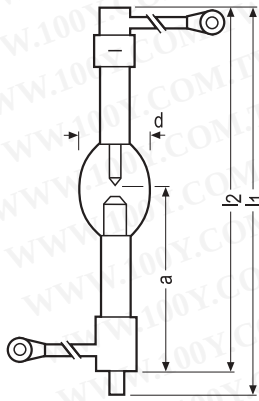
Ordering Abbreviation	HBO 500 W/A	HBO 500 W/B	HBO 1000 W/CEL	HBO 1000 W/G	HBO 1000 W/NEL
Product Number	69205	69206	69175	69208	69176
Watts (W)	500	500	750	750	750
Volts (V)	60	48.5	47	47	47
Type of Current	DC	DC	DC	DC	DC
Current (A)	8.3	10.3	16	16	16
Radiant Intensity 350..450 nm (mW/sr)	6200	5800	8300	8300	8300
Length l ₁ max (mm)	190	180	175	197	190
Length l ₂ max (mm)	161.5	151.5	157	169.5	168
Distance a (mm)	73	78.5	78.5	85	84.5
Diameter d (mm)	29	29	28	28	28
Electrode Gap -- cold (mm)	4.5	3	3	3	3
Avg Rated Life (hrs)	800	800	2500	600	2500
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Convection	Convection	Convection	Forced Base	Convection
Base Anode	SFcY13-5	SFcX13-5/20	SxFc15-6/20	SFcX14-6/25	SFa15-5/16
Base Cathode	SFcY13-5	SFcY 13-15/20	SFc15-6/20	SFcX15-4/20	SFaX14-5/21
Fig No	1	2	3	4	5
Symbols & Footnotes	70,76,78,79	70,76,79,80,81	70,82,83,84,85	70,73,83,84	70,79,83,84,86,87,88

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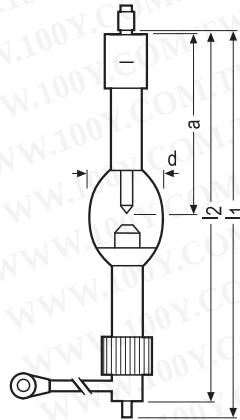


Ordering Abbreviation	HBO 1002 W/CEL	HBO 1002 W/NEL	HBO 1003 W/PI	HBO 1003 W/PIL	HBO 1000 W/D
Product Number	69177	69273	69195	69180	69200
Watts (W)	750	750	750	750	1000
Volts (V)	47	47	25.8	25.8	37.7
Type of Current	DC	DC	DC	DC	DC
Current (A)	16	16	27.1	25.8	26.5
Radiant Intensity 350..450 nm (mW/sr)	8300	8300			10800
Length l ₁ max (mm)	175	190	197	195	240
Length l ₂ max (mm)	157	168	169.5	169.5	208
Distance a (mm)	78.5	78.5	85	85	89.5
Diameter d (mm)	28	28	29	29	40
Electrode Gap – cold (mm)	3	3	3	3	3
Avg Rated Life (hrs)	2500	2500	850	1500	1000
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Convection	Convection	Forced Base	Forced Base	Forced Base
Base Anode	SFc15-6/20	SFa14-5/21	SFcX14-6/25	SFcX14-6/25	SFc15-6/25
Base Cathode	SXFc15-6/20	SFc15-6/25	SFc15-6/25	SFc15-6/25	SFc15-6/25
Fig No	1	2	3	3	4
Symbols & Footnotes	70,83,84	70,71,84,85,89	70,71,83,84,90,91,92	70,71,83,84,90,91,93	70,84

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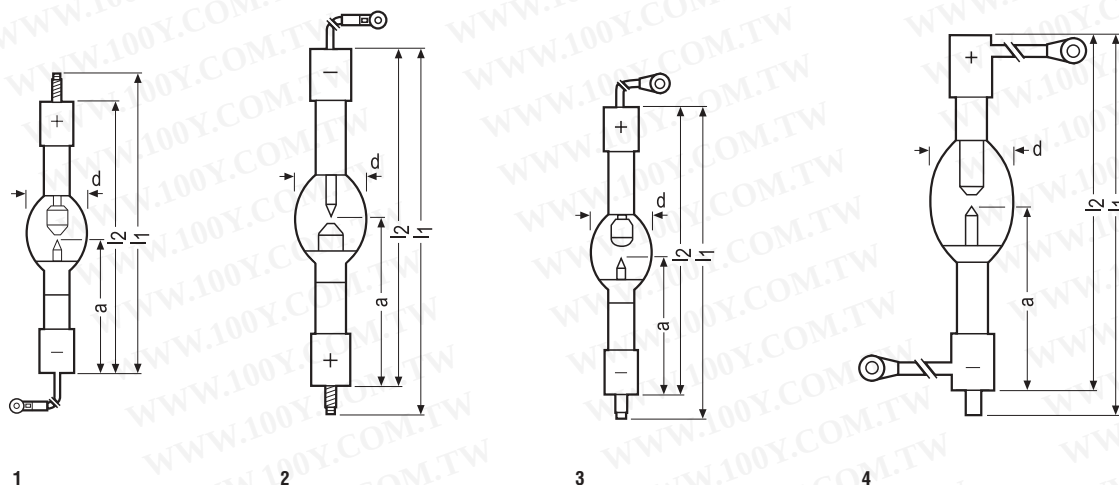
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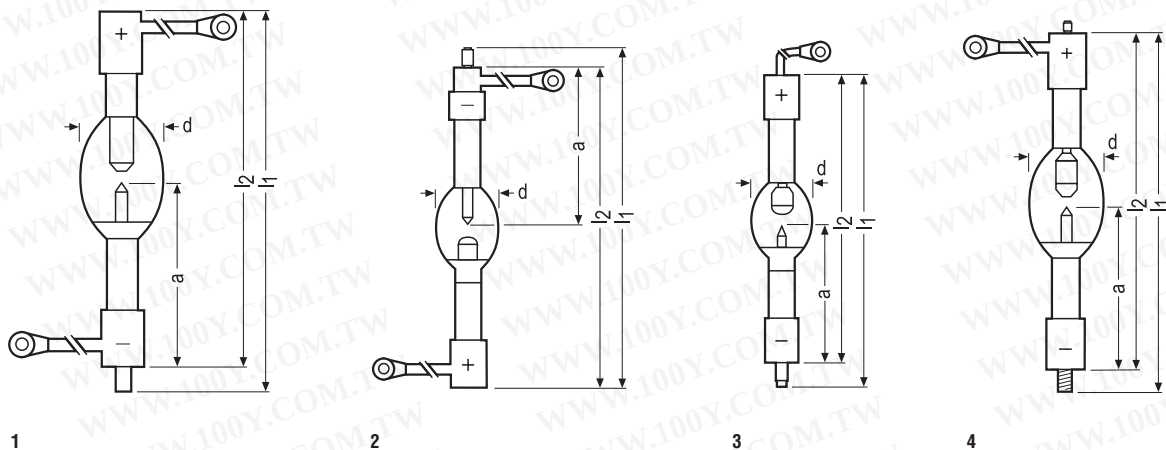
Ordering Abbreviation	HBO 1500 W/CI	HBO 1500 W/CIEL	HBO 1500 W/CIL	HBO 1500 W/PI	HBO 1500 W/PIL
Product Number	69185	69171	69179	69319	69181
Watts (W)	1500	1500	1500	1500	1500
Volts (V)	23	23	23	23	23
Type of Current	DC	DC	DC	DC	DC
Current (A)	65.2	65.2	65.2	65.2	65.2
Radiant Intensity 350..450 nm (mW/sr)					
Length l ₁ max (mm)	262	262	262	267	273
Length l ₂ max (mm)	242	242	242	240	242
Distance a (mm)	122	122	122	118	118
Diameter d (mm)	52	52	52	47	46
Electrode Gap -- cold (mm)	4	4	4	4	4
Avg Rated Life (hrs)	850	2250	1500	850	1500
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Forced Base	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFa27-10/35	SFa27-20/22	SFa27-10/35	SFc30-6/25	SFc30-6/25
Base Cathode	SFa27-20/23	SFa27-20/23	SFa27-20/23	SFc27-10/35	SFc27-10/35
Fig No	1	1	1	2	2
Symbols & Footnotes	70,84,94,95,96	70,84,95,96,97	70,84,94,96	70,84,98,99	70,84,99,100

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



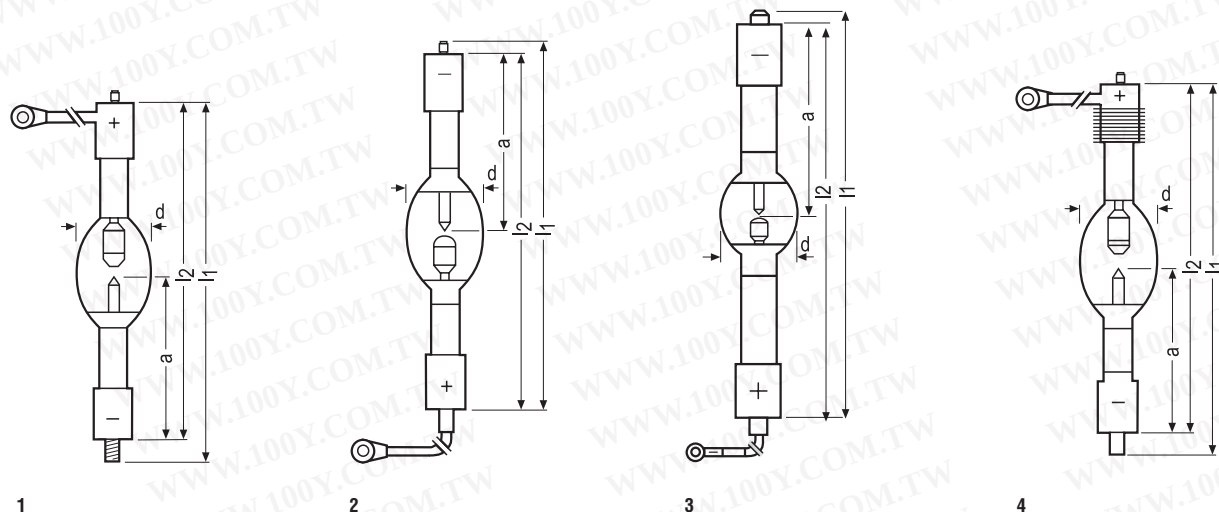
Ordering Abbreviation	HBO 2000 W/NIL	HBO 2001 W/NIEL	HBO 2001 W/NIL	HBO 2002 W/NIL	HBO 2001 W/CI
Product Number	69303	69306	69292	69287	69219
Watts (W)	1750	1750	1750	1750	2000
Volts (V)	26	26	26	24.5	26
Type of Current	DC	DC	DC	DC	DC
Current (A)	67	67	67	67	77
Radiant Intensity 350..450 nm (mW/sr)					
Length l_1 max (mm)	241	251	251	254	329
Length l_2 max (mm)	221	231	231	234	307
Distance a (mm)	112.25	112.5	112	107.5	149
Diameter d (mm)	52	52	50	52	62
Electrode Gap — cold (mm)	4.5	4.5	4.5	4.5	4.5
Avg Rated Life (hrs)	1500	2250	1500	1500	850
Operating Position	Vertical, anode up	Vertical, anode down	Vertical, anode down	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFc27-12/35	SFc27-10/35	SFc27-10/35	SFc27-7/35	SF33.5/50
Base Cathode	SFc27-7/35	SFc27-7/35	SFaX27-7/35	SFc27-10x1.25/35	SFa33.5-10/50
Fig No	1	2	2	3	4
Symbols & Footnotes	70,84,96	70,84,96	70,84,96	70,84,94	70,79,84,94,101

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



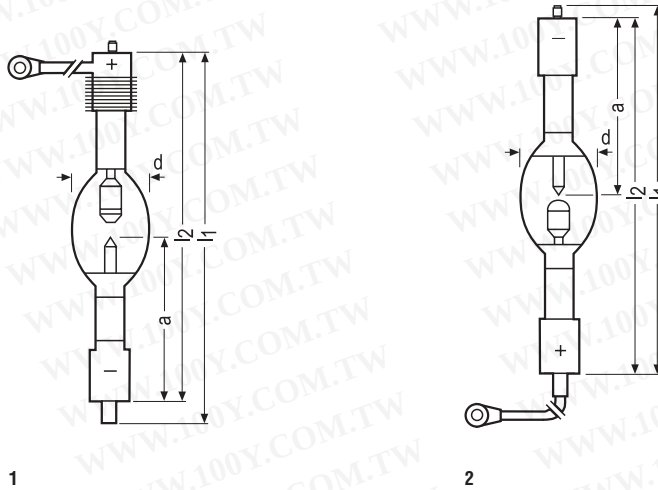
Ordering Abbreviation	HBO 2001 W/CIEL	HBO 2001 W/CIL	HBO 2002 W/MA	HBO 2011 W/NIL	HBO 2500 W/PI
Product Number	69166	69189	69199	69288	69178
Watts (W)	2000	2000	2000	2000	2500
Volts (V)	26	26	37	24	28
Type of Current	DC	DC	DC	DC	DC
Current (A)	77	77	54	80	90
Radiant Intensity 350..450 nm (mW/sr)					
Length l_1 max (mm)	329	329	292	256	350
Length l_2 max (mm)	309	307	272	236	315
Distance a (mm)	148.75	149	138.5	107.75	149
Diameter d (mm)	62	62	62	52	62
Electrode Gap -- cold (mm)	4	4.5	3	4.5	6.7
Avg Rated Life (hrs)	2250	1500	1000	1500	850
Operating Position	Vertical, anode up	Vertical, anode up	Vertical, anode down	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SF33.5/50 with cable connection (M8)	SF33.5/50	SF27/35	SFc27-7/35	SFc27-7/35
Base Cathode	SFa33.5-10/50 with cable connection (M6)	SFa33.5-10/50	SFa27-10/35	SFc27-12x1.5/35	SFc30-6.3/50
Fig No	1	1	2	3	4
Symbols & Footnotes	70,84,94,101,102,103	70,84,94,101,102	70,71,84,94,96,104	70,84,94	70,71,84,97,105

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



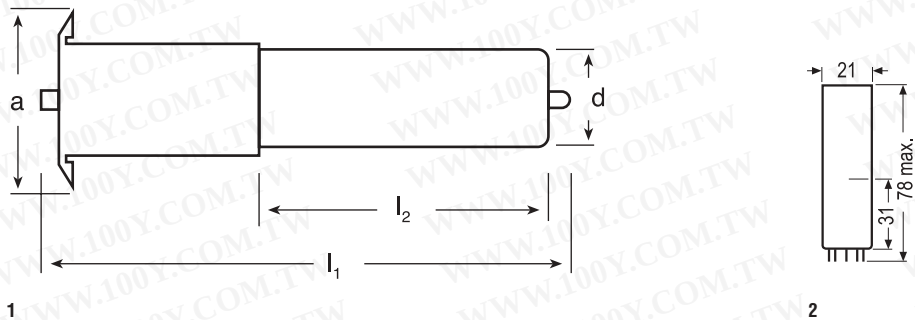
Ordering Abbreviation	HBO 2500 W/PIL	HBO 2501 W/NIL	HBO 2510 W/NIL	HBO 3500 W/PI	HBO 3500 W/PIL
Product Number	69172	69289	69299	69174	69169
Watts (W)	2500	2500	2500	3400	3400
Volts (V)	28	23	23	23	23
Type of Current	DC	DC	DC	DC	DC
Current (A)	90	110	109	148	148
Radiant Intensity 350..450 nm (mW/sr)					
Length l ₁ max (mm)	350	367	367	340	360
Length l ₂ max (mm)	315	327	327	315	315
Distance a (mm)	149	157.75	157.5	154	154
Diameter d (mm)	62	70	70	77	77
Electrode Gap – cold (mm)	6.7	4.5	4.5	4.5	4.5
Avg Rated Life (hrs)	1500	1500	1500	850	1500
Operating Position	Vertical, anode up	Vertical, anode down	Vertical, anode up	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFc30-6/50	SFc33.5-8/50	SFc33.5-8/50	SFaX40-6/50	SFaX40-6/50
Base Cathode	SFc30-6.3/50	SFc33.5-14/5	SFc33.5-14/50	SFc32.5-6.7/50	SFc32.5-6.7/50
Fig No	1	2	3	4	4
Symbols & Footnotes	70,71,84,97,106	70,71,94	70,71,84,107	70,71,84,97,108	70,71,84,97,109

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



Ordering Abbreviation	HBO 3501 W/PI	HBO 3501 W/PIL	HBO 3500 W/MR	HBO 4000 W/PL
Product Number	69127	69165	69173	69290
Watts (W)	3400	3400	3500	4000
Volts (V)	23	23	60	42
Type of Current	DC	DC	DC	DC
Current (A)	148	148	58	92.5
Radiant Intensity 350..450 nm (mW/sr)				
Length L ₁ max (mm)	360	360	315	363
Length L ₂ max (mm)	315	315	290	342
Distance a (mm)	154	154	141.7	158
Diameter d (mm)	77	77	70	77
Electrode Gap -- cold (mm)	4.5	4.5	6.6	5.0
Avg Rated Life (hrs)	850	1500	1000	1000
Operating Position	Vertical, anode up	Vertical, anode up	Vertical, anode down	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFaX40-6/50	SFc32.5-6.7/50	SFc27-5/35	SF33.5/50
Base Cathode	SFc32.5-6.7/50	SFaX40-6/50 with cable connection (M10)	SFc27-8/35	SFc33.5-10/50
Fig No	1	1	2	
Symbols & Footnotes	71,84,97	71,84	70,84,94	70,71,84,110

EXCIMER AND SPECTRAL LAMPS

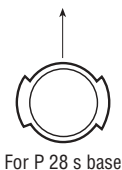
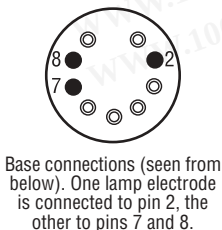
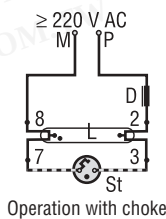
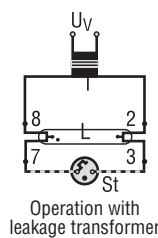


EXCIMER - XERADEX™

Ordering Abbreviation	XERADEX 20
Product Number	69338
Watts (W)	20
Length l_1 max (mm)	245
Length l_2 max (mm)	120
Distance a (mm)	75
Diameter d (mm)	40
Avg Rated Life (hrs)	1000
Operating Position	Any
Fig No	1
Symbols & Footnotes	111,112

SPECTRAL

Ordering Abbreviation	Na 10 FL
Product Number	69284
Elements	Sodium
Watts (W)	9
Volts (V)	16
Current (A)	0.57
Type of Current	AC
Operating Position	Vertical, base down
Base	Pico 9
Fig No	2
Symbols & Footnotes	113,114



- D = Choke
- L = Lamp
- M = Neutral lead
- P = Phase lead
- St = Starter St 191
- Uv = AC supply voltage

LAMP BASES



BA15d
IEC 7004-11
DIN 49721
DL
Bayonet



BA15s
IEC 7004-11A
DIN 49720
SC
Bayonet



BA20d
IEC 7004-12
DIN 49730



E10
IEC 7004-22
DIN 49610
miniature
Edison



E14
IEC 7004-23
DIN 49615
small
Edison



E27/E26
IEC 7004-21
DIN 49620
E26-NA
E27-EURO



E40/E39
IEC 7004-21
DIN 49625
E39-NA
E40-EURO



FaX1.5-3x1



G4
IEC 7004-72
DIN 49757
2-pin



GX5.3
IEC 7004-61
DIN 49640
2-pin



G5.3-4.8
2-pin



GY5.3
2-pin



G6.35-15
G6.35-20
G6.35-25
IEC 7004-59
2-pin



GX6.35-25
IEC 7004-59
2-pin



GY6.35-15
IEC 7004-59
2-pin



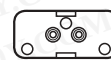
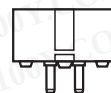
GZ6.35
IEC 7004-59 A
DIN 49754
2-pin



GXZ9.5
GZZ9.5
IEC 7004-70 B
DIN 49756
2-pin
pre-focus



G9.5
IEC 7004-70
medium
2-pin



GX9.5
DIN 49638
IEC 7004-70 A
2-pin
pre-focus

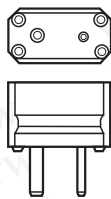


GY9.5
GZ9.5
DIN 49756
IEC 7004-70 B
2-pin
pre-focus

LAMP BASES



GX16d
2-pin



GY16
DIN 49758
IEC 7004-45
2-pin



GY17q
DIN 49758
IEC 7004-74
4-pin



GY17t
DIN 49665
IEC 7004-45
4-pin



G22
IEC 7004-75
medium
Bipost



GY22
2-pin



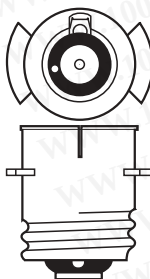
G38
IEC 7004-76
MOGUL
Bipost



GX38q



K24s
Length of cable
250 mm
Hole of cable lug
ø 8.4 mm
DIN 49748



P40s
DIN 49728
IEC 7004-43
medium
pre-focus



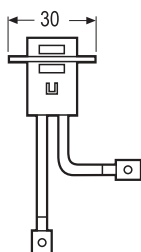
Pico9
DIN 41539



PG22-6.35
DIN 49751
IEC 7004-48



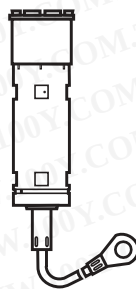
P28s
DIN 49728
IEC 7004-42
MOGUL
pre-focus



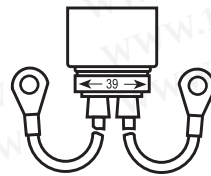
PK30d



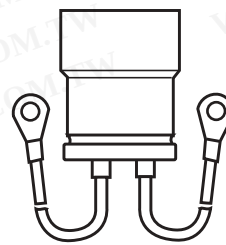
R7s
RX7s
DIN 49750
IEC 7004-92



K30 s
Length of cable
275 mm
Hole of cable lug
dia 8.4 mm
DIN 49748

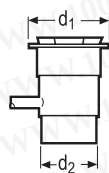


K39 d
with flexible Sialf cable
Length of cable 300 mm.
Hole of cable lug dia. 8.4 mm

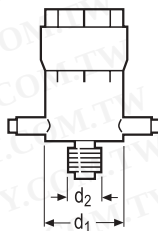


K59 d
with flexible Sialf cable
Length of cable 350 mm.
Hole of cable lug dia. 8.4 mm
DIN 49732

LAMP BASES



SK27-50



SFcX27-8
(5/16-18UNC-2 A)

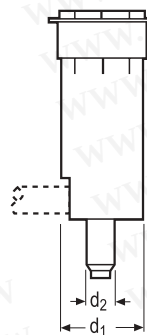


SFa15-10
SFa16-8
SFa16-10
SFa20-8
SFa20-10
SFa25-10

SFa27-8
SFa27-10
SFa27-11
SFa27-12
SFa27-14
SFa28-18



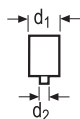
SFa21-12
DIN 49759



SFaX27-10
SFaX27-9.5
SFaX27-12
SFaX27-13
SFaX27-14
SFaX30-9.5
SFaX30-16



SFc25-14 (M 14x1.5)
SFc27-14 (M 14x1.5)

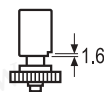


SFa5-2
SFa6-2
SFa7.5-2
SFa8-2
SFa9-2
SFa12-11
SFa21-5



SFcX12-4
(with M4 thread and
centering collar)

SFcX 13-4
SFcX 15-4 (with US inch
thread 8-32 UNC-3A and
centering collar)



SFc10-4 M4-thread
SFc6-3 M3-thread
SFc12-4 M4-thread
SFc13-4 M4-thread



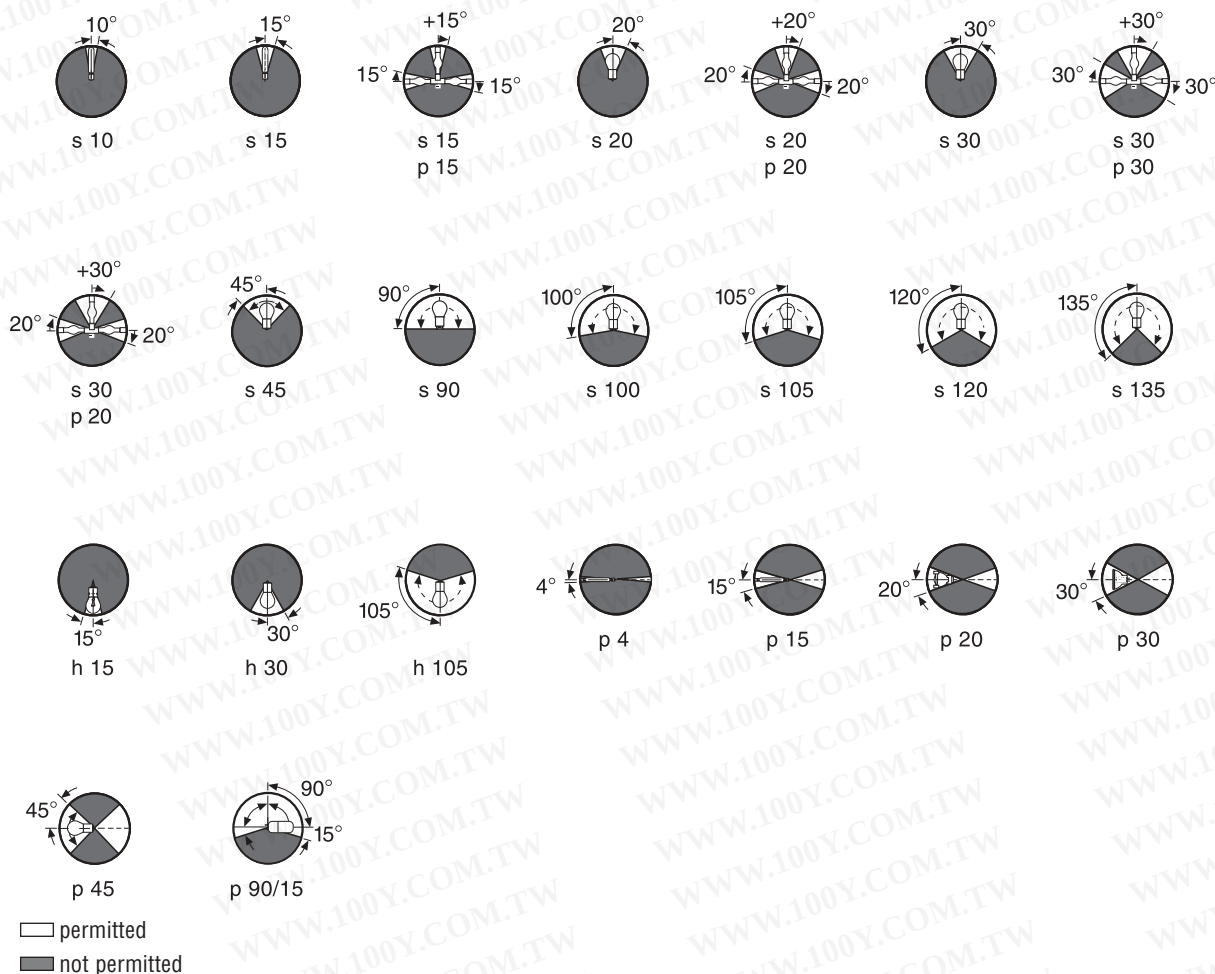
SX15s



X515
DIN 49613

OPERATING POSITIONS

Schematic diagrams



GENERAL INFORMATION

In North America, OSRAM brand Photo-Optic lighting products are sold by OSRAM SYLVANIA AND OSRAM SYLVANIA LTD. Sales are subject to standard terms and conditions of sale prevailing as of the date of purchase.

Operational data and dimensions are nominal values. OSRAM reserves the right to make technical modifications without notice. All supplies are subject to availability.

® = Registered trademarks of OSRAM GmbH

Lamps are designated in accordance with ANSI standard C78.370-1982 (As amended).

When disposing of spent lamps, always consult federal, state, local and/or provincial hazardous waste disposal rules and regulations to ensure proper disposal.

Use of improper, unapproved or unsuitable ballasts will negatively impact the performance of Photo-Optic lamps and could void the lamp warranty. A list of power supply manufacturers is available upon request.

Discharge lamps in the HMD®, HMI®, HMP®, HTI™, HSR®, HSD®, HBO® and VIP® types and the spectral lamps contain small quantities of harmful substances (such as mercury).

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC HALOGEN LAMPS

Symbol	Description
	New item introduced within the past year.
	Item will be discontinued when inventory is depleted.
Footnote	Description
1	NOTE: Base - filament connections: Pins 1 and 4.
2	s (Operating Position) = Vertical, base down
3	Lamp has monoplane filament.
4	Lamp has internal proximity reflector.
5	Lumens refers to screen lumens.
6	p (Operating Position) = Horizontal
7	Lamp also available as a 240V model (Product Number 54977).
8	Lamp also available in BELLAPHOT™ (Product Number 54840).
9	Product number 54100 is the replacement for product number 54048.
10	NOTE: Lamp service life 75hr life is defined @ 76V with a duty cycle of 45 min. ON / 15 min. OFF.
11	Lamp suited for video camera heads; 500hr life @ 1.8V/ 45 min. ON / 15 min. OFF.
12	Lamp has round-core double filament.
13	NOTE: In certain countries there are third party property rights relating to equipment which must be observed if these lamps are used in dentistry.
14	WARNING: This lamp is designed for heating purposes. It emits a strong Infrared radiation with a temperature at focal point approx. 1300 degrees C. Read Safety and Warning instructions before using this lamp.
15	h (Operating Position) = Vertical, base up
16	Lamp has a flat core filament with filament area perpendicular to the lamp axis.
17	Lamp also available in 240 V model.
18	Length I1 = Contact to contact.
19	NOTE: Preferred operating position is horizontal; vertical possible for short periods.
20	Length I = Contact to contact.
21	Lamp also available as 115V model (Product Number 54636).
22	Lamp interchangeable with HX 600
23	Lamp has a biplane filament.
24	Lamp interchangeable with HX 602
25	NOTE: High-performance HPL halogen lamps are manufactured under license from ETC, Inc.
26	NOTE: Do not tilt perpendicular to the filament.
27	NSP=Narrow Spot
28	WFL=Wide Flood
29	VNSP=Very Narrow Spot.
30	MFL=Medium Flood
31	For use where seal temperature does not exceed 650F.
32	Life at rated voltage and at 650F maximum seal temperature.
33	Clean room ready packaging.
34	NOTE: Any operating position allowed with appropriate cooling.
35	A suitable protective shield, screening technique, or both shall be used to protect people and surroundings from the possibility of a lamp shattering and from possible ultraviolet radiation.
36	High temperature base. Retards seal deterioration where seal temperature exceeds 650F.
37	Usually limited to intermittent burning.
38	NOTE: average service life of lamp if operated with 400W is 100 hrs.
39	Lamp also available with male connectors (Product Number 58722)
40	Female contact is according to DIN 46247.
41	Lamp also available with female connectors (Product Number 58697)

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC HALOGEN LAMPS

Footnote	Description
42	Male contacts according to DIN 46248.
43	Lamp also available with male connectors (Product Number 58726)
44	Lamp also available with female connectors (Product Number 58721)
45	Lamp also available with female connectors (Product Number 58709)
46	WARNING: Lamp only for use where seal temperature does not exceed 650 degrees F (343 degrees C). Minimum bulb wall temperature 480 degrees F (249 degrees C).
47	Lamp also available with male contact according to DIN 46248; Ref. No. HLX 64361 Z (Product Number 58717)
48	Max. Beam Candlepower (MBCP): 175 kcd.
49	Lamp has snap-on male contact to DIN 46248.
50	Lamp has 1.75 inch (44.45mm) stranded Nickel leads.

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Symbol	Description
	New item introduced within the past year.

Footnote	Description
1	Type of current: square-wave AC.
2	SE=Single Ended
3	p (Operating Position) = Horizontal
4	OSRAM socket #46721, cable length 22" for use with the following OSRAM lamps: HTI 250W/SE (product number 54091), HTI 400W/SE (product number 54084), HTI 600W/SE (product number 54087), and HMI 250W/SE (product number 54062).
5	Type of current: sine-wave (sinusoidal) AC.
6	s (Operating Position) = Vertical, base down
7	GS=Gap Shortened
8	S=Short
9	Lamp bases need to be forced cooled.
10	Necessary input voltage: 380 volt.
11	Permitted wattage range: 400W to 700W.
12	DE=Double Ended
13	Lamp filler tip needs to point upwards during operation.
14	Permitted wattage range: 300W to 600W.
15	NOTE: All HTI® lamps are hot restrikeable with the exception of HTI 150, HTI 152, HTI 405 W/SE, and 705 W/SE.
16	Lamp arc needs to be in horizontal operating position.
17	Current bar needs to be positioned underneath the discharge arc during operation.
18	Lampholder for FaX 1.5 base = HMI Socket 46721 (Product Number 69302).
19	WARNING: Lamp has a special GY22 base. Ignition voltage must be applied only to the thin pin.
20	WARNING: The contact pins on the base are connected internally. The electrode farthest from the base must be connected via cable.
21	DX=Type of Double Ended
22	Lamp is also available with connecting cable and plug-in contact. Lamp ref. HTI 250W/32 C (Product Number 54089).
23	Distance a is from end of base to the respective electrode tip (cold) - see lamp drawing.
24	Lamp HSD 250/2 also available with 7800K color temperature and average rated life at 3000 hr. Product Number 54118.
25	All VIP® lamps are for AC operation on electronic power supplies and are hot restrikeable. All VIP® lamps need forced cooling.
26	NOTE: Lamp life may vary depending on duty cycle and application.
27	Photometric data refer to discharge tube (lamp burner).
28	Lamp has a elliptical reflector.
29	Lamp also available in ozone-free version XBO 75 W/2 OFR (Product Number 69232)
30	With vertical operating position: anode(+) on top.
31	Photometric values are measured at rated current.
32	OFR=Ozone Free

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Footnote	Description
33	NOTE: Lamp current not to exceed 7.2A.
34	Lamp also available with connecting cable and plug-in contact. Ref. No. XBO R 100W45C OFR (Product Number 69191).
35	The focus lies 45mm in front of the mounting rim (working distance).
36	C=Cable
37	The connecting cables do not have a plug-in connector.
38	Lamp also available in ozone-free version XBO 150 W/1 OFR (Product Number 69235)
39	Lamp also available in Suprasil quartz glass version: XBO 150 W/4 (Product Number 69238).
40	Lamp uses Suprasil quartz glass.
41	NOTE: Magnetic arc stabilization required.
42	Lamp is suitable for Crosfield color scanner (CR = Crosfield).
43	Lamp also available with connecting cable and plug-in contact. Ref. No. XBO R 180W45C OFR (Product Number 69183).
44	Photometric data is measured in vertical operating position at rated wattage.
45	Lamp also available in ozone-free version XBO 450 W OFR (Product Number 69245)
46	Lamp also available in Suprasil quartz glass version XBO 450 W/4 (Product Number 69244)
47	H=Suitable for horizontal operation
48	TP=Threaded Pin
49	CA=Cable on anode base
50	Lamp also available as XBO 2001 W/HTP OFR (Product Number 69310).
51	SHSC=Super short
52	Lamp has same dimensions as XBO 1600 W/HSC OFR (Product Number 69268).
53	Lamp also available as XBO 4200 W/GS with 60mm bulb diameter and 500 hrs life.
54	Lamp also available as XBO 5000W/HBM OFR with anode base SFaX30-9,5 and cathode base SFa30-8.
55	Ignition voltage = 36 kVs
56	Ignition: Min. open circuit voltage for cold / hot ignition = 85 / 110 V
57	Cooling: Min. air flow velocity around discharge vessel = 6 m/s
58	Magnetic arc stabilization: necessary for horizontal operation
59	Lamp XBO 10000 W/HS OFR also available with current control range 160-299 amps. Product Number 69342.
60	Distance a is from end of base to the respective electrode tip (cold) - see lamp drawing.
61	Lamp optimized for fluorescence microscopy.
62	Lamp also available with AMP plug contact Ref. Lamp HBO R 103/45 C (Product Number 69311).
63	For DC operation both Product Numbers 69198 & 69222 can be used (47...65Volts / 3.1...4.2Amps). For AC operation Product Number 69198 (L1 version 57 65 Volt / 3.6 Amps) or Product Number 69222 (L2 version 49 57 Volt / 4.2 Amps) can be used.
64	Lamp also available with threaded pin 8-32 UNC-3A: HBO 200W/2TM L1 (Product Number 69221) and HBO 200 W/2TM L2 (Product Number 69223).
65	Technical data if operated on AC current: Volts=65, Lumens=10,000 lm, Luminous Efficacy=50 lm/W.
66	Cathode Base with 8-32 UNC-3A thread.
67	Anode Base with 8-32 UNC-3A thread.
68	For DC operation both Product Numbers 69221 & 69223 can be used (47...65 Volts / 3.1...4.2Amps). For AC operation Product Number 69221 (L1 version 57 65 Volt / 3.6 Amps) or Product Number 69223 (L2 version 49 57 Volt / 4.2 Amps) can be used.
69	Lamp also available with increased radiation in the wavelength range below 450nm for UV-curing. Ref. Lamp HBO 202 W/4 (Product Number 69316).
70	Distance a = Distance (cold) of either anode base to anode tip or cathode base to cathode tip depending on lamp type.
71	This lamp has positive pressure even when cold. Please read safety/warning instructions before using this lamp.
72	Lamp same as HBO 200 W/4 (Product Number 69224 but with increased radiation in the wavelength range below 450nm for UV-curing.
73	Anode and Cathode Base with UNC-3A thread.
74	Lamps suitable for pulse operation between 250W and 500W. Maximum permissible average power is 350W (also for constant power operation).
75	HBO 350W (Product Number 69226) replaces HBO 350 W/G (Product Number 69227).
76	Lamp service life is defined with a switch-on/switch off duty cycle of 12 hours ON / 30 minutes OFF.

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Footnote	Description
77	For DC operation both Product Numbers 69203 & 69204 can be used (67 85 Volts / 5.9#7.4Amps). For AC operation Product Number 69203 (L1 version 77 85 Volt / 7.1 Amps) or Product Number 69204 (L2 version 69 77 Volt / 7.8 Amps) can be used.
78	Lamp base(s) with M 5x0.9 thread.
79	NOTE: Maximum permitted base temperature: 200 degrees C (392 degrees F).
80	Cathode base with M 5x 0.9 thread
81	Lamp anode base (hexagon) with thread M5x0.9
82	Anode Base=Hexagon base with M 6 thread.
83	Lamps suitable for pulse operation between 700W and 1000W. Maximum permissible average power is 750W (also for constant power operation).
84	NOTE: Lamp should not be ignited more than ten times over lifetime.
85	Cathode Base=Sleeve base with M 6 thread.
86	Cathode base with cable connection (M5)
87	Cathode Base with cooling fins.
88	Anode sleeve base without thread.
89	Anode Base=Sleeve base with cable connection (M5)
90	Lamp has cooling fins on anode base.
91	NOTE: the radiant Power of the I-line is measured in the wavelength range: 365 +2.5 nm.
92	Lamp also available as Longlife version HBO 1003 W/PIL (NAED 69180) with 1500hr life.
93	Lamp also available as version HBO 1003 W/PI with 850hr life (Product Number 69195)
94	Anode Base with cable connection (M 8).
95	Lamp also available as Longlife version HBO 1500 W/CIL (Product Number 69179) with 1500hr life.
96	Cathode Base with cable connection (M 8).
97	Anode Base with cable connection (M 10).
98	Lamp also available as Longlife version HBO 1500 W/PIL (Product Number 69181) with 1500hr life.
99	Anode Base=Cooling fins with cable connection (M 8).
100	Lamp also available with 850 hr HBO 1500 W/PI (Product Number 69319)
101	Cathode Base with cable connection (M 6).
102	Lamp also available as version HBO 2001 W/CI with 850hr life (Product number 69219)
103	Lamp also available as version HBO 2001 W/CIL with 1500hr life (product number 69189)
104	NOTE: The average rated life of this lamp depends on the operating mode (initial power setting).
105	Lamp also available as Longlife version HBO 2500 W/PIL with 1500hr life (Product Number 69172).
106	Lamp also available as version HBO 2500 W/PI with 850hr life (Product Number 69178)
107	Anode base with cable: length 340mm; connector 8/25.
108	Lamp also available as Longlife version HBO 3500 W/PIL with 1500hr life (Product Number 69169).
109	Lamp also available with 850 hrs (HBO 3500 W/PI, Product Number 69174)
110	Anode base with cable connection
111	The XERADEX 20 lamp must be operated with DBD 20/110-240/ECG-XERADEX power supply (NAED 69128).
112	XERADEX lamps are only to be operated in appropriate equipment. Read and understand the Product Safety Warnings before using this product. XERADEX lamps generate a strong 172 nm (UV) radiation. This short-wave radiations will convert atmospheric oxygen (O ₂) surrounding the lamp into ozone (O ₃). Ozone gas is toxic when inhaled in high concentrations over long period of time. Ozone levels can be measured and monitored with commercial measuring equipment. Always keep ozone levels below the applicable TVL (threshold limit value.)
113	For Na 10 FL (product number 69284) use adapter no. 454/s using Pico 9 bases with P28 sockets.
114	Safety: Because the danger from glare, UV radiation and overpressure during operation, spectral lamps may only be operated in sealed housings specially designed for the purpose. Suitable filters must be fitted to ensure that UV radiation is reduced to permissible levels.

WARNING

TUNGSTEN HALOGEN & INCANDESCENT PHOTO-OPTIC LAMPS

The following information pertains to all Photo-Optic Tungsten-Halogen and Incandescent lamps including Infrared Heat Lamps, Current-Controlled Airfield Lamps, PAR and other Reflector Lamps.

WARNING:

In accordance with ANSI/IESNA Standard RP-27, Photo-Optic incandescent & tungsten halogen lamps are Risk Group 2 products.

Read and understand this warning before using this bulb!

THIS LAMP EMITS ULTRAVIOLET AND INFRARED RADIATION. ALWAYS WEAR SUITABLE EYE PROTECTION WHEN WORKING NEAR THIS LAMP. THIS LAMP OPERATES AT HIGH PRESSURE AND AT HIGH TEMPERATURE AND MAY SHATTER UNEXPECTEDLY. THIS LAMP MUST BE USED IN A FIXTURE THAT HAS A SUITABLE PROTECTIVE SHIELD AND/OR SCREEN TO PROTECT PEOPLE AND SURROUNDINGS AGAINST THE RISK OF PERSONAL INJURY AND/OR PROPERTY DAMAGE FROM LAMP SHATTERING AND EXPOSURE TO INFRARED OR ULTRAVIOLET RADIATION.

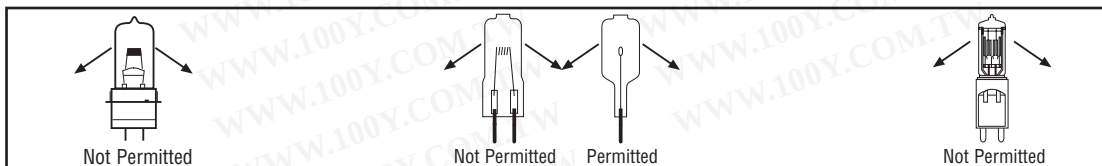
ALL OF THE FOLLOWING PROCEDURES MUST BE FOLLOWED FOR SAFETY AND TO OBTAIN SATISFACTORY LAMP PERFORMANCE.

GENERAL SAFETY AND INSTALLATION TIPS:

1. This lamp generates UV (ultraviolet) and/or IR (infrared) radiation. Prolonged exposure to this lamp may cause skin and eye irritation from the radiation when operated at or above rated voltage.
Please note that lamp with reference number 64614 has enhanced UV output as a result of its reflector coating.
2. To avoid risk of serious eye injury from the intense light, do not stare at operating lamp.
3. Because this lamp radiates considerable heat, do not use in close proximity to people, combustible materials, or substances adversely affected by heat or drying.
4. To avoid shattering of glass parts and/or lens/reflector, keep water, other liquids and metal objects from contacting hot glass surfaces. Protect the entire lamp from moisture (rain, snow, etc.) to avoid cracking or breaking.
5. Protect the lamp from contamination, abrasion and scratches. Do not use if lamp is scratched, cracked or damaged in any way.
6. For safe and proper lamp operation, operate at rated voltage and wattage. Operation above rated voltage increases UV output and internal pressure, thus increasing the risk of rupture.
7. This lamp (for reflectorized lamps, this applies to inner lamp capsule) operates at high internal pressure and at high surface temperature and may unexpectedly shatter resulting in hot, flying fragments of glass or metal. Although this lamp was carefully constructed, tested and inspected before packing and shipping, under certain conditions beyond the manufacturer's control, the glass parts could crack or break.
8. **For PAR and other reflectorized lamps:** Even though this lamp may continue to operate after the reflector and/or lens is broken or damaged, it should be replaced as soon as possible since the pressure-filled inner lamp capsule could unexpectedly shatter if scratched or otherwise damaged, creating a risk of personal injury or property damage.

LAMP MOUNTING AND OPERATION:

1. Use only in equipment/fixture specifying this lamp type, including voltage and wattage. Use in circuits, which do not exceed rated voltage and in sockets and equipment designed for its use.
2. Do not touch or handle the quartz glass with bare fingers. Contaminants can burn in at high operating temperatures and cause glass to recrystallize. This makes the glass opaque and milky; it increasingly loses its strength, and the risk of bursting increases. If lamp is touched, clean with denatured alcohol and wipe dry with a soft, clean lint-free cloth before operating.
3. Make sure lamp is properly installed into socket to obtain good electrical contact and to avoid damaging lamp and/or socket. A heat resistant connector should be used to make electrical contact to the lamp base for safety and to obtain rated lamp life. To avoid damage to lamps with bipin bases, do not twist. Pull old lamp straight out and push new lamp straight in. For safe and proper operation of lamps with lead wires, please ensure that the lamp is securely supported and the lead-wires are securely connected to the electrical supply.
For PAR 36, 46, 56, 64 lamps: To avoid breaking, the lamp must be supported by its rim.
4. Operating temperatures deteriorate lamp sockets. Socket condition may affect lamp life. Replace socket if deterioration of socket or lamp base contacts is observed.
5. Do not move, bump or bounce equipment/fixture during operation because mechanical shock can cause shattering and failure of the lamp.
6. **For PAR 36, 46, 56 and 64 lamps:** Lamp should be operated with a protective shield (especially in public places -- churches, auditoriums, etc) to prevent the risk of personal injury or property damage from flying lamp fragments in the event of the lamp cracking or breaking.
7. To avoid risk of burns or electrical shock, do not remove or insert lamp when power is on, allow lamp to cool to room temperature before removing or storing.
8. Replace all equipment/fixture covers and shields after servicing to prevent personal injury or property damage.
9. All Photo-Optic lamps have a range of permissible operating positions. Please see relevant operating position information in our literature or on-line catalog and only operate lamps at the operating positions specified. The basic rule for all single-ended Photo-Optic halogen and incandescent lamps is that the lamp may only be tilted/inclined perpendicular to the plane through both filament lead-wires (see illustrations and list of affected filament designs below).



Affected Filament Designs:

C-2V, C-6, C-6F, C-13, C-13D, CC-2V, CC-6, CC-13, CC-13D, 2C-8, 2CC-8

10. Keep lamp seal temperature below 350°C (660°F) and the lamp wall temperature between 250°C (480°F) and 900°C (1650°F). When used in equipment designed to provide cooling to operating lamp, do not obstruct equipment cooling system.
11. Filaments for high luminance applications are designed in such a way that the incandescent elements do not block each other in the direction of projection. The positioning of single filament coils in one plane is called a monoplane filament. Biplane filaments have the incandescent elements staggered forward and backward in two parallel planes while maintaining adequate spacing to prevent arc-over.
12. Note: Photometric values of a frosted lamp will vary from the published values of the same non-frosted type.

TUNGSTEN HALOGEN & INCANDESCENT PHOTO-OPTIC LAMPS (continued)

LAMP DIMMING:

1. **Incandescent lamps (non-halogen):** Incandescent lamps perform according to fixed relationships between luminous flux, luminous efficacy, color temperature, electrical voltage, electrical current and electrical power consumption. In general, a 5% increase in applied lamp voltage results in half the lamp life, and conversely a 5% reduction of lamp voltage results in twice the lamp life.
2. **Tungsten-Halogen Lamps:** In standard incandescent lamp operation, there is an inverse relationship of lamp life vs. supply voltage; i.e., the lower the voltage, the longer the life. In some tungsten halogen lamps, however, this holds true only when operated within 5 to 10% of the rated voltage. Further dimming, beyond the 10%, may affect the halogen chemistry in the lamp and may cause filament corrosion. There are also tungsten halogen lamps that only achieve nominal lamp lives regardless of the level of dimming that is used. Unlike standard incandescent lamps, the relationships in halogen lamps are not clear-cut because of the halogen chemical cycle. For the vaporized tungsten to be removed from the inner bulb wall, a minimum bulb wall temperature is necessary. This temperature is directly related to the power input to the lamp such that a reduction in power effects a reduction in the bulb wall temperature. Special design techniques have been incorporated in modern halogen lamps to prevent blackening regardless of the level of dimming. Consideration must be given to lamp dimming in applications that require maximum constancy of color temperature (photographic and video recording, for example), since the color temperature changes with the filament temperature.

CURRENT-CONTROLLED HALOGEN LAMPS:

Some lamp types are designed for constant current operation, primarily for airfield applications. They are usually operated in series with an isolation transformer tap connected to each lamp to ensure that all lamps have the same brightness. Constant current-operated lamps differ in performance from the published values of constant applied voltage lamps. Direct series connection of non-constant current designed lamps is not recommended.

INFRARED HEAT LAMPS:

These lamps are designed for use in applications specifically requiring an infrared radiation source. Infrared radiation from these lamps causes surfaces to be heated. These lamps operate at high temperatures. Allow sufficient cooling time before handling. A listing of Kelvin temperatures, method for electrical connection, and operating positions with appropriate cooling recommendations for tungsten halogen special heat lamps can be found in the OSRAM literature or in the on-line catalog.

CAUTION: The infrared reflector lamp, HLX 64635 is specially designed to produce high temperatures at its focal point (approximately 1300°C / 2372°F) for soldering, welding and heating applications.

LAMP DISPOSAL:

1. Disposal of spent lamps must be in accordance with applicable federal, state/provincial, and local regulations.
2. U.S. lamp users may obtain information concerning relevant agencies and disposal regulations from the Federal Superfund Hotline (Resource Conservation & Recovery Act) at 800-424-9346. Information may be available as to the appropriate state agencies to contact regarding disposal issues.
3. OSRAM SYLVANIA Products Inc. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.

WARNING

METAL HALIDE PHOTO-OPTIC LAMPS [HMI, HMD, HMP, HSD, HSR, HTI]

WARNING:

In accordance with ANSI/IESNA Standard RP-27, Photo-Optic metal halide lamps are a Risk Group 3 product.

Read and understand this warning before using this lamp!

THIS LAMP EMITS ULTRAVIOLET AND INFRARED RADIATION. ALWAYS WEAR SUITABLE EYE PROTECTION WHEN WORKING NEAR THIS LAMP. THIS LAMP OPERATES AT HIGH PRESSURE AND AT HIGH TEMPERATURE AND MAY SHATTER UNEXPECTEDLY. THIS LAMP MUST BE USED IN A FIXTURE THAT HAS A SUITABLE PROTECTIVE SHIELD AND/OR SCREEN TO PROTECT PEOPLE AND SURROUNDINGS AGAINST THE RISK OF PERSONAL INJURY AND/OR PROPERTY DAMAGE FROM LAMP SHATTERING AND EXPOSURE TO INFRARED OR ULTRAVIOLET RADIATION.

RUPTURE & RADIATION (UV-IR-VISIBLE) HAZARD:

1. All Photo-Optic metal halide lamps operate at high internal pressures (upwards of 500psi or 35bar possible) and may unexpectedly rupture resulting in the discharge of hot fragments (approximately 800°C / 1472°F) of quartz and/or metal particles, as well as the release of mercury/mercury vapor. In the event of such a rupture, there is a risk of personal injury, burns and fire.
2. All Photo-Optic metal halide lamps generate ultraviolet (UV), infrared (IR) and visible radiation during operation. This radiation can cause permanent damage to the eyes (including blindness) and serious injury to the skin (including burns and blistering). To avoid eye damage, other personal injury and/or property damage, the lamp MUST be operated in a suitable fixture.
3. A suitable fixture is one that will prevent the arc from being viewed directly while operating, and in the event of a lamp rupture, will prevent hot (up to 800°C / 1472°F), flying fragments of quartz and/or metal from escaping into the area.
4. To minimize the risk of a lamp rupture, replace the lamp at or before the end of rated life (see OSRAM SYLVANIA product catalog for rated life) or when the lamp shows signs of blackening.
5. The discharge vessel of Photo-Optic metal halide lamps is constructed of quartz glass that is filled with a quantity of mercury, elemental metals and/or rare earth elements. These lamps are **not** at positive pressure when cold (not operating, at room temperature).

GENERAL SAFETY & INSTALLATION TIPS

BROKEN LAMPS (MERCURY VAPOR RELEASE AND DISPOSAL):

1. In the event of a lamp rupturing during operation, all personnel should leave the area immediately to avoid the inhalation of mercury vapor. The area should then be thoroughly ventilated for a minimum of 30 minutes or until the mercury vapor in the area is below the ACGIH TLV (American Conference of Governmental Industrial Hygienists Threshold Limit Value). Inhaling vapor or small particles of mercury or its compounds can be harmful to lungs, kidneys and nervous system. Penetration of the skin or ingestion can also be harmful.
2. To avoid mercury vapor getting into air conditioning systems, mercury vapor-absorbing filters should be used. ***When the lamp housing has cooled, mercury residue may be picked up with special mercury adsorptive agents or a mercury vacuum cleaner (available from laboratory safety equipment suppliers) and disposed of in accordance with local, state and federal regulations.*** There should be no direct skin contact with and/or inhalation of mercury residues that may be residing in lamp housing, optics or lamp parts.

If a cold (room temperature) lamp is broken, proceed with clean up and disposal as indicated above (in the ***bold, italic statement***).

METAL HALIDE PHOTO-OPTIC LAMPS [HMI, HMD, HMP, HSD, HSR, HTI](continued)

INSTALLATION:

1. Do not use if lamp is scratched, cracked or damaged in any way.
2. To prevent electric shock, shut off main power to the fixture before attempting to service or replace lamp.
3. To avoid damaging the quartz and causing premature lamp failure, do not handle lamp with bare hands. Use clean gloves.
4. If the quartz parts are inadvertently touched, clean fingerprints off with denatured alcohol and wipe dry with a clean, soft, lint-free cloth. Do not use cleaning rags or material that can leave a residue.
5. To prevent skin burns, allow lamp to cool before handling.
6. To avoid breakage, mounting of the lamp must be free of mechanical stress during installation and during operation by allowing for thermal expansion along its axis.
7. Photo-Optic metal halide lamps should not be subjected to force/stress during installation. Single-ended lamp types use a metal bar, which runs parallel to the lamp body and provides an electrical path for the lamp current (from the socket end to the opposite end of the lamp). To avoid overheating the lamp current bar, Photo-Optic metal halide lamp types without outer jackets should not have the lamp current bar positioned above the discharge arc during operation. Single-ended lamp types with outer jackets may be operated in any position and with any current bar position.
8. Replace all fixture covers and shields after replacing lamp to prevent eye damage, other personal injury or property damage.
9. Use only in instruments/equipment specifying this light source.
10. **CAUTION - Shorting Hazard:** The HTI 2500 W/SE has both base pins connected to the same point inside the lamp socket. A lead wire on the opposite side of the lamp provides the current connection necessary for operating the lamp.
11. Make sure lamp is properly installed into socket/connector to obtain good electrical and thermal contact and avoid damaging lamp and/or socket/connector. electrical connections should be free from dirt and corrosion. Socket/connector condition may affect lamp life. Replace socket/connector or lamp if deterioration (pitting, scorching, corrosion, etc.) is observed.

Please note that certain Photo-Optic, AC metal halide lamps have dedicated pins or connectors for high voltage ignition.

OPERATION:

1. Magnetic current-limiting ballasts (chokes) provide sine-wave current operation for lamps. However, electronic control gear (ECG) allows for square wave current operation, often at higher frequencies. Some Photo-Optic metal halide lamps have been designed for, and therefore require, ECG square-wave operation. Please see OSRAM literature for power requirements for your specific lamp type.
2. Operate with compatible power supply and fixture only.
3. OSRAM Photo-Optic metal halide discharge lamps are designed for either hot re-start (high ignition voltages) or cold start (low ignition voltages only). Please see OSRAM literature for power requirements for your specific lamp type.
4. To ensure that lamps operate at the correct power during AC operation, connections on the ballast/choke in the power supply should be made to the correct voltage taps; i.e., tap voltage should match input line voltage. To avoid wall blackening, overheating or other premature failure modes, OSRAM strongly advises against operating Photo-Optic metal halide lamps at higher than rated wattage ("boosted operation"). Only OSRAM HMP Photo-Optic metal halide lamps are offered with a unique power feature allowing for operation at increased wattage of up to 1.5 times their rated wattage, but with reduced service life. For safe lamp operation and optimum performance, use only those ballasts/power supplies that have been approved by OSRAM. See your OSRAM dealer for a list of approved equipment.
5. Dimming of Photo-Optic metal halide lamps, like incandescent lamps, causes a drop in luminous output. If a metal halide lamp is dimmed by electrical means, it will not reach its optimum operating state and, unlike incandescent lamps, will not last longer. When dimmed, the lamp wall temperature falls more rapidly on a lamp that has no outer jacket. In metal halide lamps without an outer jacket, reduced power operation causes an increase in the color temperature and a reduction in CRI. Lamps with outer jackets can have either a vacuum or filling gas (often Nitrogen) within. Metal halide lamps with outer jackets tend to maintain their color properties better under dimmed conditions because the outer jacket provides thermal insulation against internal lamp cooling.
6. Photo-Optic metal halide lamps need 5 to 20 minutes (depending on lamp type and cooling conditions) before they reach their operating temperatures. To ensure proper ignition on subsequent start-up, lamps should not be switched off during the warm-up period.
7. Average service life of these lamps is determined by the ON/OFF duty cycle. Lamp performance is reduced with increased duty cycle.

OPERATING POSITION:

Photo-Optic metal halide lamps may only be used in the operating positions described in the OSRAM SYLVANIA product catalog. Please note that lamp photometric values and arc stability can be effected by the operating position.

OZONE GENERATION:

- During operation, Photo-Optic metal halide lamps produce a spectrum that ranges from about 150 nm in the ultraviolet region to the infrared region.
- If the quartz glass bulb is transparent in the ultraviolet region between 180 and 220 nm, this short-wave radiation will convert a small quantity of atmospheric oxygen (O_2) surrounding the lamp into ozone (O_3). Moreover, the oxygen molecules will link together with the nitrogen (N_2) in the air, creating nitrogen oxides (NO_x). (Some believe that the smell attributed to ozone is in actuality from the nitrogen oxides.)
- Ozone gas is toxic when inhaled in high concentrations over long periods of time. Ozone levels can be measured and monitored with commercial measuring equipment. Always keep ozone levels below the applicable TLV (threshold limit value)
- An "ozone smell" (or smell of nitrogen oxide) may be detected shortly after ignition. There are two probable causes for this condition. O_3 and NO_x production is caused by the (short-duration) radiation of the spark gap used for lamp ignition. Or, the cold condition of the quartz glass bulb has slightly shifted its UV-absorption characteristics thus permitting a small amount of radiation in the very short-wave ultraviolet range to be emitted by the bulb. Typically, after the lamp has run up to its operating temperature range, virtually no ozone is produced by the lamp, as a rule, due to the quartz glass absorption and the self-absorption of the plasma.

LAMP COOLING:

1. All Photo-Optic metal halide lamp bases must be kept below 230°C (446°F) during operation to prevent premature lamp failure. If convection cooling is inadequate, forced air-cooling may be used. Please see OSRAM literature for cooling requirements of specific lamp types.
2. If forced air-cooling is used, care must be taken to direct airflow at the bases only. Striking elsewhere on the lamp with the airflow will result in poor lamp performance or premature failure.
3. Discoloration, surface pitting, and/or corrosion of the lamp connections indicates a thermal overload. To obtain optimum lamp performance, components exhibiting these conditions must be cleaned or replaced.

LAMP REMOVAL:

- Turn off power to the lamp and allow lamp to cool (forced or convection) for a minimum of 30 minutes prior to shutting main fixture power and opening fixture. Do not remove lamp until it has cooled.
- Lamps should be placed in their original OSRAM SYLVANIA packaging for temporary storage until disposal and/or transportation to a disposal location. See "Lamp Transportation" and "Lamp Disposal" sections below for relevant information.

METAL HALIDE PHOTO-OPTIC LAMPS [HMI, HMD, HMP, HSD, HSR, HTI] (continued)

LAMP TRANSPORTATION:

1. All Photo-Optic metal halide lamps should be transported **ONLY** in their original packaging.
2. Transportation in non-original packaging can damage the lamp and void warranty.
3. U.S. Federal regulations require mercury-containing lamps to be shipped **ONLY** in DOT-compliant packaging. Original OSRAM packaging is DOT-compliant.

MERCURY FILL OF Photo-Optic METAL HALIDE LAMPS:

- Mercury is referred to by its chemical symbol, Hg, which is derived from the Greek and Latin "hydrargyrum," a silvery shiny liquid metal at room temperature. In humid air it is covered with a gray oxide skin. Of all metals it has the highest vapor pressure which increases exponentially with rising temperatures. For this reason, mercury is volatile at room temperature. The colorless and odorless vapors produced are poisonous and heavier than air.
- The inhalation (respiration) of mercury or mercury compounds as vapor or dust will lead to the damage of lungs, kidneys, and the nervous system. Apart from inhalation, mercury can be transmitted through the skin (penetration) or through the gastro-intestinal tract (ingestion), which is also harmful.
- The ACGIH TLVs are merely guidelines to assist in the control of health hazards. The ACGIH states that the TLVs refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Therefore, the TLV for mercury should never be exceeded.
- Analytical detection of mercury vapor is possible by means of gas/vapor detector tubes (rough measurement) or air-monitors that absorb mercury vapor.

OSRAM metal halide lamps have the following mercury contents:

Lamp Family	Maximum Mercury Content (mg)
HMI	1200
HMP	70
HTI	180
HSR/HSD	110
HMD	520

PROPERTIES OF MERCURY:

- Chemical symbol: Hg
- Atomic number: 80
- Molecular Weight: 200.59
- Density: 13.6 g/cm³ @ 20°C / 68°F
- Melting Point: -39°C / -38.2°F
- Boiling Point: 357°C / 674°F
- Vapor pressure:
 - 160 Pa @ 20°C / 68°F
 - 370 Pa @ 30°C / 86°F
 - 823 Pa @ 40°C / 104°F
- Concentration in air:
 - 13.6 mg/m³ @ 20°C / 68°F
 - 29.6 mg/m³ @ 30°C / 86°F
 - 62.7 mg/m³ @ 40°C / 104°F
- CAS Registry Number: 7439-97-6
- RCRA waste number: U151
- Other Names: Hydrargyrum, Colloidal mercury, Kwik, Mercure, Mercurio, Metallic mercury, Quecksilber, Quick silver, Liquid Silver

LAMP DISPOSAL:

1. Disposal of spent lamps must be in accordance with applicable federal, state/provincial, and local regulations. State laws may differ in their disposal requirements for lamps.
2. U.S. lamp users may obtain information concerning relevant agencies and disposal regulations from the Federal Superfund Hotline (Resource Conservation & Recovery Act) at 800-424-9346. Information may be available as to the appropriate state agencies to contact regarding disposal issues.
3. OSRAM SYLVANIA Products Inc. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities. It is the responsibility of the waste generator to ensure proper classification and disposal of waste products.

WARNING

VIP SUPER HIGH PRESSURE MERCURY LAMPS (PHOTO-OPTIC)

WARNING:

In accordance with ANSI/IESNA Standard RP-27, VIP Super High Pressure Mercury Lamps are Risk Group 3 products.

Read and understand this entire statement before using this lamp!

RUPTURE & RADIATION (UV- VISIBLE) HAZARD:

1. The discharge vessel of Super High Pressure Mercury VIP lamps is constructed of quartz glass that is filled with a quantity of mercury. These lamps are not pressurized when cold (i.e., at room temperature).
2. **All Super High Pressure Mercury VIP lamps have high internal pressures (up to approximately 3,675 psi or 250 bar) during operation and may unexpectedly rupture resulting in the discharge of hot fragments (approximately 800°C / 1472°F) of quartz and/or metal particles, as well as the release of mercury/mercury vapor.** In the event of such a rupture, there is a risk of personal injury, burns, and fire.
3. **Super High Pressure Mercury VIP lamps generate intense ultraviolet (UV), visible and infrared radiation during operation. This radiation can cause permanent damage to the eyes (including blindness) and serious injury to the skin (including burns and blistering).** To avoid eye damage, other personal injury, and/or property damage, the lamp **MUST** be operated in a suitable fixture.
4. A suitable fixture is one that will prevent the arc from being viewed directly while operating, and in the event of a lamp rupture, will prevent hot (up to 800°C / 1472°F), flying fragments of quartz and/or metal from escaping into the area.
5. To minimize the risk of a lamp rupture, replace the lamp at or before the end of rated life (see OSRAM SYLVANIA product catalog for rated life).

VIP SUPER HIGH PRESSURE MERCURY LAMPS (PHOTO-OPTIC) (continued)

BROKEN LAMPS (MERCURY VAPOR RELEASE AND DISPOSAL):

1. In the event of a lamp rupturing during operation, all personnel should leave the area immediately to avoid the inhalation of mercury vapor. The area should then be thoroughly ventilated for a minimum of 30 minutes or until the mercury vapor in the area is below the ACGIH TLV (American Conference of Governmental Industrial Hygienists Threshold Limit Value). Inhaling vapor or small particles of mercury or its compounds can be harmful to lungs, kidneys, and nervous system. Penetration of the skin or ingestion can also be harmful.
2. When the lamp housing has cooled, mercury residue may be picked up with special mercury adsorptive agents or a mercury vacuum cleaner (available from laboratory safety equipment suppliers) and disposed of in accordance with local, state, and federal regulations. There should be no direct skin contact with and/or inhalation of mercury residues that may be residing in lamp housing, optics or lamp parts.
3. If a cold (room temperature) lamp is broken, proceed with clean-up and disposal as indicated in item 2 above.

GENERAL SAFETY & INSTALLATION TIPS

INSTALLATION:

1. Do not use if lamp or any lamp parts such as reflector, front glass, etc. are scratched, cracked, or damaged in any way.
2. To prevent electric shock, shut off main power to the fixture before attempting to service or replace lamp.
3. If the quartz parts are inadvertently touched, clean fingerprints off with denatured alcohol and wipe dry with a soft, clean, lint-free cloth. Do not use cleaning rags or material that can leave a residue.
4. To prevent skin burns, allow lamp to cool before handling.
5. To avoid breakage, mounting of the lamp must be free of mechanical stress during installation and during operation by allowing for thermal expansion.
6. Super High Pressure Mercury VIP lamps should not be subjected to force/stress during installation.
7. Replace all fixture covers and shields after replacing lamp to prevent eye damage, other personal injury, or property damage.
8. Use only in instruments/equipment specifying this light source.
9. Make sure lamp is properly connected to avoid damaging lamp and/or socket/connector. Electrical connections should be free from dirt and corrosion. Socket/connector condition may affect lamp life.
10. Replace socket/connector or lamp if deterioration (pitting, scorching, corrosion, etc.) of either is observed.

OPERATION:

1. Super High Pressure Mercury VIP lamps are designed for operation on AC only.
2. Operate with compatible power supply and fixture only.
3. Super High Pressure Mercury VIP lamps need approximately 5 minutes (depending on lamp type and cooling conditions) before they reach their operating temperatures. To ensure proper ignition on the following start-up, lamps should not be switched off during the warm-up period.
4. The average service life of Super High Pressure Mercury VIP lamps is influenced by their ON/OFF-duty cycle. Lamp performance is reduced with increased duty cycle.

OPERATING POSITION:

Super High Pressure Mercury VIP lamps may only be operated in the positions described in the OSRAM SYLVANIA product catalog and/or technical literature.

LAMP COOLING:

1. To prevent premature failure, forced-air cooling is required. Maximum permitted lamp temperatures are described in the available technical literature.
2. Discoloration, surface pitting, and/or corrosion of the lamp connections indicate a thermal overload. Components exhibiting these conditions must be cleaned or replaced.

LAMP REMOVAL:

Turn off power to the lamp and allow lamp to cool (forced) for a minimum of 15 minutes prior to shutting main fixture power and opening fixture. Do not remove lamp until it has cooled.

LAMP TRANSPORTATION:

1. All Super High Pressure Mercury VIP lamps should be transported ONLY in their original packaging.
2. Transportation in non-original packaging can result in damage to the lamp thus voiding the warranty.
3. U.S. Federal regulations require mercury-containing lamps to be shipped ONLY in DOT-compliant packaging. Original OSRAM packaging is DOT-compliant.

MERCURY FILL OF SUPER HIGH PRESSURE MERCURY VIP LAMPS:

Mercury is referred to by its chemical symbol, Hg, which is derived from the Greek and Latin "hydrargyrum," a silvery, shiny liquid metal at room temperature. In humid air it is covered with a gray oxide skin. Of all metals it has the highest vapor pressure which increases exponentially with rising temperatures. For this reason, mercury is volatile at room temperature. The colorless and odorless vapors produced are poisonous and heavier than air.

The inhalation (respiration) of mercury or mercury compounds as vapor or dust may lead to the damage of lungs, kidneys, and the nervous system. Apart from inhalation, mercury can be transmitted through the skin (penetration) or through the gastro-intestinal tract (ingestion), which is also harmful.

Threshold Limit Values (TLVs) are not fine lines between safe and dangerous concentrations but are guidelines to assist in the control of health hazards. They represent the maximum exposure to substances, both short-term and long-term, that a person may experience without resulting in health-related problems. Therefore, the TLV for mercury should never be exceeded.

Analytical detection of mercury vapor is possible by means of gas/vapor detector tubes (rough measurement) or air-monitors that absorb mercury vapor.

OSRAM Super High Pressure Mercury VIP lamps have the following mercury contents:

Power level	Maximum Mercury content (mg)
100-200W	12

PROPERTIES OF MERCURY:

- Chemical symbol: Hg
- Atomic number: 80
- Molecular Weight: 200.59
- Density: 13.6 g/cm³ @ 20°C / 68°F
- Melting Point: -39°C / -38.2°F
- Boiling Point: 357°C / 674°F
- Vapor pressure: 160 Pa @ 20°C / 68°F
370 Pa @ 30°C / 86°F
823 Pa @ 40°C / 104°F

VIP SUPER HIGH PRESSURE MERCURY LAMPS (PHOTO-OPTIC) (continued)

- Concentration in air: 13.6 mg/m³ @ 20°C / 68°F
29.6 mg/m³ @ 30°C / 86°F
62.7 mg/m³ @ 40°C / 104°F
- CAS Registry Number: 7439-97-6
- RCRA waste number: U151
- Other Names: Hydrargyrum, Colloidal mercury, Kwik, Mercure, Mercurio, Metallic mercury, Quecksilber, Quick silver, Liquid Silver

LAMP DISPOSAL:

1. Disposal of spent lamps must be in accordance with applicable federal, state/provincial, and local regulations. Some U.S. states differ in their disposal requirements for lamps containing mercury.
2. OSRAM SYLVANIA recommends that all mercury-containing lamps be recycled. For a list of lamp recyclers and to obtain state regulatory disposal information, log onto www.lamprecycle.org. Lamp users may also obtain information concerning relevant agencies and disposal regulations from the Federal Superfund Hotline (Resource Conservation & Recovery Act) at 800-424-9346. Information may be available as to the appropriate state agencies to contact regarding disposal issues.
3. OSRAM SYLVANIA INC. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.

WARNING

XBO® HIGH PRESSURE XENON LAMPS

WARNING:

In accordance with ANSI/IESNA Standard RP-27, this XBO bulb is a Risk Group 3 product.

Read and understand this warning before using this bulb!

XBO lamps are at high internal pressure when cold (up to 35 bar or approximately 525 psi) and at operating temperature (up to 80 bar or approximately 1200 psi at bulb wall temperatures of 600°C to 800°C). Therefore, XBO lamps may unexpectedly rupture resulting in the discharge of hot fragments of quartz and/or glass and metal. In the event of such a rupture, there is a risk of personal injury, burns and fire. Only handle lamps with their protective covers in place. Do not handle lamps without their protective covers unless government-approved (OSHA-approved in the U.S.A.) safety glasses, facemask (with neck protector), chest protector, and gauntlets are worn.

RUPTURE & RADIATION (UV-VISIBLE-IR) HAZARDS:

1. Intense ultraviolet (UV), visible, and infrared (IR) radiation is also generated during operation. This radiation can cause permanent damage to the eyes (including blindness) and serious injury to the skin (including burns and blistering). Some operating lamps also generate ozone (O₃). Others, designated "OFR," are constructed of materials that prevent the generation of ozone. See the "Ozone Generation" section below.
2. To avoid eye damage, other personal injury and/or property damage, the lamp **MUST** be operated in a suitable fixture. A suitable fixture is one that will prevent the arc from being viewed directly while operating. It is ventilated to the outside for those lamps that produce ozone and, in the event of a rupture, will prevent hot (up to 800°C), flying fragments of quartz and/or glass or metal from escaping into the surrounding area.
3. To minimize the risk of a lamp rupture, the lamp must be replaced at or before the end of rated life (see catalog for rated life) or when the lamp shows signs of advanced blackening or quartz devitrification (recrystallization, a white, frosted appearance).
4. XBO lamps are constructed of quartz glass, tungsten electrodes and either tungsten support rods or molybdenum foils. High wattage XBO lamps used for cinema film projection have nickel-plated end caps (bases). Reflectorized XBO lamps have a dichroic-coated borosilicate glass reflector.

GENERAL SAFETY & INSTALLATION TIPS

INSTALLATION:

1. Do not use if lamp is scratched, cracked, or damaged in any way.
2. To prevent electric shock, shut off main power to the fixture before attempting to service or replace lamp.
3. To avoid damaging the quartz and causing premature lamp failure, do not handle lamp with bare hands.
4. Handle lamp **ONLY** with suitable, clean, safety gloves. See special handling instructions for using government-approved personal protective safety equipment with high-pressure lamps.
5. If the quartz parts (or the reflector for reflectorized lamps) are inadvertently touched, clean fingerprints off with denatured alcohol and wipe dry with a soft, clean, lint-free cloth. Do not use cleaning rags or material that can leave a residue.
6. To prevent skin burns, allow lamp to cool before handling.
7. To avoid breakage, mounting of the lamp must be free of mechanical stress during installation and during operation by allowing for thermal expansion along its axis. For this reason, XBO lamps should be fixed at one end only and the electrical connection on the other end must be flexible enough to avoid stressing the lamp.
8. XBO lamps should not be subjected to force/stress during installation.
9. Handle lamp only with protective safety cover in place. When installing lamp, remove safety cover only **AFTER** fully securing lamp in lamphouse/fixture and immediately preceding the replacement of equipment covers or closing of lamphouse door.
10. Replace all fixture covers and shields after replacing lamp to prevent eye damage, other personal injury, and/or property damage.
11. Use only in instruments/equipment specifying this lamp type.
12. Make sure lamp is properly installed into socket/connector to obtain good electrical and thermal contact and avoid damaging lamp and/or socket/connector. Electrical connections should be free from dirt and corrosion.
13. Socket/connector condition may affect lamp life. Replace socket/connector or lamp if deterioration (pitting, scorching, corrosion, etc.) of either is observed.
14. All XBO lamps are designed for DC operation. Make sure that the polarity is correct before turning power on. Incorrect polarity can destroy the lamp in a matter of seconds. Operate with compatible power supply and fixture only.
15. For best performance, operate this XBO lamp at rated current. Note: some low wattage XBO lamps may not be operated above their specified rated wattage. See catalog for details.
16. For those XBO lamps that have a current control range, the current may be increased to its maximum value to compensate for loss of light over the life of the lamp. Operating the lamp at minimum current does not prolong the life of the lamp. The DC current may only be varied within specified control limits for the selected type. (See catalog for these limits for your specific lamp type.)
17. When installing bare lamps that have an included flat washer, slip the washer over the threaded pin on the cathode (- negative) side. Removal of this flat washer (after half the average life) will allow a rotation of the lamp by 180° resulting in better output maintenance over life for horizontally operated lamps. This should be done only if darkening is evident in the upper part of the bulb. In instances where bare lamp cathode bases are provided with two metal pins, they may be engaged with the two slots on the protective cover to screw the cathode end of the lamp into its socket.

XBO® HIGH PRESSURE XENON LAMPS (continued)

LAMP REMOVAL:

1. Turn off power to the lamp and allow it to cool (forced or convection) for a minimum of 15 minutes prior to shutting main fixture power and opening fixture. Do not remove lamp until it has cooled. After the lamp has cooled, place the protective cover around it and reverse the procedure described above. See special handling instructions for using government-approved safety equipment with high-pressure lamps.
2. Lamp should be placed in the original OSRAM SYLVANIA packaging for temporary storage until disposal and/or transportation to a disposal location. See "Lamp Disposal" section below for transportation and spent lamp disposal information.

OPERATING POSITION:

1. XBO bare lamps are designed to operate vertically. Of those, some (having an "H" in their designation) may also be operated in the horizontal position as well. For vertically operated lamps, the anode (+ positive) electrode must be on the top. See catalog for operating position and permissible deviation for your specific type.
2. Some horizontally operated lamps require magnetic arc stabilization. Check the catalog for your specific lamp type.
3. XBO reflector lamps are designed to operate with lamp/reflector axis within 15° of the horizontal position.

LAMP COOLING:

1. Discoloration, surface pitting, and/or corrosion of the lamp indicates a thermal overload. Components exhibiting these conditions must be cleaned or replaced.
2. If forced-air cooling is used, care must be taken to direct airflow at the lamp bases only. Striking the lamp elsewhere with the airflow will result in poor lamp performance or premature failure.
3. To prevent premature failure, the following cooling instructions must be followed:
Bare lamps - Bases must be kept below 230°C (445°F) during operation. If convection cooling is insufficient and additional cooling is required, forced air-cooling may be used. If forced air is used, care must be taken to direct airflow at bases only, since striking elsewhere on the lamp with the airflow will result in poor lamp performance or premature failure. See catalog for your specific lamp type to learn whether forced air-cooling is required.
Reflector lamps - To avoid damaging the reflector coating, do not allow the outer reflector surface to exceed the maximum temperature of 250°C (480°F). [Optimum temperature: 175-200°C (345-390°F)] To prevent premature failure, the lamp ends must not exceed the maximum temperature of 350°C (660°F). [Optimum temperature: 200-250°C (385-480°F)] Forced air-cooling is therefore required and the air flow must be directed perpendicular to the lamp/reflector axis, through the slots in the openings of both ceramics. See catalog for diagram.

OZONE GENERATION:

An electrical discharge in xenon gas generates radiant energy ranging from approximately 140 nm in the UV region to far into the infrared region. Xenon lamps are made of quartz glass. The quartz glass allows for the transmission of short UV wavelengths starting from approximately 140 nm, depending on the quartz type. Ozone gas (O₃) is generated by the conversion of oxygen (O₂) in the air by UV energy in the range of approximately 110-200 nm. Ozone is extremely toxic and will cause serious health problems if inhaled in excess of allowable limits over a prolonged period of time. For more information on allowable limits, please refer to the ACGIH (American Conference of Governmental Industrial Hygienists) publication, "TLVs and BEIs" (Threshold Limit Values and Biological Exposure Indices). Ozone production can be suppressed in xenon discharge lamps by adding materials to the quartz glass that block short-wave UV transmission.

QUARTZ GLASS DESIGN OPTIONS:

OSRAM XBO® xenon lamps are offered in three quartz glass designs. They are:

1. **OSRAM XBO W/4:** These lamps are fabricated from synthetic Suprasil quartz glass. Suprasil quartz is low in impurities and provides for maximum short-wave UV transmission and consequently allows for the production of ozone. These lamps should always be used with external ventilation with no possible direct exposure to humans. Under no circumstances may the applicable maximum allowable workplace concentration of ozone be exceeded for any OSRAM xenon XBO lamps.
2. **OSRAM XBO:** These lamps use standard quartz glass and will also emit UV radiation that produces ozone. These lamps, like the W/4 types, must always be externally ventilated. With these types of lamps, health risks must always be minimized by suitably extracting the air from the lamp housing and externally venting it.
3. **OSRAM XBO OFR:** These lamps are designated "Ozone-Free" and are characterized by the letters "OFR" in the order description. OSRAM XBO OFR type lamps have their quartz glass transparently coated to effectively suppress radiation below approximately 250 nm, resulting in the elimination of ozone production during operation.

LAMP DISPOSAL:

1. There is a risk that a lamp could rupture because of its high internal pressure (both hot and at room temperature). A lamp rupture could result in personal injury or property damage from flying fragments of glass and/or metal. Therefore, spent (end-of-life) lamps should ALWAYS be stored in the protective covers and packaging in which they originally came, and ultimately depressurized before release for disposal. The following is one example of a depressurizing method for XBO lamps prior to disposal, but it may not be the most suitable or appropriate method depending on the circumstance:
 - The operator must wear government-approved (OSHA-approved in the U.S.A.) safety glasses, facemask (with neck protector), chest protector, and gauntlets during this entire procedure.
 - With protective lamp covers in place, place lamps¹ into steel drum² and lock down cover with bolt ring and bolt.
 - Drop drum onto solid surface (concrete floor) from at least five feet. Increase height as needed to ensure all lamps are depressurized.
 - Wait for dust to settle (about 5 minutes) before opening drum. Loosen bolt and allow gas to escape before complete removal of cover.

¹ The lamps should not exceed the half-full point in the drums. Adjust the maximum number of lamps accordingly.
² 8, 20, or 30-gallon drums, depending on quantity of lamps to be de-pressurized, are available. Drums of 20-gauge steel are recommended and are available from many safety supply companies.
2. Disposal of spent lamps must be in accordance with applicable federal, state/provincial, and local regulations. State laws differ in their disposal requirements.
3. U.S. lamp users may obtain information concerning relevant agencies and disposal regulations from the Federal Superfund Hotline (Resource Conservation & Recovery Act) at 800-424-9346. Information may be available as to the appropriate state agencies to contact regarding disposal issues.
4. OSRAM SYLVANIA Products Inc. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.

WARNING

HBO® HIGH PRESSURE MERCURY LAMPS

WARNING:

In accordance with ANSI/IESNA Standard RP-27, this HBO bulb is a Risk Group 3 product.

Read and understand this warning before using this bulb!

RUPTURE & RADIATION (UV- VISIBLE) HAZARD:

1. The discharge vessel of HBO lamps is constructed of quartz glass that is filled with a quantity of mercury and either Argon or Xenon gas. Most HBO lamps are not at positive pressure when cold (not operating, at room temperature). However, there are several HBO lamps that DO have a positive internal pressure of up

HBO® HIGH PRESSURE MERCURY LAMPS (continued)

to approximately 8 bar (or approximately 120 psi) in the cold (room temperature) state. The printing of the following bold warning statement on individual packages identifies them as positive-pressure lamps.

WARNING

RISK OF LAMP RUPTURING. TO AVOID PERSONAL INJURY OR PROPERTY DAMAGE, ALWAYS WEAR PROTECTIVE CLOTHING WHEN HANDLING THESE LAMPS. Never handle these lamps unless government-approved (OSHA-approved in the U.S.A.) safety glasses, facemask (with neck protector), chest protector, and gauntlets are worn.

These positive-pressure lamps may unexpectedly rupture resulting in the discharge of quartz and/or metal fragments as well as exposing the surrounding area to mercury. In the event of such a rupture, there is a risk of personal injury or property damage. Therefore these positive-pressure lamps should be handled in accordance with these safety instructions.

2. All HBO lamps have high internal pressures (400 - 1100 psi or 30 to 75 bar) during operation and may unexpectedly rupture resulting in the discharge of hot fragments (approximately 800°C / 1472°F) of quartz and/or metal particles, as well as the release of mercury/mercury vapor. In the event of such a rupture, there is a risk of personal injury, burns, and fire.
3. All HBO lamps generate intense ultraviolet (UV) and visible radiation during operation. This radiation can cause permanent damage to the eyes (including blindness) and serious injury to the skin (including burns and blistering). To avoid eye damage, other personal injury, and/or property damage, the lamp **MUST** be operated in a suitable fixture.
4. A suitable fixture is one that will prevent the arc from being viewed directly while operating, and in the event of a lamp rupture, will prevent hot (up to 800°C / 1472°F), flying fragments of quartz and/or metal from escaping into the area.
5. Fixtures for lamps that produce ozone during operation should be ventilated and filtered to the outside for ozone removal.
6. To minimize the risk of a lamp rupture, replace the lamp at or before the end of rated life (see OSRAM SYLVANIA product catalog for rated life) or when the lamp shows signs of blackening.

BROKEN LAMPS (MERCURY VAPOR RELEASE AND DISPOSAL):

1. In the event of a lamp rupturing during operation, all personnel should leave the area immediately to avoid the inhalation of mercury vapor. The area should then be thoroughly ventilated for a minimum of 30 minutes or until the mercury vapor in the area is below the ACGIH TLV (American Conference of Governmental Industrial Hygienists Threshold Limit Value). Inhaling vapor or small particles of mercury or its compounds can be harmful to lungs, kidneys, and nervous system. Penetration of the skin or ingestion can also be harmful.
2. To avoid mercury vapor getting into air conditioning systems, instruments/equipment using lamps of 350 watts or greater should be connected to separate air exhaust systems through mercury vapor-absorbing filters. When the lamp housing has cooled, ***mercury residue may be picked up with special mercury adsorptive agents or a mercury vacuum cleaner (available from laboratory safety equipment suppliers) and disposed of in accordance with local, state, and federal regulations.*** There should be no direct skin contact with and/or inhalation of mercury residues that may be residing in lamp housing, optics or lamp parts. If a cold (room temperature) lamp is broken, proceed with clean-up and disposal as indicated above (in the ***bold, italicized statement***).

GENERAL SAFETY & INSTALLATION TIPS

INSTALLATION:

1. Do not use if lamp is scratched, cracked, or damaged in any way.
2. To prevent electric shock, shut off main power to the fixture before attempting to service or replace lamp.
3. To avoid damaging the quartz and causing premature lamp failure, do not handle lamp with bare hands.
4. Only handle lamp with suitable, clean safety gloves. See special, bolded warning for using government-approved safety equipment when handling positive-pressure lamps.
5. If the quartz parts are inadvertently touched, clean fingerprints off with denatured alcohol and wipe dry with a soft, clean, lint-free cloth. Do not use cleaning rags or material that can leave a residue.
6. To prevent skin burns, allow lamp to cool before handling.
7. To avoid breakage, mounting of the lamp must be free of mechanical stress during installation and during operation by allowing for thermal expansion along its axis. For this reason, HBO lamps should be fixed at one end only and the electrical connection on the other end must be flexible enough to avoid stressing the lamp.
8. HBO lamps should not be subjected to force/stress during installation.
9. Replace all fixture covers and shields after replacing lamp to prevent eye damage, other personal injury, or property damage.
10. Use only in instruments/equipment specifying this light source.
11. Make sure lamp is properly installed into socket/connector to obtain good electrical and thermal contact and avoid damaging lamp and/or socket/connector. Electrical connections should be free from dirt and corrosion.
12. Socket/connector condition may affect lamp life. Replace socket/connector or lamp if deterioration (pitting, scorching, corrosion, etc.) of either is observed.

OPERATION:

1. Some HBO lamps are designed for operation on only AC or only DC while some are designed for operation on either AC or DC.
2. Note: all HBO lamps with power consumption of 350 W and higher are only suited for DC operation. Make sure that the polarity is correct before turning power on. Incorrect polarity can destroy the lamp in a matter of seconds.
3. Operate with compatible power supply and fixture only.
4. To ensure that AC-suited lamps operate at correct power during AC operation, connections on the ballast/choke in the power supply should be made to the voltage taps that are marked the same as the marking on the lamp base (L1 or L2). Some power supplies are equipped with a switch (or taps) for selecting L1 or L2. For correct and safe lamp operation, use only those ballasts/power supplies that have been approved or meet minimum requirements as specified by OSRAM. See your OSRAM dealer for list of approved equipment.
5. HBO lamps need 5 to 20 minutes (depending on lamp type and cooling conditions) before they reach their operating temperatures. To ensure proper ignition on subsequent start-up, lamps should not be switched off during the warm-up period.
6. The average service life of high wattage HBO lamps (≥350 watts) is determined by their ON/OFF duty cycle. These lamps have been designed for a limited amount of ignitions only (less than 10). Lamp performance is reduced with increased duty cycle.

OPERATING POSITION:

HBO lamps may only be operated in the operating positions described in the OSRAM SYLVANIA product catalog.

Some HBO lamps are designed to operate horizontally (mainly low wattage types in the power range of 50 to 200 W) and others, vertically (all lamp types with power consumption of 350 W and higher). Greater arc stability is obtained in vertically operating lamps when they are operated as close to vertical as possible. See catalog for permissible operating positions and electrode positions.

OZONE GENERATION:

During operation, HBO lamps produce a spectrum that ranges from about 150 nm in the ultraviolet region to the infrared region.

HBO® HIGH PRESSURE MERCURY LAMPS (continued)

If the quartz glass bulb is transparent in the ultraviolet region between 180 and 220 nm, this short-wave radiation will convert a small quantity of atmospheric oxygen (O_2) surrounding the lamp into ozone (O_3). Moreover, the oxygen molecules will link together with the nitrogen (N_2) in the air, creating nitrogen oxides (NO_x). (Some believe that the smell attributed to ozone is in actuality from the nitrogen oxides.)

Ozone gas is toxic when inhaled in high concentrations over long periods of time. Ozone levels can be measured and monitored with commercial measuring equipment. Always keep ozone levels below the applicable TLV (threshold limit value).

The production of ozone and nitrogen oxide can be suppressed by using doped quartz glass, which absorbs the ozone-producing ultraviolet radiation. The quartz glass used in high wattage i-line (365nm) enhanced HBO lamps only transmits wavelengths above 250 nm, which provides effective, ozone-free lamps. Please be advised that the OSRAM HBO 4000 W/PL lamp is designed to generate UV wavelengths below 250nm. Consequently, this lamp will generate ozone in operation and should be externally ventilated.

An "ozone smell" (or smell of nitrogen oxide) may be detected shortly after ignition. There are two probable causes for this condition. O_3 and NO_x production is caused by the (short-duration) radiation of the spark gap used for lamp ignition. Or, the cold condition of the quartz glass bulb has slightly shifted its UV-absorption characteristics thus permitting a small amount of radiation in the very short-wave ultraviolet range to be emitted by the bulb. Typically, after the lamp has run up to its operating temperature range, virtually no ozone is produced by the lamp, as a rule, due to the quartz glass absorption and the self-absorption of the plasma.

LAMP COOLING:

1. To prevent premature failure, lamp base temperatures must be kept below 230°C (446°F) for 50 to 350 watt lamps and below 200°C (392°F) for all lamps with power consumption of more than 350 watts.
2. Discoloration, surface pitting, and/or corrosion of the lamp connections indicates a thermal overload. Components exhibiting these conditions must be cleaned or replaced.
3. If convection cooling is insufficient and additional cooling is required, cooling fins may be applied to the bases and/or forced air may be used.
4. If forced air is used, care must be taken to direct airflow at the bases only. Striking elsewhere on the lamp with the airflow will result in poor lamp performance or premature failure.

LAMP REMOVAL:

Turn off power to the lamp and allow lamp to cool (forced or convection) for a minimum of 30 minutes prior to shutting main fixture power and opening fixture. Do not remove lamp until it has cooled. See special, bolded warning for using government-approved safety equipment when handling positive-pressure lamps.

Lamps should be placed in their original OSRAM SYLVANIA packaging for temporary storage until disposal and/or transportation to a disposal location. See "Lamp Transportation" and "Lamp Disposal" sections below for relevant information.

LAMP TRANSPORTATION:

1. All HBO lamps should be transported ONLY in their original packaging.
2. Transportation in non-original packaging can damage the lamp and void warranty.
3. U.S. Federal regulations require mercury-containing lamps to be shipped ONLY in DOT-compliant packaging. Original OSRAM packaging is DOT-compliant.
4. When transporting positive-pressure lamps, the bolded warning found in the "Rupture & Radiation Hazard" section MUST be placed on outside surface of the shipping carton and the warning instructions must also be placed inside the shipping packaging.

MERCURY FILL OF HBO LAMPS:

Mercury is referred to by its chemical symbol, Hg, which is derived from the Greek and Latin "hydrargyrum," a silvery shiny liquid metal at room temperature. In humid air it is covered with a gray oxide skin. Of all metals it has the highest vapor pressure which increases exponentially with rising temperatures. For this reason, mercury is volatile at room temperature. The colorless and odorless vapors produced are poisonous and heavier than air.

The inhalation (respiration) of mercury or mercury compounds as vapor or dust will lead to the damage of lungs, kidneys, and the nervous system. Apart from inhalation, mercury can be transmitted through the skin (penetration) or through the gastro-intestinal tract (ingestion), which is also harmful.

The ACGIH threshold limit values (TLVs) are merely guidelines to assist in the control of health hazards. The ACGIH says that the TLVs refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. Therefore, the TLV for mercury should never be exceeded.

Analytical detection of mercury vapor is possible by means of gas/vapor detector tubes (rough measurement) or air-monitors that absorb mercury vapor.

OSRAM HBO® lamps have the following mercury contents:

Power level	Maximum Mercury content (mg)
50 - 200 W	110
350 W	300
500 W	500
1,000 W	600
1,500 W	800
2,000 - 2,500 W	5,000
3,500 W and higher	12,000

PROPERTIES OF MERCURY:

- Chemical symbol: Hg
- Atomic number: 80
- Molecular Weight: 200.59
- Density: 13.6 g/cm³ @ 20°C / 68°F
- Melting Point: -39°C / -38.2°F
- Boiling Point: 357°C / 674°F
- Vapor pressure: 160 Pa @ 20°C / 68°F
370 Pa @ 30°C / 86°F
823 Pa @ 40°C / 104°F
- Concentration in air: 13.6 mg/m³ @ 20°C / 68°F
29.6 mg/m³ @ 30°C / 86°F
62.7 mg/m³ @ 40°C / 104°F

HBO® HIGH PRESSURE MERCURY LAMPS (continued)

- CAS Registry Number: 7439-97-6
- RCRA waste number: U151
- Other Names: Hydrargyrum, Colloidal mercury, Kwik, Mercure, Mercurio, Metallic mercury, Quecksilber, Quick silver, Liquid Silver

LAMP DISPOSAL:

1. Disposal of spent lamps must be in accordance with applicable federal, state/provincial, and local regulations. State laws differ in their disposal requirements for lamps containing mercury.
2. U.S. lamp users may obtain information concerning relevant agencies and disposal regulations from the Federal Superfund Hotline (Resource Conservation & Recovery Act) at 800-424-9346. Information may be available as to the appropriate state agencies to contact regarding disposal issues.
3. OSRAM SYLVANIA Products Inc. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.

Special disposal note for cold, positive-pressure lamps (see "RUPTURE & RADIATION HAZARD" section for applicable lamps)

There is a risk that these lamps could rupture because of their high internal pressure when hot (during operation) and when cold (at room temperature when not operating). A lamp rupture could result in personal injury or property damage from flying fragments of quartz and/or metal. Therefore, spent (end-of-life) lamps should ALWAYS be stored in the packaging in which they originally came.

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