

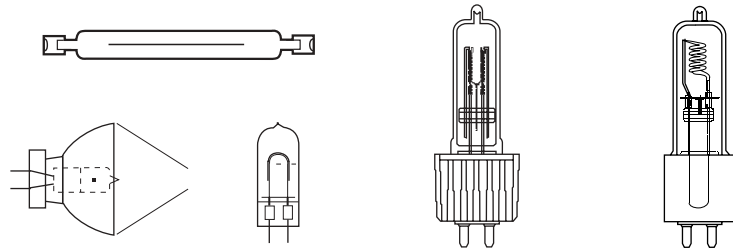
OSRAM BRAND PHOTO-OPTIC LIGHT SOURCES

Lighting to provide solutions in diverse applications such as effect lighting, stage, studio, TV, projection systems, microlithography, medical/scientific, industrial, and airfield/aircraft.

Photo-Optic Lamp Types

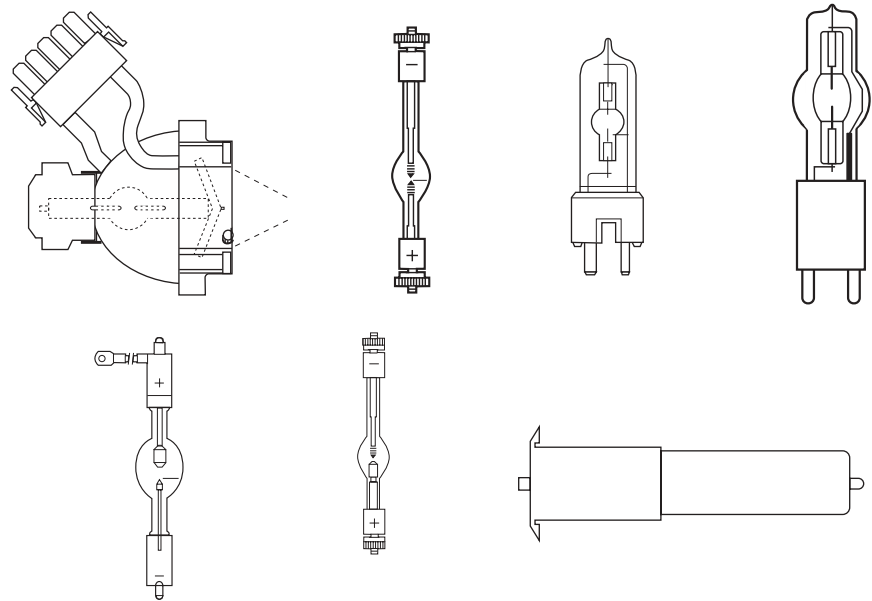
HALOGEN

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



DISCHARGE

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



The following item was accepted into the 2003 IESNA Progress Report which recognizes innovative products introduced to the industry during that year.

LINEX Mercury-Free Xenon Fluorescent Systems

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	MR16	24	
BBA	11619	BBA 118V	Photoflood No.1/Enlarger & Printer	250	118	Med		4	A21	12	
BCK	54576	BCK	Projector - Slide	500	120	G17t		50	T6	24	1
BHC/DYS/DYV	54836	BHC/DYS/DYV	Projector, Microfilm, Stage & Studio	600	120	GZ9.5	17500	75	T6	24	
BHC/DYS/DYV/X	54868	BHC/DYS/DYV/X	Projector, Microfilm, Stage & Studio	600	120	GZ9.5	14500	250	T6	24	
BHC/DYS/DYV-5	54835	BHC/DYS/DYV-5	Projector, Microfilm, Stage & Studio	600	125	GZ9.5	17500	75	T6	24	2
BRJ/EVB	54039	BRJ/EVB 64633 HLX	Projector, Microfilm, Microscope, Studio	150	15	G6.35	5600	50	T3.25	100	
BRL	54034	BRL 64610 HLX	Projector, Microfilm, Microscope, Studio	50	12	G6.35	1600	50	T3	100	
BRL	54035	BRL 64610 HLX BULK	Project, Microfilm, Microscope, Studio	50	12	G6.35	1600	50	T3	250	
BRN	54698	BRN	Projector	1200	120	G17q		20	T7	24	3
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	
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
DDK	54729	DDK	Projector	80	19	GX5.3	150	50	T3.15	24	4
DDL	54660	DDL	Projector - Microfilm	150	20	GX5.3		500	MR16	24	
DDM	54737	DDM	Projector - Slide	80	19	GX5.3	400	50	MR16	24	4
DDS	54944	DDS	Projector - Microfilm	80	21	GX5.3		1000	MR16	24	
DED	54726	DED	Projector - Microfilm	85	14	GX5.3	150	1000	MR16	24	4
DEK/DFW	74440	DEK/DFW	Projector	500	120	Trufocus			T12	24	
DNE	54409	DNE	Projector	150	120	GX7.9	100	15	TB16	24	4
DNF	54411	DNF	Projector - 8mm	150	21	GX7.9	300	25	MR18	24	
DVY	54528	DVY	Projector, Stage & Studio	650	120	G5.3	20000	25	T6	12	
DYH	54561	DYH	Projector, Stage & Studio	600	120	G5.3	17000	75	T5	24	
DZE	54755	DZE	Projector, Microfilm, Stage & Studio	150	24	GZ9.5	4000	100	T4	24	
EBV	11558	EBV 118V	Super Photoflood/ No.2	500	118	Med Brass	17800	8	PS25	24	
ECA	13365	ECA 120V	Super Photoflood	250	120	Med Brass	6500	20	A23	24	
ECT	11560	ECT 120V	Photoflood	500	120	Med Brass	13650	60	PS25	24	
EFM	54123	EFM 64607	Projector - 8mm	50	8	GZ6.35		50	MR16	20	
EFN	54126	EFN 64615 HLX	Projector - 8mm	75	12	GZ6.35		50	MR16	20	
EFP	54189	EFP 64627 HLX	Projector - 8mm	100	12	GZ6.35		50	MR16	20	
EFP/X	54192	EFP/X 64629 HLX	Projector - 8mm	100	12	GZ6.35		600	MR16	20	
EFR	54210	EFR 64634 HLX	Projector - 8mm	150	15	GZ6.35		50	MR16	20	
EFR-5/X	54211	EFR-5/X 64620 HLX	Projector - 8mm	150	15	GY6.35		500	MR16	20	
EHA	54585	EHA	Projector, Microfilm, Stage & Studio	500	120	GY9.5		50	T6	24	3

AUDIOVISUAL

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
EHE	54038	EHE 64626 HLX	Projector	100	12	PG22	3600	50	T4	30	
EHJ	54045	EHJ 64655 HLX	Projector, Microfilm, Microscope, Studio	250	24	G6.35	10000	50	T4	100	
EJA	54753	EJA	Projector - Fiber optics	150	21	GX5.3	354	40	MR16	24	
EJL	54730	EJL	Projector - 16mm Color printer	200	24	GX5.3	725	50	MR16	24	4
EJM	54747	EJM	Projector - 8mm	150	21	GX5.3	170	40	TB18	24	4
EJV	54732	EJV	Projector - 8mm, Printer	150	21	GX5.3	270	100	MR16	24	4
EKE	54842	EKE	Projector - 8mm, Fiber-Optics	150	21	GX5.3	80	200	MR16	24	4
EKE/X	58771	EKE/X	Projector - 8mm, Fiber-Optics	150	21	GX5.3	80	1000	MR16	24	4
EKP/ENA	54734	EKP/ENA	Projector - 8mm	80	30	GX5.3	115	25	MR16	24	4
ELC	54212	ELC 64653 HLX	Overhead projection, fiber-optic, entertainment	250	24	GX5.3		50	MR16	20	
ELC	54840	ELC	Overhead projection, fiber-optic, entertainment	250	24	GX5.3	800	50	MR16	24	4
ELC-3/X	54841	ELC-3/X	Overhead projection, fiber-optic, entertainment	250	24	GX5.3	550	300	MR16	24	4
ELC-7/X	54811	ELC-7/X BULK	Overhead projection, fiber-optic, entertainment	250	24	GX5.3	475	700	MR16	100	4
ELC-7/X	54814	ELC-7/X	Overhead projection, fiber-optic, entertainment	250	24	GX5.3	475	700	MR16	24	4
ELC-HL	54804*	ELC-HL	Overhead projection, fiber-optic, entertainment	250	24	GX5.3	950	50	MR16	24	
ELD	54745	ELD	Projector - Microfilm	150	21	GX5.3	350	40	MR16	24	4
ELH	54776	ELH	Projector - Overhead	300	120	GY5.3	525	35	MR16	24	4
ELS	54810	ELS	Projector	50	16	GX7.9	20	650	TB14	24	4
ELV	54765	ELV	Projector	150	22	GX7.9	225	100	TB18	24	4
ELZ	54816	ELZ	Projector	150	21	GX7.9	350	60	TB18	24	4
EMG	54828	EMG	Projector	500	220	GY9.5		75	T6	24	
EMM/EKS	54960	EMM/EKS	Projector - 16mm	250	24	GX7.9	725	50	MR14	24	4
ENG	54957	ENG	Projector	300	120	GY5.3	690	15	MR16	24	4
ENH	54986	ENH	Projector - Slide	250	120	GY5.3	340	175	MR16	24	4
ENH-5	54988	ENH-5	Projector - Overhead	250	125	GY5.3	340	175	MR16	24	4
ENL	58786	ENL	Projector - Display, Fiber-Optics	50	12	GX5.3	85	4000	MR16	24	
ENX	54984	ENX	Projector - Overhead	360	82	GY5.3	460	75	MR16	24	4
ENX-5	54913	ENX-5	Projector - Overhead	360	86	GY5.3	540	75	MR16	24	4
ENX-7	54916	ENX-7	Projector - Overhead	360	88	GY5.3	540	75	MR16	24	4
EPR	54829	EPR	Projector	500	120	G17t		50	T6	24	1
EPS	54977*	EPS	Projector	500	240	G17t		50	T6	24	1,3
EPS/230	54975*	EPS/230	Projector	500	230	G17t		50	T6	24	3,5
EPT	58782	EPT	Projector - Fiber-Optics	42	11	GX5.3		8000	MR16	24	
EPV	54926	EPV	Projector - Microfilm	90	14	GX5.3	36	500	MR16	24	4

AUDIOVISUAL

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
EPX	54927	EPX	Projector - Microfilm	90	14	GX5.3	43	500	MR16	24	4
EPZ	54743	EPZ	Projector - Microfilm	50	14	GX5.3	80	3000	MR16	24	4
ERK	55050	ERK BULK	Projector	12	6	Wedge		150	T2.25	500	
ERM	55054	ERM BULK	Projector	7	6	Wedge		30	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	
ETJ	54928	ETJ	Projector	250	120	GY5.3	600	175	MR16	24	4
EVA	54052	EVA 64623 HLX	Projector, Microfilm, Microscope, Studio	100	12	GY6.35	2800	2000	T4	100	
EVC	54047	EVC 64657 HLX	Projector, Microfilm, Microscope, Studio	250	24	G6.35	9000	300	T4	100	
EVD	54100	EVD 64663 HLX	Projector, Microfilm, Studio	400	36	G6.35	16000	50	T6	24	6
EVD	54103	EVD 64663 HLX BULK	Projector, Microfilm, Studio	400	36	G6.35	16000	50	T6	100	
EVW	54723	EVW	Projector	250	82	GY5.3	390	50	MR16	24	4
EXR	54392	EXR	Projector - Slide	300	82	GX5.3	925	35	MR13	24	4
EXR	54393	EXR BULK	Projector - Slide	300	82	GX5.3		35	MR13	100	4
EXW	54388	EXW	Projector - Slide	300	82	GX5.3	1050	15	MR13	24	4
EXY	54394	EXY	Projector - Slide	250	82	GX5.3	400	200	MR13	24	4
EYB	54446	EYB	Projector, Stage & Studio	360	82	G5.3	10000	75	T3.5	24	
EYB-5	54448	EYB-5	Projector, Microfilm, Stage & Studio	360	86	G5.3	10000	75	T3.5	24	
EYB-7	54455	EYB-7	Projector, Microfilm, Stage & Studio	360	88	G5.3	10000	75	T3.5	24	
EZE	54386	EZE	Projector, Stage & Studio	150	82	GX5.3	350	150	MR13	24	4
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	
FCS	54041	FCS 64640 HLX	Projector	150	24	G6.35	6000	50	T4	100	
FCS	54042	FCS 64640 HLX BULK	Projector	150	24	G6.35	6000	50	T4	250	
FDS/DZE	54055	FDS/DZE 64643	Projector, Microfilm, Microscope, Studio	150	24	GY9.5	5000	100	T4	30	
FDT 64628	54031	FDT 64628	Projector, Stage & Studio	100	12	GY9.5	3000	50	T4	30	
FDV	54054	FDV 64642 HLX	Projector, Microfilm, Microscope, Studio	150	24	G6.35	5000	300	T4	100	
FHS	54979	FHS	Projector - Slide	300	82	GX5.3	650	70	MR16	24	4
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	MR16	24	4,7
FLT	54440	FLT	Projector - Video Camera, Microfilm	25	14	G4		500	MR11	24	8
FNS	58635	FNS 64512	Projector, Stage & Studio	300	120	GX6.35	9500	15	T5	25	
FNT	54044	FNT 64656PT HLX	Projector, Microfilm, Microscope, Studio	275	24	G6.35	10000	75	T4	100	

AUDIOVISUAL

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
FNT	54046	FNT 64656PT HLX BULK	Projector, Microfilm, Microscope, Studio	275	24	G6.35	10000	75	T4	250	
FSG	54899	FSG	Projector	1200	120	P28s	28000	100	T7	12	
FSX	54897	FSX/230	Projector	400	230	GY9.5		75	T6	24	3
FSY	54898	FSY	Projector	400	240	GY9.5		75	T6	24	3
FXL	54912	FXL	Projector - Overhead	410	82	GY5.3	640	75	MR16	24	
FXL-HL	54904	FXL-HL	Projector - Overhead	410	82	GY5.3	850	40	MR16	24	4
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	54845	GCD	Projector, Microfilm, Stage & Studio	590	50	GZ9.5	21500	50	T6	24	
	53998	64638 HLX	Projector	100	24	G6.35	2900	300	T3	100	
	53999	64265 HLX	Projector	30	6	G4	765	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	
	54032	64621 HLX	Projector, Microfilm, Stage & Studio, Aircraft	100	12	PG22	2750	2000	T3	30	
	54050	64223	Projector	10	6	G4	150	300	T3	100	
	54056	64650	Projector, Microfilm, Microscope, Studio	50	23	G6.35	1000	1300	T4	100	
	54057	64664 HLX	Projector, Microfilm, Microscope, Studio	400	36	G6.35	14500	150	T6	25	9
	54058	64665 HLX	Projector, Microfilm, Microscope, Studio	400	36	G6.35	12200	300	T6	25	
	54120	64258 HLX	Projector	20	12	G4		2000	T3	100	
	54121	64617S	Projector	75	12	G5.3-4.8		25	MR11	20	
	54122	64255	Projector	20	8	GZX4		50	MR11	20	
	54124	64617	Projector	75	12	G5.3-4.8		25	MR11	20	
	54125	64624	Projector	100	12	G5.3-4.8		25	MR11	20	
	54136	64654 HLX	Projector, Microfilm, Microscope, Studio	250	24	GY9.5	9000	300	T6	30	
	54138	64602	Projector, Microfilm, Microscope, Studio	50	12	G6.35	1000	1100	T3.25	100	
	54214	64637	Projector	100	12	GZ6.35		1500	MR16	20	
	54233	64635 HLX	Projector, Fiber-Optic	150	15	GZ6.35		50	MR16	20	
	54400	85T3/RM	Projector	85	82	GX5.3		40	MR16	24	
	54466	120/T4/SPECIAL	Projector	120	24	Special	2750	500	T4	24	
	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	

PHOTO OPTIC HALOGEN

AUDIOVISUAL

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
	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	
	76311	8013	Projector	10	6	BA15d		200		100	10
	76313	8017	Projector	15	6	DC Bayonet		1000		100	
	76314	8018	Projector	15	6	DC Bayonet		100		100	10,11
	76317	8025	Projector		6	BA20d		300		100	10
	76319	8029	Projector	60	15	BA20d		25		100	
	76321	8100	Projector		5	E14		600		100	
	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	
BTL	54685	BTL	Stage & Studio	500	120	P28s	11000	750	T6	12	
BTM	54686	BTM	Stage & Studio	500	120	P28s	13000	100	T6	12	
BTN	54687	BTN	Stage & Studio	750	120	P28s	17000	500	T7	12	
BTP	54688	BTP	Stage & Studio	750	120	P28s	20000	200	T7	12	
BTR	54689	BTR	Stage & Studio	1000	120	P28s	27500	250	T6	12	
BVM	58638	BVM 64540	Stage & Studio	650	230	GX6.35	20000	15	T8	25	12
BVT	54690	BVT	Stage & Studio	1000	120	P40s	23000	500	T7	6	
BWV	54691	BVV	Stage & Studio	1000	120	P40s	27500	200	T6	6	
BWW	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	
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	10
DPY	54647	DPY	Stage & Studio	5000	120	G38	143000	500	T17	1	
DTA	54716	DTA	Stage & Studio	1500	120	P40s	39000	100	T8	6	
DTY	54696	DTY	Stage & Studio	10000	120	G38	290500	350	T24	1	
DWE	54500	DWE	Stage & Studio	650	120	Screw Term	24000	100	PAR36	12	
DWT	58937	DWT	Stage & Studio	1000	120	RX7s	22000	2000	T6	12	
DXW	53997	DXW	Stage & Studio	1000	120	R7s	28000	150	T5	12	13
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	

STUDIO, THEATRE, TV & VIDEO

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
EGR	54662	EGR	Stage & Studio	750	120	G22	20000	200	T7	12	
EGT	54664	EGT	Stage & Studio	1000	120	G22	27500	250	T6	12	
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	14
EJG	54598	EJG	Stage & Studio	750	120	R7s	20600	400	T3	12	
EKB	54837	EKB	Stage & Studio	420	120	GZ9.5	11000	75	T6	24	
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	14
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	
FDA	54471	FDA	Stage & Studio	400	120	R7s	10400	250	T4	12	14
FDB	54435	FDB	Stage & Studio	1500	120	R7s	41200	400	T4	12	
FDN	54534	FDN	Stage & Studio	500	120	R7s	12800	400	T2.5	12	
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	15
FER	54571	FER	Stage & Studio	1000	120	RX7s	27500	500	T6	12	
FEV	54441	FEV	Stage & Studio	200	120	BA15d	5500	50	T4	12	
FEX/230	54514	FEX/230 64781	Stage & Studio	2000	230	RX7s	50000	300	T8	12	12
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	14
FFM	58862	FFM	Stage & Studio	420	120	R7s	11000	75	T4	24	14
FFT	54350	FFT	Stage & Studio	1000	120	R7s	27000	300	T3	12	
FHM	54532	FHM	Stage & Studio	1000	120	R7s	27300	300	T3	12	
FKW	54711	FKW	Stage & Studio	300	120	GY9.5	7800	200	T6	24	
FLK	54589	FLK	Stage & Studio	575	115	G9.5	16500	300	T5	12	16
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	
FRK	54631	FRK	Stage & Studio	650	120	GY9.5	16900	200	T6	24	
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	
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	

STUDIO, THEATRE, TV & VIDEO

ANSI Code	Product Number	Ordering Abbreviation	Application	Watts	Volts	Base	Lumens	Avg Rated Life(hrs)	Bulb	Pkg Qty	Footnotes
GKV	54511	GKV	Stage & Studio	600	230	G9.5	14000	300	T6	25	5
GLA	54516	GLA 575/115/2000	Stage & Studio	575	115	G9.5	10500	2000	T6	12	17
GLC	54507	GLC 575/115/300	Stage & Studio	575	115	G9.5	15500	300	T6	12	17,18
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	
	54232	64614	Projector, Video, Studio	75	12	G5.3-4.8		25	T2.5	20	
	54499	4515 PAR36 30W	Stage & Studio	30	6	Screw Term	67000	100	PAR36	12	
	54549	HPR 575/115	Stage & Studio	575	115	G9.5	18000	300	T5	12	16
	54602	HPL750/115 (UCF)	Stage & Studio	750	115		21900	300	T6	12	19
	54603	HPL750/230 (UCF)	Stage & Studio	750	230	Special	19750	300	T6	12	19
	54604	HPL550/77/X (UCF)	Stage & Studio	550	77		12160	2000	T6	12	19
	54605	HPL750/120 (UCF)	Stage & Studio	750	120	Special	21900	300	T6	12	19
	54611	HPL750/115/X (UCF)	Stage & Studio	750	115		16400	1500	T6	12	19
	54614	HPL750/240 (UCF)	Stage & Studio	750	240	Special	19750	300	T6	12	19
	54618	HPL575/230 (UCF)	Stage & Studio	575	230	Special	14900	400	T6	12	19
	54619	HPL575/240 (UCF)	Stage & Studio	575	240	Special	14900	400	T6	12	19
	54622	HPL575/115 (UCF)	Stage & Studio	575	115		16520	300	T6	12	19
	54623	HPL550/77 (UCF)	Stage & Studio	550	77		16170	300	T6	12	19
	54625	HPL375/115 (UCF)	Stage & Studio	375	115		10540	300	T6	12	19
	54649	HPL375/115/X (UCF)	Stage & Studio	375	115		8000	1000	T8	12	19
	54653	HPL750/120/X (UCF)	Stage & Studio	750	120	Special	16400	1500	T6	12	19
	54807	HPL575/115/X (UCF)	Stage & Studio	575	115		12360	2000	T6	12	19
	54813	HPL550/64 (UCF)	Stage & Studio	550	64	Special	16340	300	T6	12	19
	54815	HPL575/120/X (UCF)	Stage & Studio	575	120	Special	12360	2000	T6	12	19
	54817	HPL575/120 (UCF)	Stage & Studio	575	120	Special	16460	300	T6	12	19
	54822	HPL575/100 (UCF)	Stage & Studio	575	100	Special	16730	300	T6	12	19
	54825	HPL750/77 (UCF)	Stage & Studio	750	77		22950	300	T6	12	19
	58636	64515	Stage & Studio	300	230	GX6.35	8500	15	T5	25	12
	58639	64573	Stage & Studio	1000	120	GX6.35	33000	15	T8	25	
	58640	64575	Stage & Studio	1000	230	GX6.35	33000	15	T8	25	12

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	20,21
EXC/240	56232	EXC/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	20,21
EXD/230	56281	EXD/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	20
EXD/240	56233	EXD/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	20
EXE/230	56283	EXE/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	20

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
EXE/240	56234	EXE/240	Stage & Studio	1000	240	Ext Mog End Pr		300	PAR64	6	20
EXG	56282	EXG/230	Stage & Studio	1000	230	Ext Mog End Pr		300	PAR64	6	20,22
FFN	56214	FFN	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	20,23
FFP	56215	FFP	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	20,21
FFR	56217	FFR	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	20,24
FFS	56216	FFS	Stage & Studio	1000	120	Ext Mog End Pr		800	PAR64	6	20,22
	14974	350PAR56/SP	Train Ditch Light	350	75	MEP		750	PAR56	12	20

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	25,26
	54007	64514	300	120	GX6.35	7700	75	T6	25	25,26
	54008	64516/300T6/CL	300	230	GX6.35	7300	75	T6	25	12,25,26
	54546	750/120/T5/RTP	750	120	G9.5	15400	2000	T5	15	25,26
	54560	1000T0/RTP/CR/BULK	1000	120	G9.5	25000	2000	T6	15	25,26,27
	54584	1000Q/T6/RTPFS	1000	120	G9.5	27500	300	T6	12	25,26
	54633	1500Q/T6/RTPGS	1500	120	G9.5	42000	300	T6	12	
	54752	1000T6QRTXP	1000	120	G9.5	25000	2000	T6	12	
	59803	2500T3Q/IR/7 480V	2500	480	RSC		5000	T3	12	25,26,28
	59822	500T3Q/IR/7 120V	500	120	RSC		5000	T3	12	25,26,28
	59841	1600T3Q/IR/7 240V	1600	240	RSC		5000	T3	12	25,26,28
	59850	500T3Q/IR 120V	500	120	Flex Nickel Leads		5000	T3	12	25,26,28
	59859	3650T3Q/IR/CL 480V	3650	480	Flex Nickel Leads		5000	T3	12	25,26,28
	59860	1000T3Q/IR 230-250V	1000	240	Flex Nickel Leads		5000	T3	12	25,26,28
	59864	1600T3Q/IR 240V	1600	240	Flex Nickel Leads		5000	T3	12	25,26,28
	59867	2500T3Q/IR 480V	2500	480	Flex Nickel Leads		5000	T3	12	25,26,28
	59870	3800T3Q/IR 570V	3800	570	Flex Nickel Leads		5000	T3	12	25,26,28
	59934	1200T3Q/IR/CL/HT 144V	1200	144	Flex Nickel Leads		3000	T3	12	25,28,29,30
	59936	1600T3Q/IR 277V	1600	277	Flex Nickel Leads		5000	T3	12	25,26,28

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	12	PG22	54032	64621 HLX	Projector, Microfilm, Stage & Studio, Aircraft				2000	48	30	
250	PAR46	28	Screw Term	15399	4551	Aircraft Taxiing	VNSP	75000	CC-6	25	95.25	12	23
450	PAR46	28	Screw Term	56229	Q4681	Aircraft Landing / Taxiway	VNSP	310000	CC-6	50	63.5	12	20,23
600	PAR64	28	Screw Term	14936	4559	Aircraft Landing / Taxiway	VNSP	600000	CC-8	25	101.6	6	23
				56222	Q4559	Aircraft Landing / Taxiway	VNSP	600000	CC-8	100	101.6	6	20,23

AIRCRAFT

Watts	Bulb	Volts	Base	Product Number	Ordering Abbreviation	Application	Beam Type	CBCP	Filament	Avg Rated Life(hrs)	MOL (mm)	Pkg Qty	Footnotes
600	PAR64	28	Screw Term	56223	Q4559X	Aircraft Landing / Taxiway	VNSP	765000	CC-8	100	101.6	6	20,23
1000	PAR64	28	Screw Term	14988	4557	Aircraft Landing/Taxiway	VNSP	540000	CC-8	25	101.6	6	23
				14994	5557	Aircraft Landing/Taxiway	VNSP	540000	CC-8	50	101.6	6	23,31

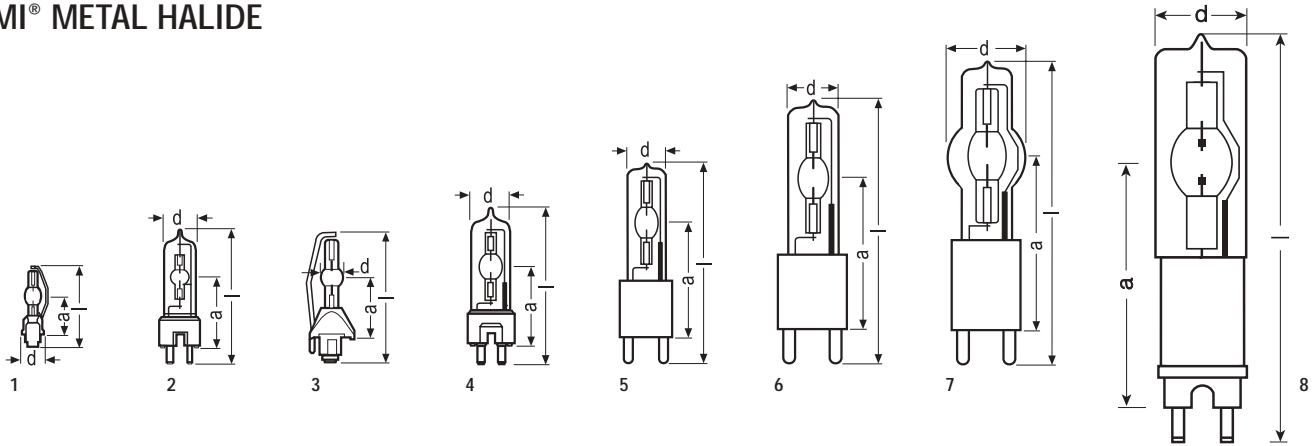
AIRFIELD

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	58537	6.6A/30MR16/64331A/SP	Airfield/Airport	6.6						10	
			58730	6.6A/30MR16/64331AC/FL	Airfield / Airport	6.6			1000			10	32
	T3.5	GZ9.5	58779	6.6A/30T3.5/64322/EXL/DL	Airfield/Airport	6.6	400	C-8	2000	16	58	30	
	T10	Med Prefocus	17980	6.6A/30T10/1P	Airfield/Airport	6.6	400	C-2V	1000	38.1	100	60	
40	MR11	PK30d	58787	6.6A/40MR11/64333B	Airfield / Airport	6.6			1500			10	33
45	MR16	Special	58545	6.6A/45MR16/64337A45-15	Airfield / Airport	6.6	19000		1500			10	
		PK30d	58758	6.6A/45MR16/64337B45-15	Airfield / Airport	6.6			1500			10	33
	T3	R7s	58704	6.6A/45T3/CL/64315	Airfield/Airport	6.6	750	C-8	1000	23	47.5	25	
	T3.5	GZ9.5	58775	6.6A/45T3.5/64320/EXM	Airfield/Airport	6.6	875	C-8	1000	25.4	44.5	100	
		G6.35	58813	6.6A/45T3.5Q/64321	Airfield / Airport	6.6	840	C-8	1200	33	50	100	
	T4	PK30d	58697	6.6A/45T4/64319 FEMALE	Airfield/Airport	6.6	800	C-8	1000	20	53	100	34,35
			58705	6.6A/45T4/CL/64317	Airfield/Airport	6.6	800	C-8	1000	16	58	100	35
		Special	58722	6.6A/45T4/64319Z	Airfield/Airport	6.6	800	C-8	1000	20	53	100	36,37
	T10	Med Prefocus	17981	6.6A/45T10/P	Airfield/Airport	6.6	675	C-2V	1000	38.1	100	60	
48	MR16	Special	58711	6.6A/48MR16/64338AC	Airfield / Airport	6.6			1000			10	
			58792	6.6A/48MR16/64337A48-15	Airfield/Airport	6.6	20000		1500			10	35
65	T4	Special	58726	6.6A/65T4/64328Z/HLX	Airfield/Airport	6.6	1450	C Bar 6	1000	20	53	100	37,38
100	T4	Special	58703	6.6A/100T4/64341Z/HLX	Airfield/Airport	6.6	2700	C Bar 6	1000	20	55	100	37,39
		PK30d	58706	6.6A/100T4/64342/HLX	Airfield/Airport	6.6	2700	C Bar 6	1000	20	58	100	35
			58709	6.6A/100T4/64341/HLX	Airfield/Airport	6.6		C Bar 6	1000	20	55	100	35
105	MR16	PK30d	58759	6.6A/105MR16/64339B	Airfield/Airport	6.6			1000			10	33
			58785	6.6A/105MR16/64339A	Airfield / Airport	6.6			1000			10	35
		Special	58816	6.6A/105MR16/64339C	Airfield / Airport	6.6			1000			10	37
115	T4	GY9.5	58794	6.6A/115T4Q/58798/2PPF/EVV	Airfield/Airport	6.6	2900	C Bar 6	1000	39.1	57	30	40,41
		DCR	58819	6.6A/115T4Q/DCR/DL	Airfield/Airport	6.6		C Bar 6	1000	26.9	60.3	100	
150	T4	PK30d	58717	6.6A/150T4Q/64361/HLX	Airfield/Airport	6.6	3600	C Bar 6	1000	20	58	100	35,42
		Special	58724	6.6A/150T4Q/64361Z/HLX	Airfield/Airport	6.6	3600	C Bar 6	1000	20	58	100	37
		GY9.5	58777	6.6A/150T4Q/64354/EWR/DL	Airfield/Airport	6.6	4000	C Bar 6	1500	39.1	65	30	40,41
175	T4	GY9.5	58795	6.6A/175T4Q/58799/2PPF/DL	Airfield/Airport	6.6	4700	C Bar 6	1000	39.1	57	30	41,43
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	20,44
	T4	PK30d	58649	6.6A/200T4/64382A/HLX	Airfield/Airport	6.6	4800	CC-6	1000	20	64	100	
		Special	58708	6.6A/200T4/64382/HLX	Airfield/Airport	6.6	4800	CC-6	1000	20	64	100	45
		GY9.5	58789	6.6A/200T4Q/2PPF/58750/EZL/DL	Airfield/Airport	6.6	5200	CC-6	1000	39.1	57.0	30	40,41

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	T4	G6.35	58815	6.6A/200T4Q/64386	Airfield / Airport	6.6	4700	C Bar 6	1200	33	47	100	
			58821	6.6A/200T4Q/CL/DCR/DL	Airfield/Airport	6.6	5000	CC-6	1000	27	80.9	100	
	T5	R7s	58707	6.6A/200T5/CL/64380	Airfield/Airport	6.6	4400	CC-8	1000	21.3	60.2	25	
204	T14	Med Prefocus	17983	6.6A/204T14/2P	Airfield/Airport	6.6	4220	C-13	500	55.5	146	24	

HMI® METAL HALIDE



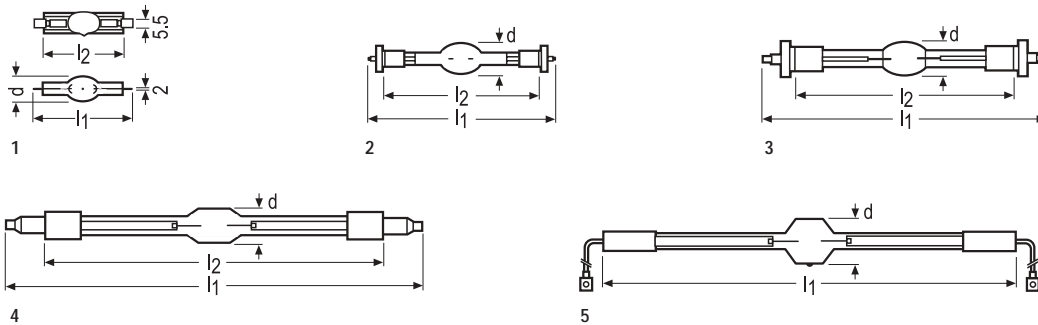
HMI® SINGLE-ENDED

Ordering Abbreviation	HMI 123 W	HMI 200 W/SE	HMI 250 W/SE	HMI 400 W/SE	HMI 575 W/SE
Product Number	54059 ²	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	1,2,3	4	4

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	4	4	4	4,5,6	4,5,6

HMI® METAL HALIDE



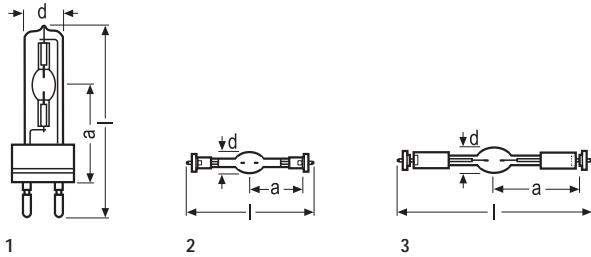
HMI® DOUBLE-ENDED

Ordering Abbreviation	HMI 200 W	HMI 575 W/GS	HMI 1200 W/GS	HMI 1200 W/S	HMI 2500 W/GS
Product Number	54060	54098	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	1000	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	4	4,7	4,7	4,8,9	4,7

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	4,8,9	4,10	4	4,7	4,10

HMP® METAL HALIDE



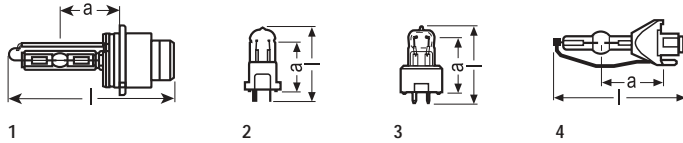
HMP® SINGLE-ENDED

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	4,11

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	4,12,13	4,11

HTI® METAL HALIDE



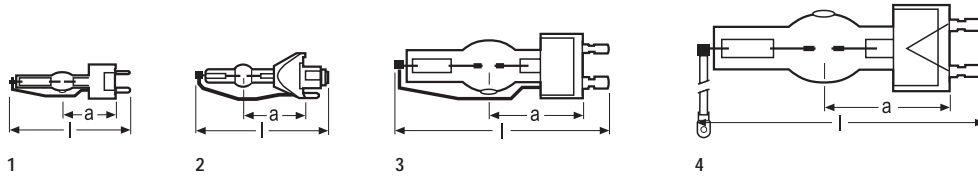
HTI® SINGLE-ENDED

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	1,2	4,14	4

HTI® SINGLE-ENDED

Ordering Abbreviation	HTI 250 W/SE	HTI 400 W/SE	HTI 404 W/SE
Product Number	54091	54084	54106 ²³
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	1,2,3,15	1,2,3,15,16,17,18	1,15,16

HTI® METAL HALIDE



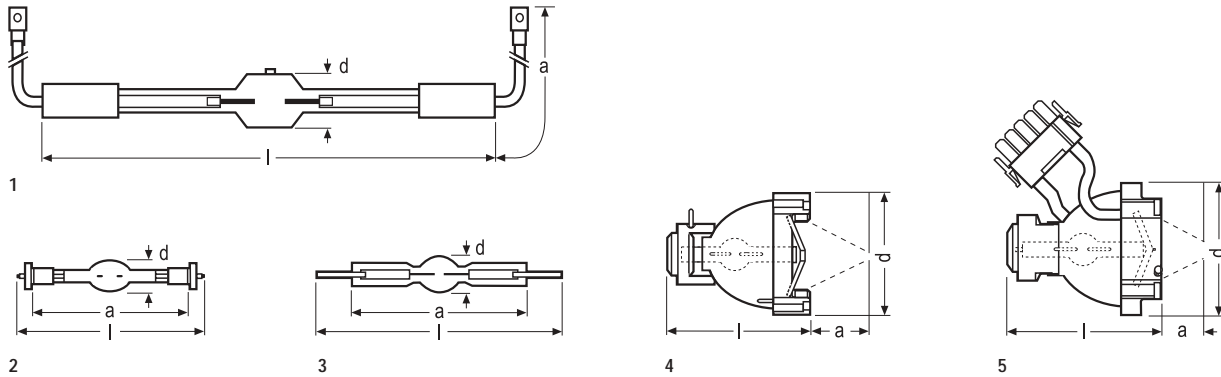
HTI® SINGLE-ENDED

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/cm ²)	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	1,2,6,15,17,18	3,4,15,16	6,15

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/cm ²)	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	4,6,15,19	4,6,20	

HTI® METAL HALIDE



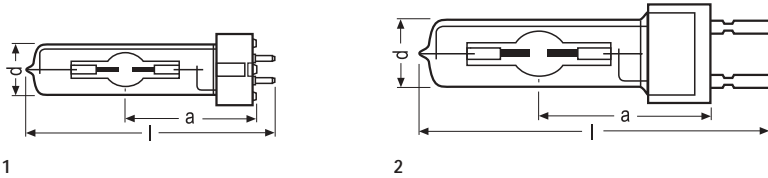
HTI® DOUBLE-ENDED

Ordering Abbreviation	HTI 300 W/DEL	HTI 300 W/DX	HTI 600 W/D	HTI 700 W/DE	HTI 4000 W/DE
Product Number	54112	54143	54140	54117	54133
Watts (W)	300	300	600	700	4000
Volts (V)	85	100	95	73	115
Current (A)	4.3	3.6	7.7	10	39.0
Lumens (lm)	20000	22000	48000	59000	360000
Average Luminance (cd/cm ²)		20000	25000		35000
Color Temp (K)	5700	6500	5300	5600	6300
Length L max (mm)	92	92	75	135	270
Distance a (mm)	70	70	59	115	140
Diameter d (mm)	16	16	16	18	40
Electrode Gap - cold (mm)	5.5	5.5	5.5	4	15
Avg Rated Life (hrs)	3000	750	300	750	500
Operating Position	p 45	p 45	p 45	Any	p 30
Base	SFc10-4	SFc10-4	Special	Special	S25.5
Hot Restart	Yes	Yes	Yes	Yes	Yes
Fig No	1	1	2	1	3
Symbols & Footnotes	4	4,21	4	4,6	4

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	4	4	5	5	5
Symbols & Footnotes	1	1,22	4	1	1

HSR® METAL HALIDE



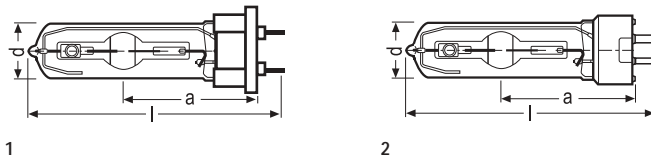
HSR® WITH OUTER JACKET

Ordering Abbreviation	HSR 400/60	HSR 575/60	HSR 575/72
Product Number	54102	54115	54116
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	7200
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	4	4	4

HSR® WITH OUTER JACKET

Ordering Abbreviation	HSR 700/60	HSR 1200/60	
Product Number	54107	54168	
Watts (W)	700	1200	
Volts (V)	72	100	
Current (A)	11	13.8	
Lumens (lm)	58000	110000	
Average Luminance (cd/cm ²)	10000	20000	
Color Temp (K)	6000	6000	
Length l (mm)	155	175	
Distance a (mm)	75	85	
Diameter d (mm)	30	40	
Electrode Gap - cold (mm)	8	10	
Avg Rated Life (hrs)	1000	1000	
Operating Position	Any	Any	
Base	G22	G22	
Hot Restart	No	No	
Fig No	2	2	
Symbols & Footnotes	4	4	

HSD® METAL HALIDE

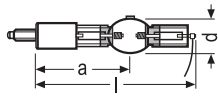


HSD® WITH OUTER JACKET

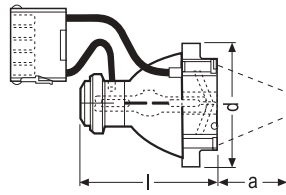
Ordering Abbreviation	HSD 150/70	HSD 200/60	HSD 250/60	HSD 250/78	HSD 575/72
Product Number	54119	54167	54170	54118	54129
Watts (W)	150	200	250	250	575
Volts (V)	97	70	90	90	88
Current (A)	1.8	3.3	3.1	3.1	7.4
Lumens (lm)	12000	13000	17000	17000	45000
Color Temp (K)	7000	6000	6000	7800	7200
Length l (mm)	105	108	110	108	135
Distance a (mm)	56	55	55	55	65
Diameter d (mm)	20	23	23	23	30
Electrode Gap - cold (mm)	5.5	5	5	5	7
Avg Rated Life (hrs)	2000	2000	2000	3000	3000
Operating Position	Any	Any	Any	Any	Any
Base	G12	GY9.5	GY9.5	GY9.5	GX9.5
Hot Restart	No	No	No	No	No
Fig No	1	2	2	2	2
Symbols & Footnotes	4,23	4	4,24	4	4

PHOTO OPTIC DISCHARGE

VIP® VIDEO AND DATA PROJECTION



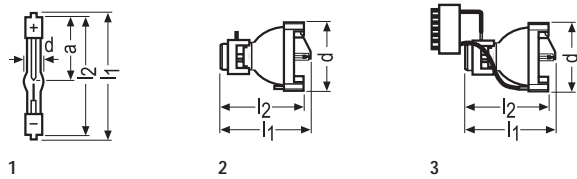
1



2

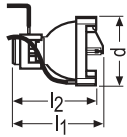
Ordering Abbreviation	VIP S 170/13	VIP R 273/45
Product Number	69320	69327
Watts (W)	170	270
Volts (V)	85	38
Current (A)	2.0	7.1
Lumens (lm)	11900	17000
Average Luminance (cd/cm ²)	30000	100000
Color Temp (K)	9000	5800
Length l (mm)	62	73
Distance a (mm)	35	45
Diameter d (mm)	13	67
Arc Length (mm)	5	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	1,25,26

XBO® ≤ 450W XENON SHORT ARC

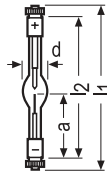


Ordering Abbreviation	XBO 75 W/2	XBO 75 W/2 OFR	XBO 100 W OFR	XBO R 100 W/45 OFR	XBO R 100 W/45C OFR
Product Number	69231	69232	69233	69197	69191
Watts (W)	75	75	100	100	100
Volts (V)	14	14	14	13	13
Type of Current	DC	DC	DC	DC	DC
Current (A)	5.4	5.4	7.0	7.0	7.0
Current Control Range (A)					
Lumens (lm)	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 105	s 105	s 105	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	27,28,29,30	28,29,30,31	29,30,31	28,29,31,32,33,34	28,29,30,31,34

XBO® ≤ 450W XENON SHORT ARC



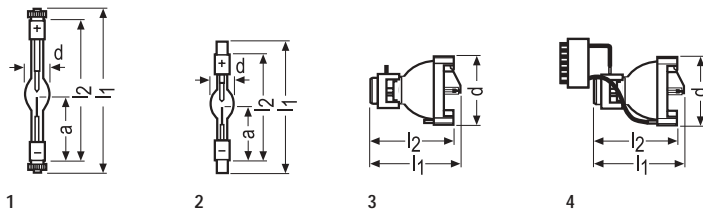
1



2

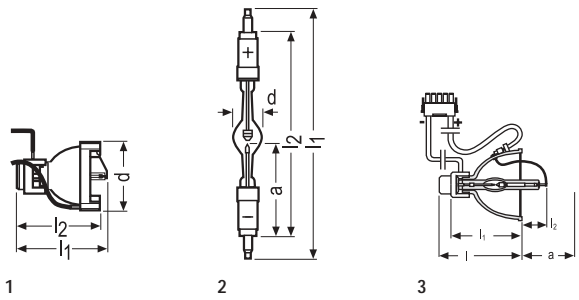
Ordering Abbreviation	XBO R 101 W/45C OFR	XBO 150 W/1	XBO 150 W/1 OFR	XBO 150 W/4
Product Number	69190	69234	69235	69238
Watts (W)	100	150	150	150
Volts (V)	13	20	20	20
Type of Current	DC	DC	DC	DC
Current (A)	7.0	7.5	7.5	7.5
Current Control Range (A)				
Lumens (lm)		3000	3000	3000
Luminous Intensity (cd)		300	300	300
Average Luminance (cd/cm ²)		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	28,31,34,35,36	28,29,30,37,38	28,29,30,31,38	28,29,30,39

XBO® ≤ 450W XENON SHORT ARC



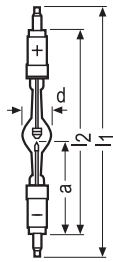
Ordering Abbreviation	XBO 150 W/CR OFR	XBO 150 W/S	XBO R 180 W/45/OFR	XBO R 180 W/45C OFR
Product Number	69237	69236	69186	69183
Watts (W)	150	150	180	180
Volts (V)	18	20	14	14
Type of Current	DC	DC	DC	DC
Current (A)	8.5	7.5	12	12
Current Control Range (A)				
Lumens (lm)	2900	2200		
Luminous Intensity (cd)	290	220		
Average Luminance (cd/cm ²)	20000	18000		
Luminous Area -- w x h (mm)	0.5 x 1.6	0.5 x 1.9		
Length l ₁ max (mm)	150	117	90	90
Length l ₂ 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	28,29,30,31,40,41	8,28,29,30,40	28,29,30,31,34,42	28,29,30,31,34,35

XBO® ≤ 450W XENON SHORT ARC

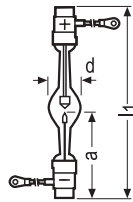


Ordering Abbreviation	XBO R 181 W/45C OFR	XBO 250 W OFR	XBO R 300 W/60C OFR	XBO 450 W
Product Number	69184	69239 ²	69167	69241
Watts (W)	180	250	300	450
Volts (V)	14	13	17	17
Type of Current	DC	DC	DC	DC
Current (A)	12	18	16	25
Current Control Range (A)		14-20	14 - 19	17-30
Lumens (lm)		4800		13000
Luminous Intensity (cd)		530		1300
Average Luminance (cd/cm ²)		26000		35000
Luminous Area -- w x h (mm)		0.7 x 1.7		0.9 x 2.7
Length l ₁ max (mm)	90	226	62	260
Length l ₂ 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	28,29,30,31,34,35,36	28,29,30,31	28,29,30,31,35,43	28,29,30,44,45

XBO® ≤ 450W XENON SHORT ARC



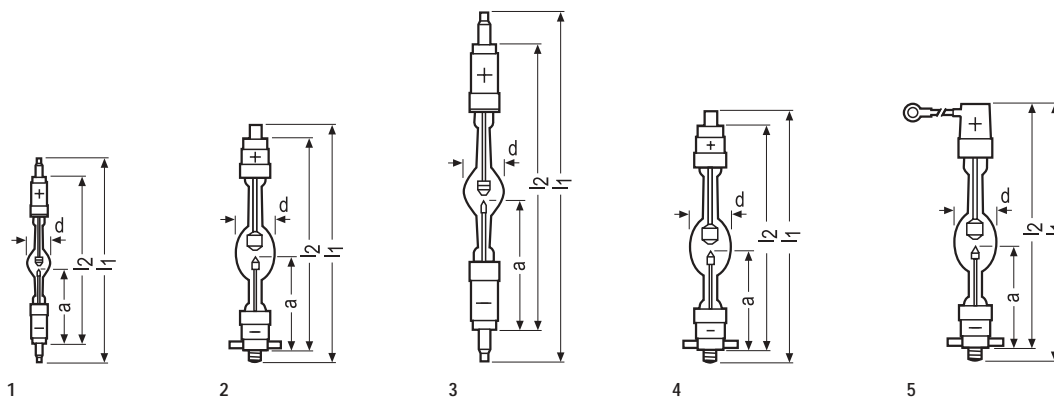
1



2

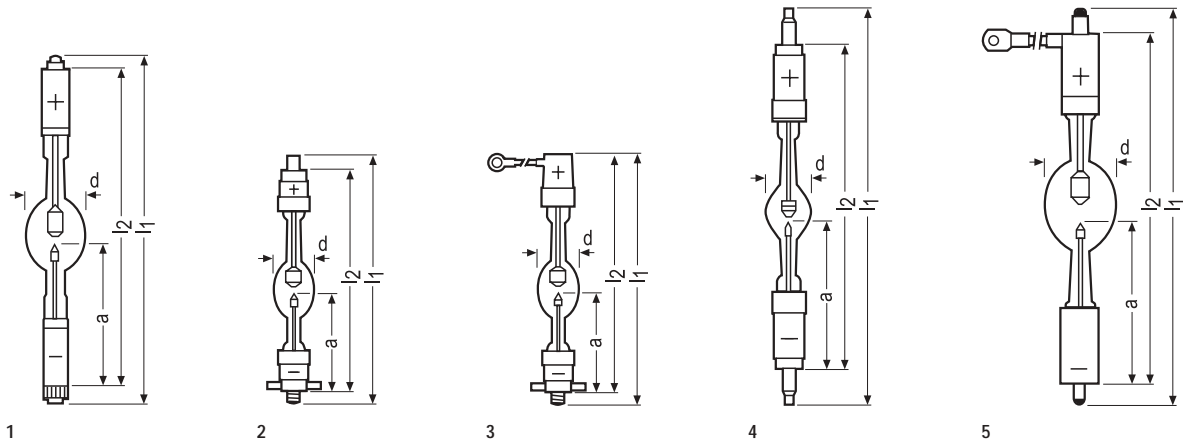
Ordering Abbreviation	XBO 450 W OFR	XBO 450 W/1	XBO 450 W/2 OFR	XBO 450 W/4
Product Number	69245	69242	69243	69244
Watts (W)	450	450	450	450
Volts (V)	17	17	17	17
Type of Current	DC	DC	DC	DC
Current (A)	25	25	25	25
Current Control Range (A)	17-30	17-30	17-30	17-30
Lumens (lm)	13000	13000	13000	13000
Luminous Intensity (cd)	1300	1300	1300	1300
Average Luminance (cd/cm ²)	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 l ₁ max (mm)	260	260	177	260
Length l ₂ 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	28,29,30,31	28,29,30	28,29,30,31	28,29,30,39

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



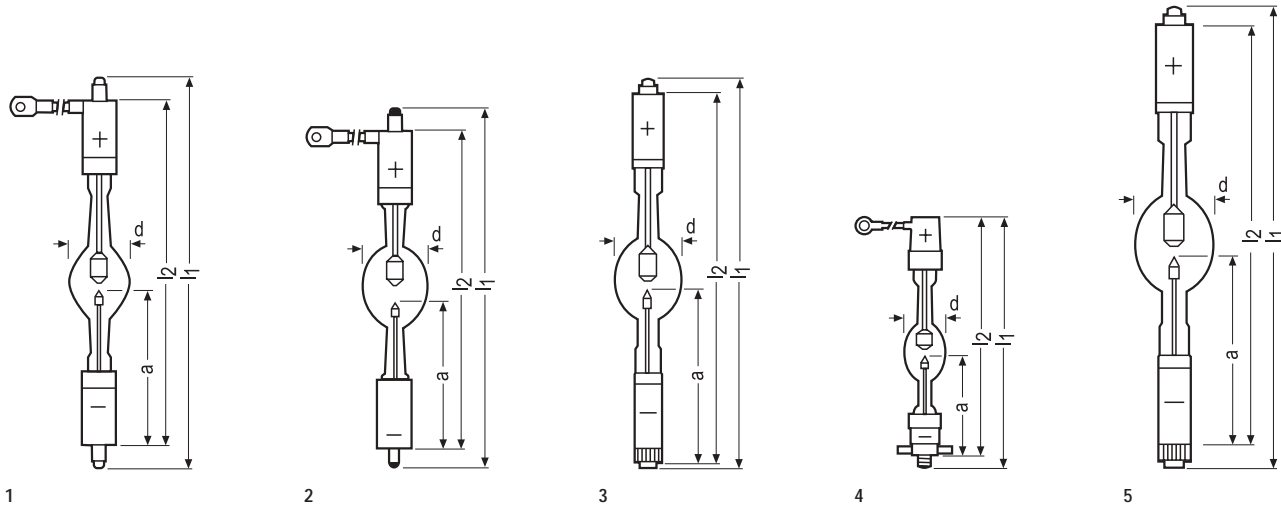
Ordering Abbreviation	XBO 500 W/H OFR	XBO 700 W/HS OFR	XBO 900 W OFR	XBO 1000 W/HS OFR	XBO 1000 W/HSC OFR
Product Number	69257	69260	69261	69263	69264
Watts (W)	500	700	900	1000	1000
Volts (V)	17	18	19	19	19
Type of Current	DC	DC	DC	DC	DC
Current (A)	28	37	45	50	50
Current Control Range (A)	17-30	30-45	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	2400	2000	2000
Avg Rated Life Horizontal (hrs)	2000	1500		2000	2000
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	2,28,29,30,31,46	2,8,28,29,30,31,46	28,29,30,31,46	2,8,28,29,30,31,46	2,8,28,29,30,31,35,46

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	70000	60000	60000	60000
Luminous Intensity (cd)	3200	5500	5500	6000	6000
Average Luminance (cd/cm ²)	45000	70000	70000	65000	65000
Luminous Area -- w x h (mm)	1.0 x 4.0	1.0 x 3.2	1.0 x 3.2	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	46	52	52
Avg Rated Life Vertical (hrs)	2400	2000	2000	2400	2400
Avg Rated Life Horizontal (hrs)	2400	2000	2000		
Operating Position	s30 p30	s20 p20	s20 p20	s 30	s 30
Forced Cooling		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	2,28,29,30,31,46	2,8,28,29,30,31,46	2,8,28,29,30,31,35,46	28,29,30,31,46	28,29,30,31,46,47

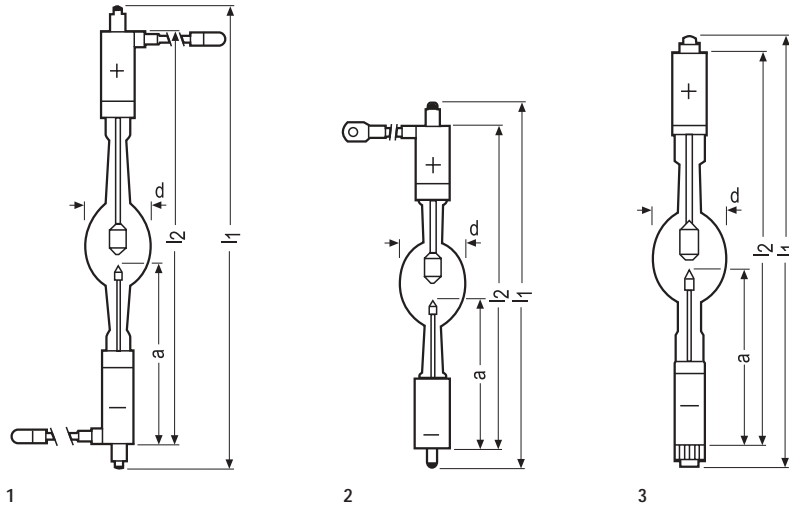
XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



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)	28	25	27	26	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)	80000	80000	75000	80000	75000
Luminous Area -- w x h (mm)	1.3 x 4.8	1.3 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	236	375
Length l_2 max (mm)	322	302	322	222	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)	2400	2400	2400	2400	2400
Avg Rated Life Horizontal (hrs)	2400	2400	2400	2400	2400
Operating Position	s30 p30	s30 p30	s30 p30	s20 p20	s30 p30
Forced Cooling	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	SFcX27-8	SFc25-14
Fig No	1	2	3	4	5
Symbols & Footnotes	2,28,29,30,31,46	2,8,28,29,30,31,46	2,28,29,30,31,46,48,49	2,28,29,30,31,35,46,50,51	2,28,29,30,31,40,46,48,49

PHOTO OPTIC DISCHARGE

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



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	26	30	30	30
Type of Current	DC	DC	DC	DC	DC
Current (A)	85	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/cm ²)	60000	80000	90000	90000	85000
Luminous Area -- w x h (mm)	1.5 x 6.0	1.5 x 4.5	1.7 x 5.0	1.7 x 5.0	1.7 x 5.0
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)	2000	1800	1800	1800	1800
Avg Rated Life Horizontal (hrs)		1500	1500	1500	1500
Operating Position	s 30	s30 p20	s30 p30	s30 p30	s30 p30
Forced Cooling		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	SFc27-14
Fig No	1	2	2	2	3
Symbols & Footnotes	28,29,30,31,46	2,8,28,29,30,31,46	2,28,29,30,31,46	2,8,28,29,30,31,46	2,28,29,30,31,46,48

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION

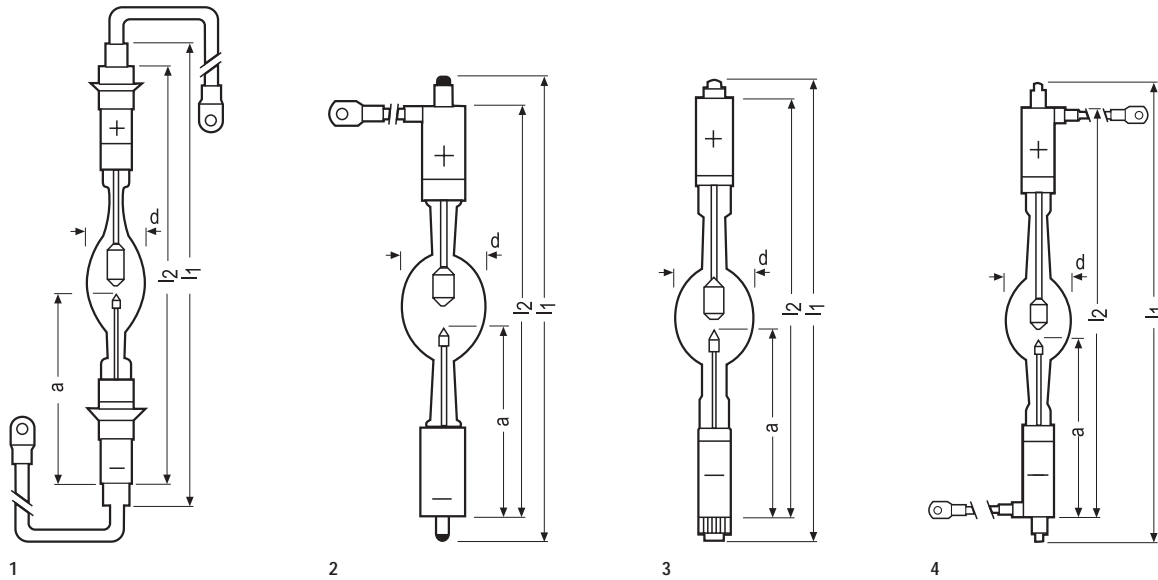
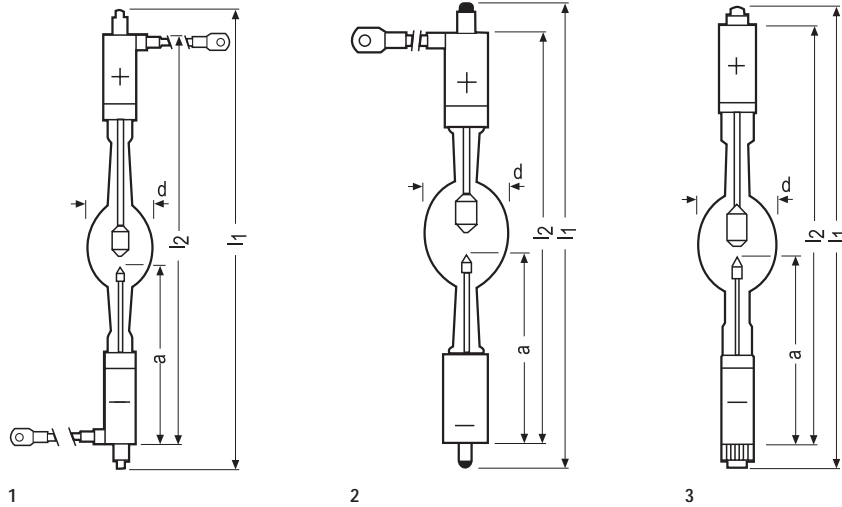


PHOTO OPTIC DISCHARGE

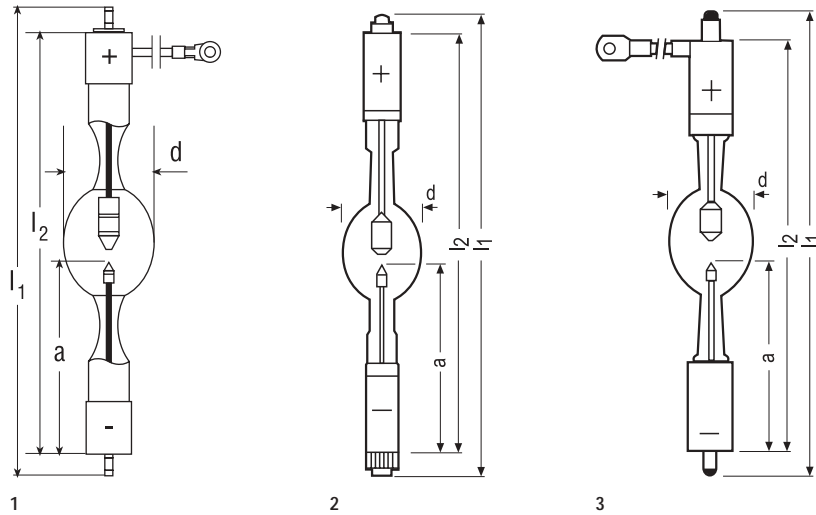
Ordering Abbreviation	XBO 4000 W OFR	XBO 4000 W/HS OFR	XBO 4000 W/HTP OFR	XBO 4200 W/CA OFR	XBO 4200 W/GS OFR
Product Number	69253	69254	69296	69294	69350
Watts (W)	4000	4000	4000	4200	4200
Volts (V)	32	28	31	29	29
Type of Current	DC	DC	DC	DC	DC
Current (A)	120	135	130	140	140
Current Control Range (A)	80-140	80-150	100-140	80-160	80-160
Lumens (lm)	180000	155000	155000	190000	190000
Luminous Intensity (cd)	19000	17000	16000	20000	20000
Average Luminance (cd/cm ²)	70000	90000	90000	100000	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 5.7	2.1 x 5.7
Length l ₁ max (mm)	432	410	433	428	428
Length l ₂ max (mm)	384	370	382	382	382
Distance a (mm)	176	171	167.5	167.5	167.5
Diameter d (mm)	60	70	70	70	60
Avg Rated Life Vertical (hrs)	1000	1000	1200	1000	500
Avg Rated Life Horizontal (hrs)		1000	1200		500
Operating Position	s 15	s20 p20	s20 p20	s 15	s 15
Forced Cooling	Required	Required	Required	Required	Required
Magnetic Arc Stabilization					
Base Anode	SFa30-18	SFaX30-9.5	SFa27-14	SFaX27-13	SFaX27-13
Base Cathode	SFa30-20	SFa30-7.9	SFc27-14	SFaX27-14	SFaX27-14
Fig No	1	2	3	4	4
Symbols & Footnotes	28,29,30,31,46	2,8,28,29,30,31,46	2,28,29,30,31,46,48	28,29,30,31,46,47,52	7,28,29,30,31,46

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



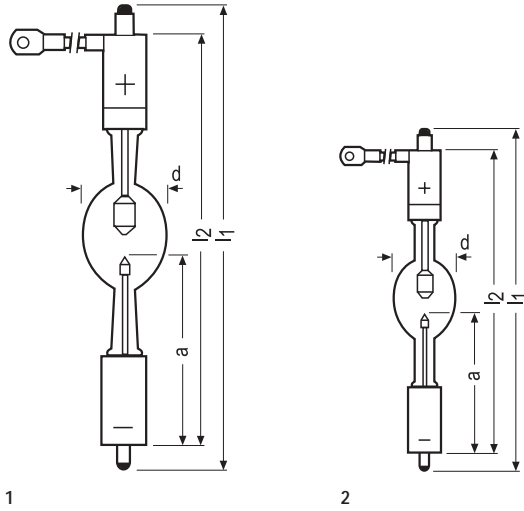
Ordering Abbreviation	XBO 4500 W/HS	XBO 4500 W/HTP	XBO 5000 W/H OFR	XBO 5000 W/HTP OFR
Product Number	69359*	69360*	69315	69336
Watts (W)	4500	4500	5000	5000
Volts (V)	32	32	34	35
Type of Current	DC	DC	DC	DC
Current (A)	135	135	140	140
Current Control Range (A)	80-150	100-150	100-150	100-150
Lumens (lm)	200000	200000	225000	225000
Luminous Intensity (cd)	20000	20000	27000	22000
Average Luminance (cd/cm ²)	120000	120000	95000	95000
Luminous Area -- w x h (mm)	1.8 x 6.0	1.8 x 6.0	2.2 x 6.5	2.2 x 6.5
Length l ₁ max (mm)	410	433	433	433
Length l ₂ max (mm)	370	370	382	382
Distance a (mm)	171	171	168	165
Diameter d (mm)	70	70	70	70
Avg Rated Life Vertical (hrs)	1000	1000	1000	1000
Avg Rated Life Horizontal (hrs)	1000	1000	1000	1000
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	SFa30-7.9	SFa27-14	SFaX30-16	SFa27-14
Base Cathode	SFaX30-9.5	SFc27-14	SFa28-18	SFc27-14
Fig No	1	3	2	3
Symbols & Footnotes	28,46	28,46	2,28,29,30,31,46	2,28,29,30,31,46,48

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



Ordering Abbreviation	XBO 6000 W/HS OFR	XBO 6000 W/HTP OFR	XBO 6500 W	XBO 7000 W/HS OFR
Product Number	69339	69340	69298	69295
Watts (W)	6000	6000	6500	7000
Volts (V)	37	37	40	42
Type of Current	DC	DC	DC	DC
Current (A)	160	160	160	160
Current Control Range (A)	110 - 165	110 - 165	80-160	110-165
Lumens (lm)	300000	280000	325000	350000
Luminous Intensity (cd)	28000	28000	32000	35000
Average Luminance (cd/cm ²)	105000	105000	95000	100000
Luminous Area -- w x h (mm)	2.0 x 7.5	2.0 x 7.5	2.3 x 9.0	2.0 x 7.5
Length l ₁ max (mm)	433	433	483	433
Length l ₂ max (mm)	393	382	434	393
Distance a (mm)	170.5	165	200	170.5
Diameter d (mm)	78	78	60	78
Avg Rated Life Vertical (hrs)	600	600	500	500
Avg Rated Life Horizontal (hrs)	600	600		500
Operating Position	s15 p15	s15 p15	s 10	s15 p15
Forced Cooling	Required	Required	Required	Required
Magnetic Arc Stabilization		Required		Required
Base Anode	SFaX30-9.5	SFa30-14	SFa30-20	SFaX30-9.5
Base Cathode	SFa30-7.9	SFc30-14	SFa30-22	SFa30-8.0
Fig No	1	2	3	3
Symbols & Footnotes	2,8,28,29,30,31,46	2,8,29,30,31,46,53,54	28,29,30,46	2,28,29,30,31,46

XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



Ordering Abbreviation	XBO 7000 W/HS OFR	XBO 8000 W/HS OFR	XBO 10000 W/C OFR	XBO 10000 W/HS OFR
Product Number	69301	69351	69297 ²	69342
Watts (W)	7000	8000	9600	10000
Volts (V)	43	45	59	51
Type of Current	DC	DC	DC	DC
Current (A)	160	175	160	195
Current Control Range (A)	110-165	150-180	110-170	160-200
Lumens (lm)	350000	400000	500000	500000
Luminous Intensity (cd)	35000	40000	47500	45000
Average Luminance (cd/cm ²)	110000	110000	80000	90000
Luminous Area -- w x h (mm)	2.0 x 7.5	2.3 x 10.5	2.7 x 14.0	2.4 x 12.0
Length l ₁ max (mm)	433	433	483	433
Length l ₂ max (mm)	393	393	434	393
Distance a (mm)	170.5	170.5	200	170.5
Diameter d (mm)	78	90	78	90
Avg Rated Life Vertical (hrs)	500	500	500	500
Avg Rated Life Horizontal (hrs)	500	500		500
Operating Position	s 15, p15	s 15, p15	s 15	s15 p15
Forced Cooling	Required	Required	Required	Required
Magnetic Arc Stabilization	Required	Required		Required
Base Anode	SFaX 30-9.5	SFaX 30-9.5	SK30-20	SfaX 30-9.5
Base Cathode	SFa30-7.9	SFa 30-7.9	SFa30-22	SFa30-7.9
Fig No	1	1	2	2
Symbols & Footnotes	2,28,29,30,31,46	2,28,29,30,31,46	28,29,30,31,35,46,55	2,28,29,30,31,46

HBO® MERCURY SHORT ARC

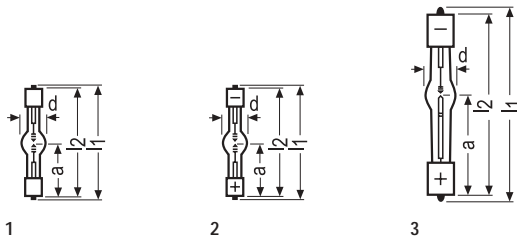
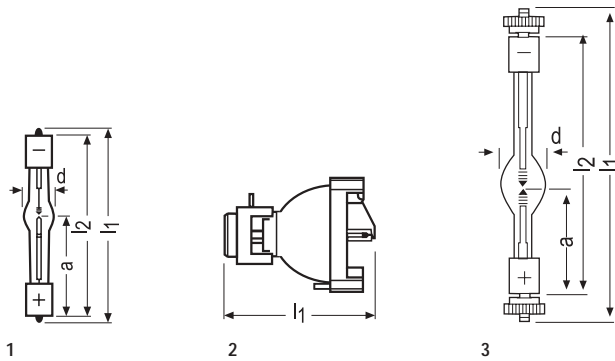


PHOTO OPTIC DISCHARGE

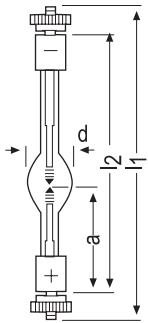
Ordering Abbreviation	HBO 50 W AC L1	HBO 50 W AC L2	HBO 50 W/3	HBO 100 W/2
Product Number	69213	69214	69215	69217
Watts (W)	50	50	50	100
Volts (V)	37	42	23	20
Type of Current	AC	AC	DC	DC
Current (A)	1.45	1.3	2.3	5.0
Lumens (lm)	2000	2000	1300	2200
Luminous Intensity (cd)	230	230	150	260
Average Luminance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

HBO® MERCURY SHORT ARC



Ordering Abbreviation	HBO 103 W/2	HBO R 103 W/45	HBO 200 W/2 L1	HBO 200 W/2 L2
Product Number	69182	69311	69198	69222
Watts (W)	100	100	200	200
Volts (V)	23	23	61	53
Type of Current	DC	DC	DC or AC	DC or AC
Current (A)	4.44	4.3		
Lumens (lm)	2550		9500	9500
Luminous Intensity (cd)	270 MIN		1000	1000
Average Luminance (cd/cm ²)	150000		40000	40000
Luminous Area – w x h (mm)	0.25 x 0.25		0.6 x 2.2	0.6 x 2.2
Luminous Efficacy (lm/W)	30		47.5	47.5
Length l ₁ max (mm)	90	81.50	128	128
Length l ₂ max (mm)	82		102	102
Distance a (mm)	43		40	40
Diameter d (mm)	10		17	17
Avg Rated Life (hrs)	300	300	400	400
Operating Position	s 90, anode down	p 15	s 45, anode down	s 45, anode down
Cooling	Convection	Convection	Convection	Convection
Base Anode	SFa7.5-2	Pin	SFc10-4	SFc10-4
Base Cathode	SFa9-2	Pin	SFc10-4	SFc10-4
Fig No	1	2	3	3
Symbols & Footnotes	56	34,57	58,59,60	58,59,60

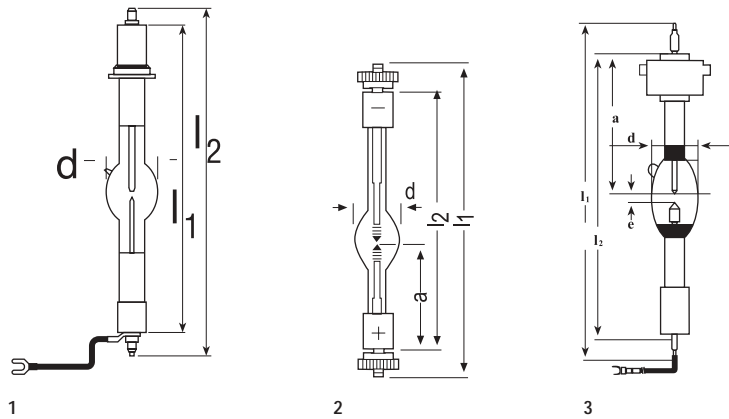
HBO® MERCURY SHORT ARC



1

Ordering Abbreviation	HBO 200 W/2 TM L1	HBO 200 W/2 TM L2	HBO 200 W/4	HBO 200 W/DC
Product Number	69221	69223	69224	69225
Watts (W)	200	200	200	200
Volts (V)	47	47	61	57
Type of Current	DC or AC	DC or AC	AC	DC
Current (A)			3.6	3.5
Lumens (lm)	9500	9500	9500	10000
Luminous Intensity (cd)	1000	1000	1000	1100
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	0.75 x 2.3
Luminous Efficacy (lm/W)	47.5	47.5	47.5	50
Length l_1 max (mm)	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)	400	200	200	1000
Operating Position	s 45, anode down	s 45, anode down	s 45, anode down	s 15, anode down
Cooling	Convection	Convection	Convection	Convection
Base Anode	8-32 UNC-3A	8-32 UNC-3A	SFc10-4	SFc10-4
Base Cathode	8-32 UNC-3A	8-32 UNC-3A	SFc10-4	SFc10-4
Fig No	1	1	1	1
Symbols & Footnotes	61	61	62	

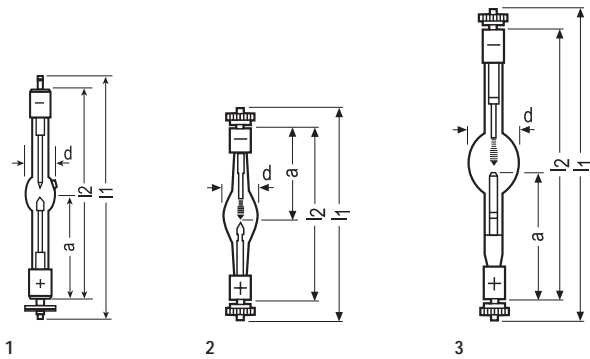
HBO® MERCURY SHORT ARC



Ordering Abbreviation	HBO 201 W/HS-D2	HBO 202 W/4	HBO 250 W/HS
Product Number	69168	69316	69364*
Watts (W)	200	200	250
Volts (V)	25	61	40
Type of Current	DC	AC	DC
Current (A)	8	3.6	6.25
Lumens (lm)			
Luminous Intensity (cd)		1000	
Average Luminance (cd/cm ²)		40000	
Luminous Area – w x h (mm)		0.6 x 2.2	
Luminous Efficacy (lm/W)		47.5	
Length l ₁ max (mm)	150	128	143
Length l ₂ max (mm)	127	102	125
Distance a (mm)		40	62
Diameter d (mm)	20	17	20
Avg Rated Life (hrs)	1000	200	1000
Operating Position	Vertical, anode up	s 45, anode down	Vertical, anode down
Cooling	Convection	Convection	Convection
Base Anode	SFcX32-22	SFc10-4	SFa 13-5/20
Base Cathode	SFcX12-4/15	SFc10-4	Special
Fig No	1	2	3
Symbols & Footnotes	28,63	64	63

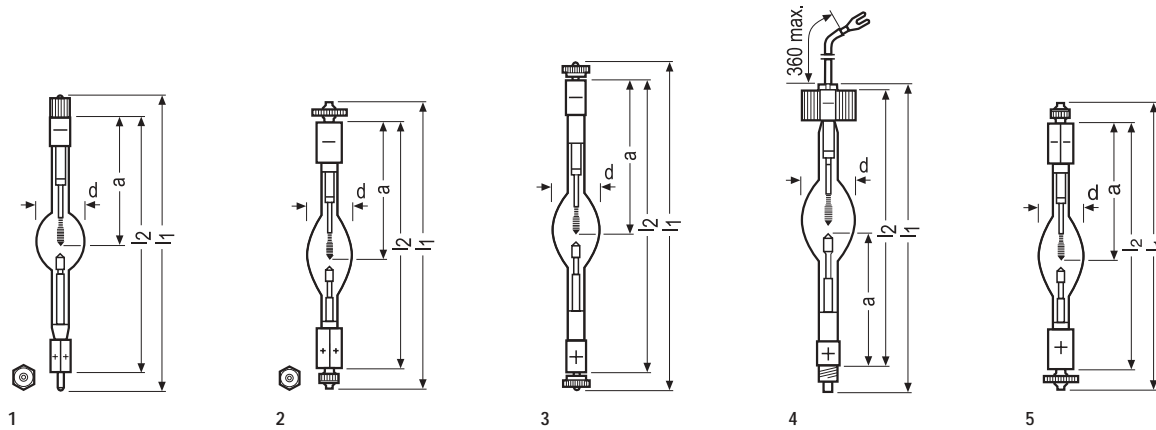
PHOTO OPTIC DISCHARGE

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



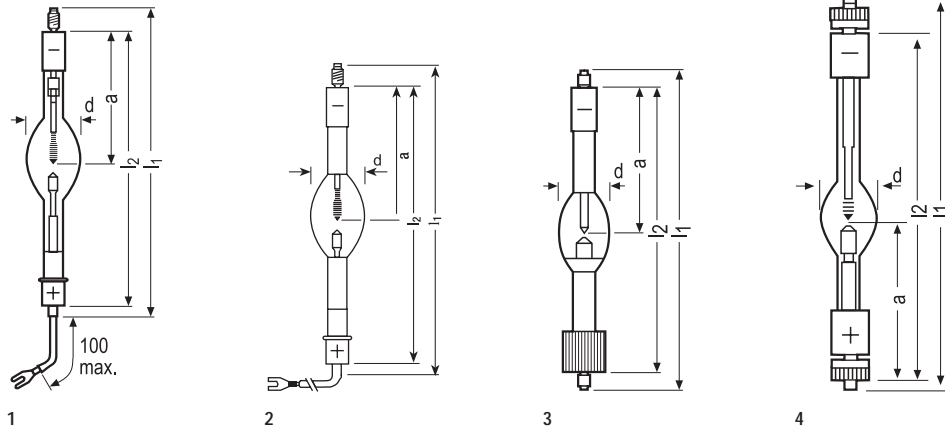
Ordering Abbreviation	HBO 250 W/BY	HBO 350 W	HBO 350 W/S	HBO 450 W/GS	HBO 500 W/A
Product Number	69246	69226	69228	69343	69205
Watts (W)	250	350	350	450	500
Volts (V)	40	68	68	50	60
Type of Current	DC	DC	DC	DC	DC
Current (A)	6.5	5.3	5.15	9	8.3
Radiant Intensity 350..450 nm (mW/sr)		4600	4700		6200
Length l_1 max (mm)	152	128	127	150	190
Length l_2 max (mm)	125	102	103	105	161.5
Distance a (mm)	62	45	52.5	53	73
Diameter d (mm)	20	20	20	22	29
Electrode Gap -- cold (mm)	2	2.9	3	2.2	4.5
Avg Rated Life (hrs)	1000	600	600	600	800
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Forced Base	Convection	Convection	Convection	Convection
Base Anode	SFc13-5/20	SFcY 10-4	SFcY10-4	SFc 13-5/15	SFcY13-5
Base Cathode	SFc13-5/20	SFcY 10-4	SFcY10-4	SFc 13-5/15	SFcY13-5
Fig No	1	2	2	1	3
Symbols & Footnotes		67,68,69,70	67,70	71	70,71,72

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



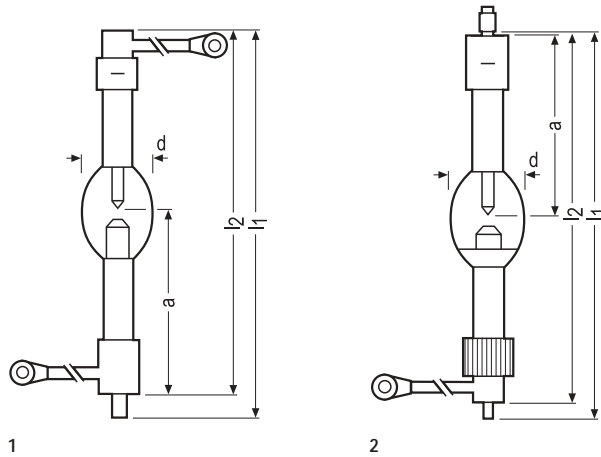
Ordering Abbreviation	HBO 500 W/B	HBO 1000 W/CEL	HBO 1000 W/G	HBO 1000 W/NEL	HBO 1002 W/CEL
Product Number	69206	69175	69208 ²	69176	69177
Watts (W)	500	750	750	750	750
Volts (V)	48	47	47	47	47
Type of Current	DC	DC	DC	DC	DC
Current (A)	10.3	16	16	16	16
Radiant Intensity 350..450 nm (mW/sr)	5800	8300	8300	8300	8300
Length l_1 max (mm)	180	175	197	190	175
Length l_2 max (mm)	151.5	157	169.5	168	157
Distance a (mm)	78.5	78.5	85	84.5	78.5
Diameter d (mm)	29	28	28	28	28
Electrode Gap -- cold (mm)	3	3	3	3	3
Avg Rated Life (hrs)	800	2500	600	2500	2500
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Convection	Convection	Forced Base	Convection	Convection
Base Anode	SFcX13-5/20	SxFc15-6/20	SFcX14-6/25	SFa15-5/16	SFc15-6/20
Base Cathode	SFcY 13-15/20	SFc15-6/20	SFcX15-4/20	SFaX14-5/21	SXFc15-6/20
Fig No	1	2	3	4	5
Symbols & Footnotes	70,71,73,74	75,76,77	67,76	71,76,78,79,80	76

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



Ordering Abbreviation	HBO 1002 W/NEL	HBO 1002 W/NIL	HBO 1003 W/PI	HBO 1003 W/PIL	HBO 1000 W/D
Product Number	69273	69347	69195	69180	69200
Watts (W)	750	750	750	750	1000
Volts (V)	47	25	26	26	38
Type of Current	DC	DC	DC	DC	DC
Current (A)	16	27.1	27.1	25.8	26.5
Radiant Intensity 350..450 nm (mW/sr)	8300				10800
Length l ₁ max (mm)	190	187	197	195	240
Length l ₂ max (mm)	168	168	169.5	169.5	208
Distance a (mm)	78.5	78.5	85	85	89.5
Diameter d (mm)	28	29	29	29	40
Electrode Gap -- cold (mm)	3	3	3	3	3
Avg Rated Life (hrs)	2500	1500	850	1500	1000
Operating Position	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down	Vertical, anode down
Cooling	Convection	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFaX14-5/21	SFaX14-5/21	SFcX14-6/25	SFcX14-6/25	SFc15-6/25
Base Cathode	SFc15-6/25	SFc15-6/25	SFc15-6/25	SFc15-6/25	SFc15-6/25
Fig No	1	2	3	3	4
Symbols & Footnotes	77,81	77,82	76,83,84	76,83,85	

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



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	86,87,88	87,88,89	86,88	66,90	66,91,92

PHOTO OPTIC DISCHARGE

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY

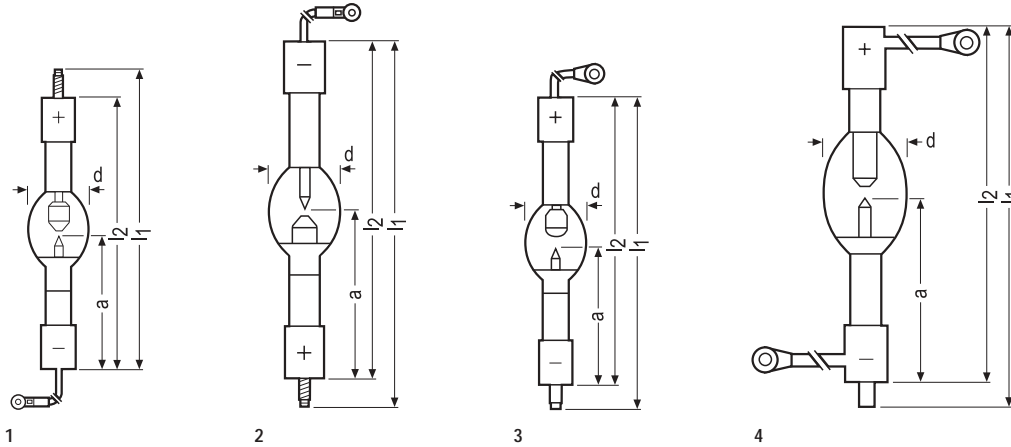
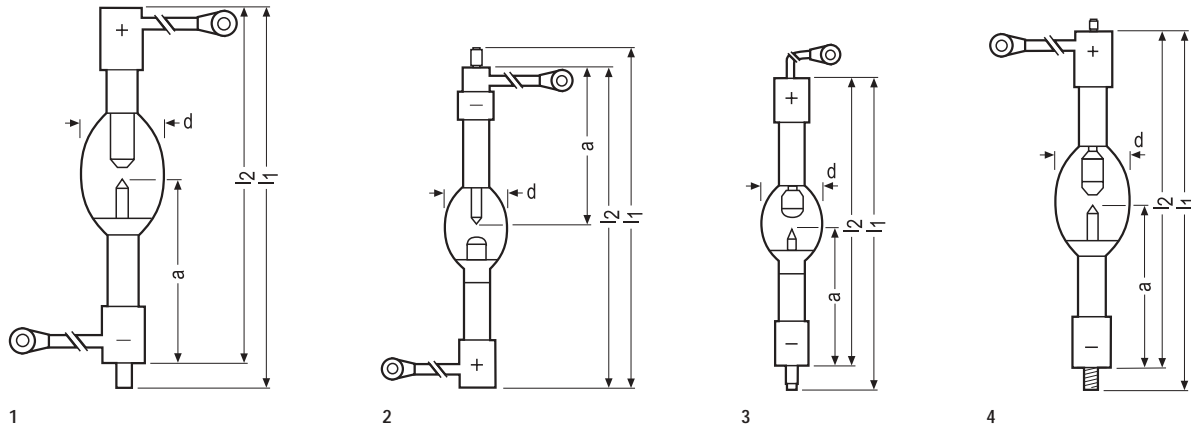


PHOTO OPTIC DISCHARGE

Ordering Abbreviation	HBO 2000 W/NIL	HBO 2001 W/NIEL	HBO 2001 W/NIL	HBO 2002 W/NIL	HBO 2001 W/CIEL
Product Number	69303	69306	69292	69287	69166
Watts (W)	1750	1750	1750	1750	2000
Volts (V)	26	26	26	24	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	309
Distance a (mm)	112.25	112.5	112	107.5	148.75
Diameter d (mm)	52	52	50	52	62
Electrode Gap -- cold (mm)	4.5	4.5	4.5	4.5	4
Avg Rated Life (hrs)	1500	2250	1500	1500	2250
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 with cable connection (M8)
Base Cathode	SFc27-7/35	SFc27-7/35	SFaX27-7/35	SFc27-10x1.25/35	SFa33.5-10/50 with cable connection (M6)
Fig No	1	2	2	3	4
Symbols & Footnotes	88,92	88,92	88,92	86,92	89,93,94

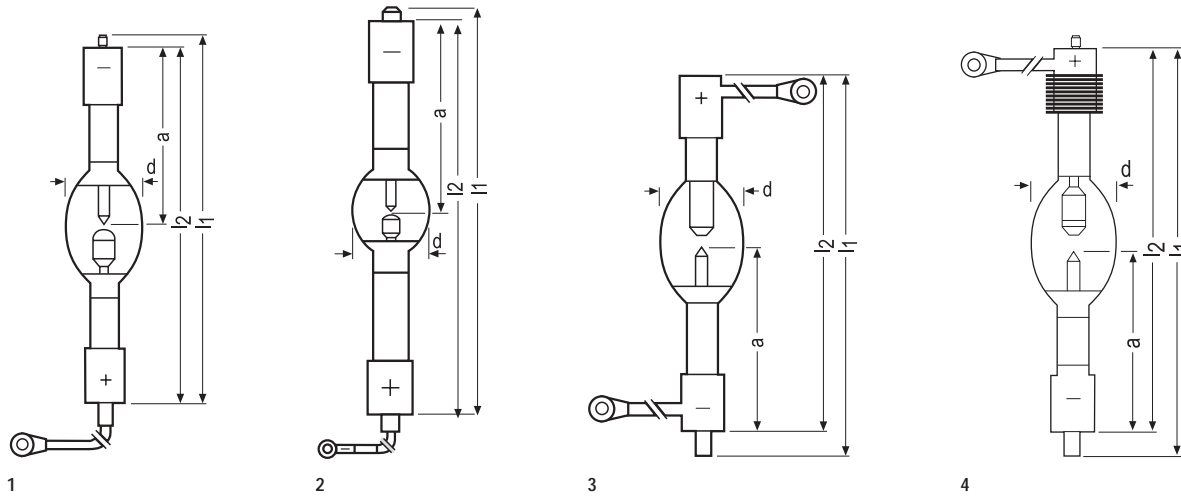
HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



Ordering Abbreviation	HBO 2001 W/CIL	HBO 2002 W/MA	HBO 2011 W/NIL	HBO 2500 W/PIL
Product Number	69189	69199	69288	69172
Watts (W)	2000	2000	2000	2500
Volts (V)	26	37	24	28
Type of Current	DC	DC	DC	DC
Current (A)	77	54	80	90
Radiant Intensity 350..450 nm (mW/sr)				
Length l ₁ max (mm)	329	292	256	350
Length l ₂ max (mm)	307	272	236	315
Distance a (mm)	149	138.5	107.75	149
Diameter d (mm)	62	62	52	62
Electrode Gap -- cold (mm)	4.5	3	4.5	6.7
Avg Rated Life (hrs)	1500	1000	1500	1500
Operating Position	Vertical, anode up	Vertical, anode down	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SF33.5/50	SF27/35	SF27-7/35	SF30-6/50
Base Cathode	SFa33.5-10/50	SFa27-10/35	SF27-12x1.5/35	SF30-6.3/50
Fig No	1	2	3	4
Symbols & Footnotes	86,92,93,95	28,86,88,92,96	86,92	28,89,92,97

PHOTO OPTIC DISCHARGE

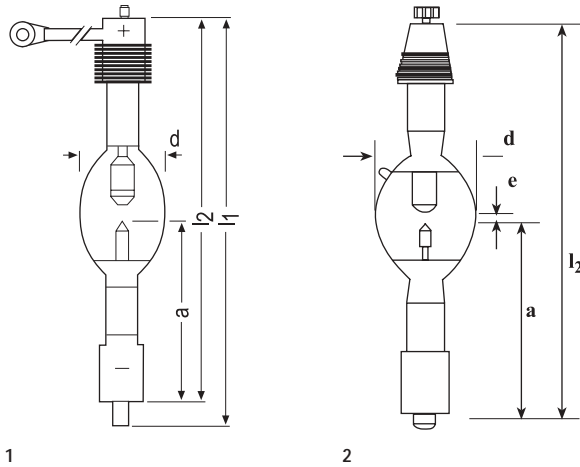
HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



Ordering Abbreviation	HBO 2501 W/NIL	HBO 2510 W/NIL	HBO 2700 W/CIL	HBO 3500 W/PI
Product Number	69289	69299	69344	69174
Watts (W)	2500	2500	2700	3400
Volts (V)	23	23	24	23
Type of Current	DC	DC	DC	DC
Current (A)	110	109	110	148
Radiant Intensity 350..450 nm (mW/sr)				
Length l ₁ max (mm)	367	367	334	340
Length l ₂ max (mm)	327	327	309	315
Distance a (mm)	157.75	157.5	148.75	154
Diameter d (mm)	70	70	62	77
Electrode Gap -- cold (mm)	4.5	4.5		4.5
Avg Rated Life (hrs)	1500	1500	1500	850
Operating Position	Vertical, anode down	Vertical, anode up	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFc33.5-8/50	SFc33.5-8/50	SFa33.5/50	SFaX40-6/50
Base Cathode	SFc33.5-14/5	SFc33.5-14/50	SFa33.5-14.59	SFc32.5-6.7/50
Fig No	1	2	3	4
Symbols & Footnotes	28,86	28,92,98	71,86,99	28,89,92,100

PHOTO OPTIC DISCHARGE

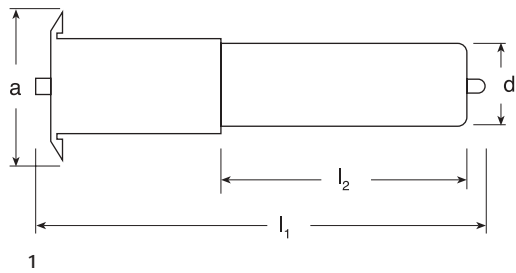
HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



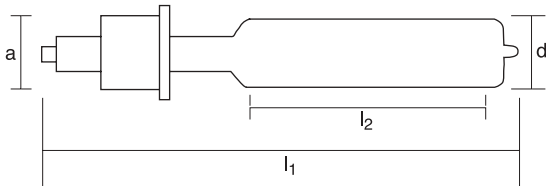
Ordering Abbreviation	HBO 3500 W/PIL	HBO 3501 W/PI	HBO 3501 W/PIL	HBO 4500 W/CIL	HBO 5500 W/PI
Product Number	69169	69127	69165	69162*	69164
Watts (W)	3400	3400	3400	4500	5000
Volts (V)	23	23	23	30	25
Type of Current	DC	DC	DC	DC	DC
Current (A)	148	148	148	148	200
Radiant Intensity 350..450 nm (mW/sr)					
Length l ₁ max (mm)	360	360	360	360	
Length l ₂ max (mm)	315	315	315	315	355
Distance a (mm)	154	154	154	154	154
Diameter d (mm)	77	77	77	77	85
Electrode Gap -- cold (mm)	4.5	4.5	4.5		5.5
Avg Rated Life (hrs)	1500	850	1500	1500	850
Operating Position	Vertical, anode up	Vertical, anode up	Vertical, anode up	Vertical, anode up	Vertical, anode up
Cooling	Forced Base	Forced Base	Forced Base	Forced Base	Forced Base
Base Anode	SFaX40-6/50	SFaX40-6/50	SFc32.5-6.7/50	SFAX40-6/50	SFcX 42.5-6/50
Base Cathode	SFc32.5-6.7/50	SFc32.5-6.7/50	SFaX40-6/50 with cable connection (M10)	SFC32.5-6.7/50	SFa 37.5-9/50
Fig No	1	1	1	1	2
Symbols & Footnotes	28,65,89,92	28,89,92	65,85,91,97,99,101,102,103	65,66	9,30,83,89,104

PHOTO OPTIC DISCHARGE

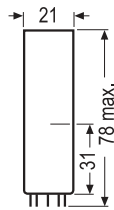
EXCIMER AND SPECTRAL LAMPS



1



2



3

EXCIMER - XERADEX

Ordering Abbreviation	XERADEX 20	XERADEX 20/HV	XERADEX 20/SY45/45
Product Number	69338	69352	69349
Watts (W)	20	20	20
Length l_1 max (mm)	245	245	300
Length l_2 max (mm)	120	120	125
Distance a (mm)	75	75	45
Diameter d (mm)	40	40	40
Avg Rated Life (hrs)	1500	1500	1500
Operating Position	Any	Any	Any
Fig No	1	1	2
Symbols & Footnotes	105,106,107,108	105,106,107,109	105,106,107,110

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	3		
Symbols & Footnotes	111,112		

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



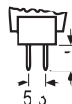
FaX1.5-3x1



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



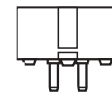
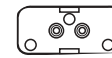
GZ6.35
IEC 7004-59 A
DIN 49754
2-pin



GZX9.5
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

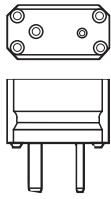


GY9.5
GZ9.5
DIN 49756
IEC 7004-70 B
2-pin
pre-focus

LAMP BASES



GX16d
2-pin



GY16
DIN 49758
IEC 7004-45
2-pin



GY17q
DIN 49758
IEC 7004-74
4-pin



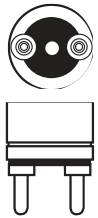
GY17t
DIN 49665
IEC 7004-45
4-pin



G22
IEC 7004-75
medium
Bipost



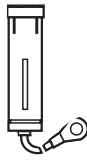
GY22
2-pin



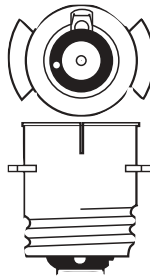
G38
IEC 7004-76
MOGUL
Bipost



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



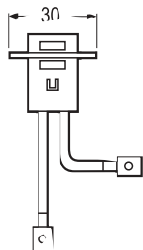
Pico9
DIN 41539



PG22-6.35
DIN 49751
IEC 7004-48



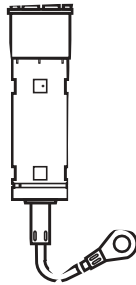
P28s
DIN 49728
IEC 7004-42
MOGUL
pre-focus



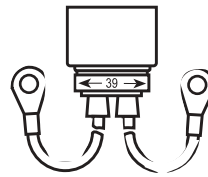
PK30d



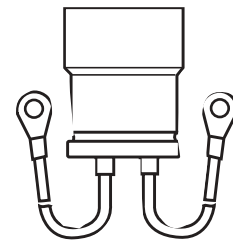
R7s
RX7s
DIN 49750
IEC 7004-92



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

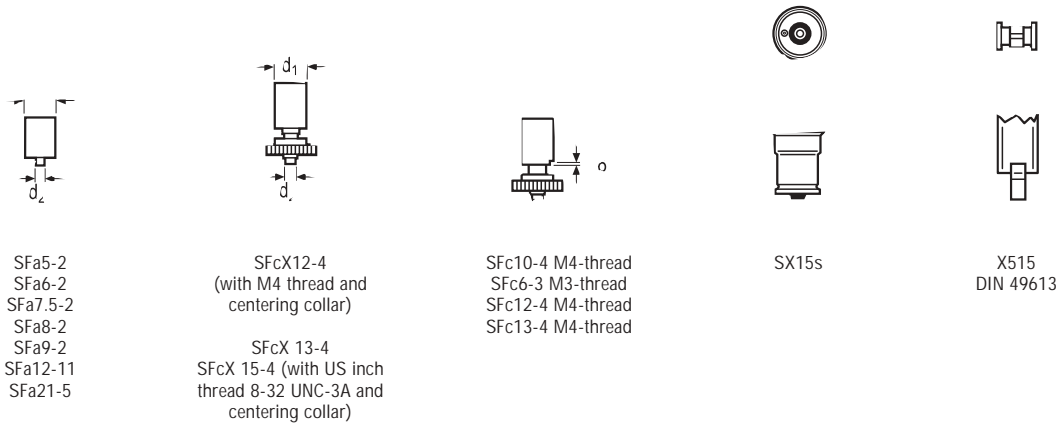
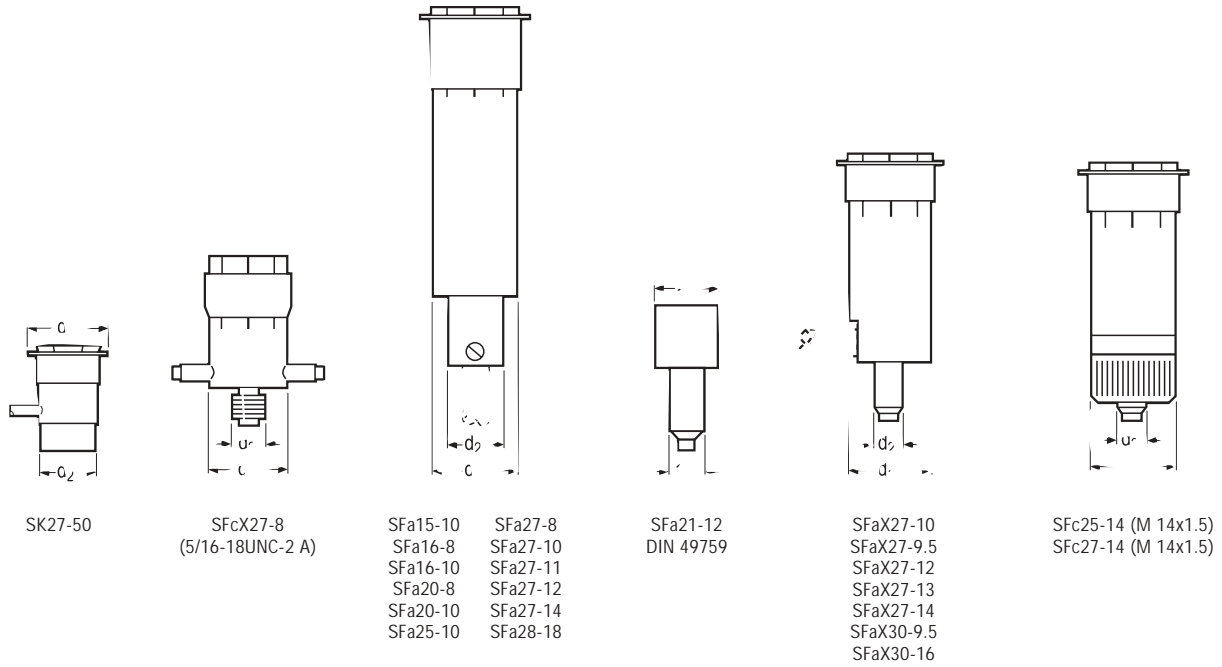


K39 d
with flexible Siaf cable
Length of cable 300 mm.
Hole of cable lug dia. 8.4 mm



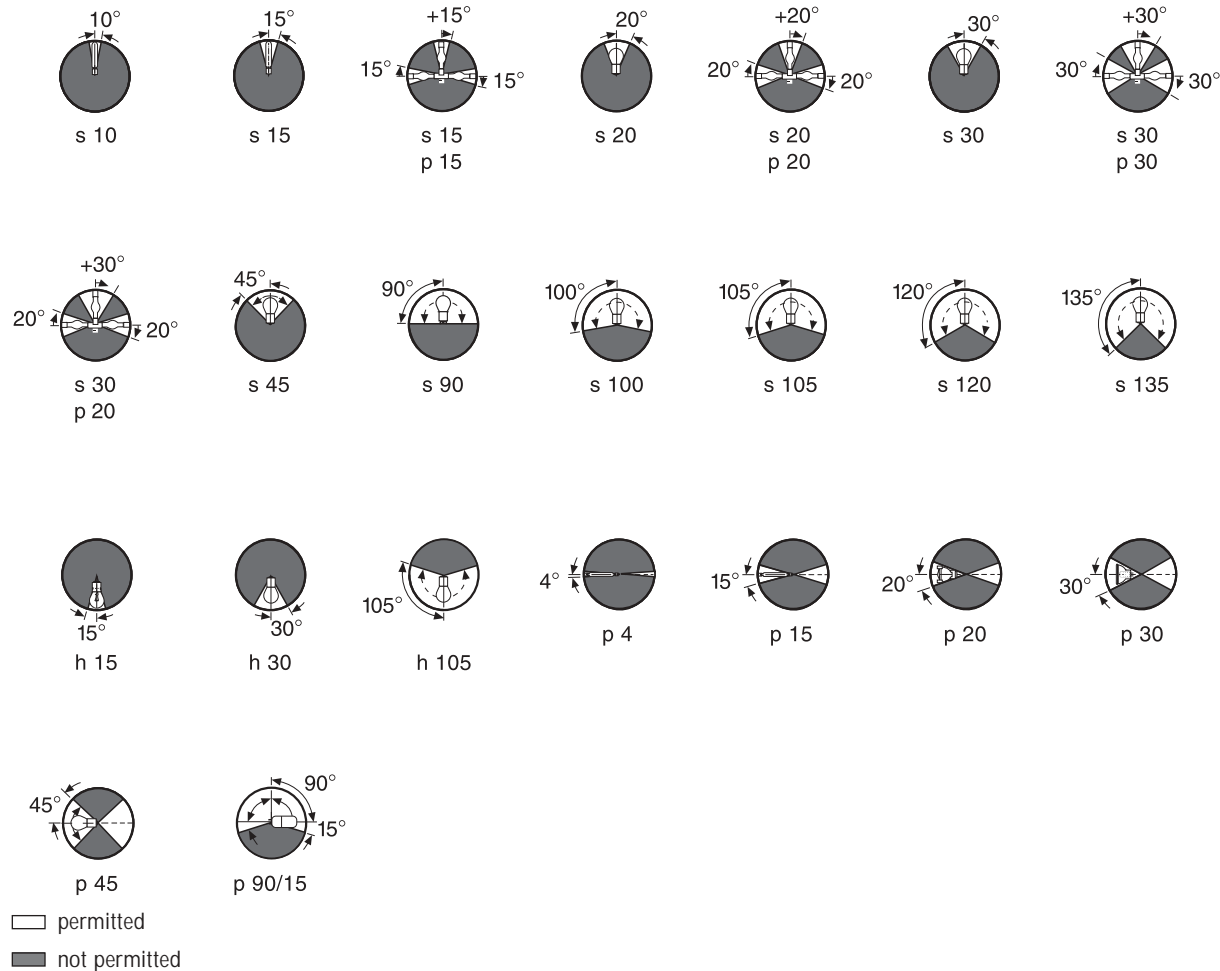
K59 d
with flexible Siaf cable
Length of cable 350 mm.
Hole of cable lug dia. 8.4 mm
DIN 49732

LAMP BASES



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®, OSRAM STUDIOLINE® 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	Base - filament connections: Pins 1 and 4.
2	Lamp has monoplane filament.
3	Lamp has internal proximity reflector.
4	Lumens refers to screen lumens.
5	Lamp also available as a 240V model (Product Number 54977).
6	Product number 54100 is the replacement for product number 54048.
7	Lamp service life 75hr life is defined at 76V with a duty cycle of 45 min. ON / 15 min. OFF.
8	Lamp suited for video camera heads; 500hr life @ 1.8V/ 45 min. ON / 15 min. OFF.
9	Lamp has round-core double filament.
10	h (Operating Position) = Vertical, base up
11	Lamp has a flat core filament with filament area perpendicular to the lamp axis.
12	Lamp also available in 240 V model.
13	Length I1 = Contact to contact.
14	Length I = Contact to contact.
15	Lamp also available as 115V model (Product Number 54636).
16	Lamp interchangeable with HX 600
17	Lamp has a biplane filament.
18	Lamp interchangeable with HX 602
19	High-performance HPL halogen lamps are manufactured under license from ETC, Inc.
20	Do not tilt perpendicular to the filament.
21	NSP=Narrow Spot
22	WFL=Wide Flood
23	VNSP=Very Narrow Spot.
24	MFL=Medium Flood
25	For use where seal temperature does not exceed 650F.
26	Life at rated voltage and at 650F maximum seal temperature.
27	Clean room ready packaging.
28	A suitable protective shield, screening technique, or both must be used to protect people and surroundings from the possibility of a lamp shattering and from possible ultraviolet radiation.
29	High temperature base. Retards seal deterioration where seal temperature exceeds 650F.
30	Usually limited to intermittent burning.
31	Average service life of lamp if operated with 400W is 100 hrs.
32	Snap-on connector, female / male contact.
33	Connector = Female, round, with 4mm pin.
34	Lamp also available with male connectors (Product Number 58722)
35	Female contact is according to DIN 46247.
36	Lamp also available with female connectors (Product Number 58697)
37	Male contacts according to DIN 46248.
38	Lamp also available with female connectors (Product Number 58721)
39	Lamp also available with female connectors (Product Number 58709)
40	This lamp type is twice the life of the ANSI standard version.
41	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).
42	Lamp also available with male contact according to DIN 46248. 64361/HLX Z (Product Number 58717)

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC HALOGEN LAMPS

Footnote	Description
43	This lamp type is twice the life of the standard version.
44	Max. Beam Candlepower (MBCP) : 175 kcd.
45	Lamp has snap-on male contact to DIN 46248.

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Symbol	Description
	New item introduced within the past year.
	Item will be discontinued when inventory is depleted.

Footnote	Description
1	Type of current: square-wave AC.
2	p (Operating Position) = Horizontal
3	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).*
4	Type of current: sine-wave (sinusoidal) AC.
5	In horizontal operation position it is recommended that the "lead connection" wire be in the top position with filler tip facing down.
6	Optimized lamp seal technology to withstand interior base temperatures of up to 450 degrees C.
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	Lamp filler tip needs to point upwards during operation.
13	Permitted wattage range: 300W to 600W.
14	Lamp arc needs to be in horizontal operating position.
15	Current bar needs to be positioned underneath the discharge arc during operation.
16	Lampholder for FaX 1.5 base = HMI Socket 46721 (Product Number 69302).
17	All HTI® lamps are hot restrikeable with the exception of HTI 150, HTI 152, HTI 405 W/SE, and 705 W/SE.
18	SE=Single Ended
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. HTI 250W/32 C (Product Number 54089).
23	When operated on electronic control gear (ECG) service life extended to 3000h.
24	Lamp HSD 250/78 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	Lamp has a elliptical reflector.
27	Lamp also available in ozone-free version XBO 75 W/2 OFR (Product Number 69232)
28	This lamp has positive pressure even when cold. Please read safety/warning instructions before using this lamp.
29	Distance a is from end of base to the respective electrode tip (cold) - see lamp drawing.
30	With vertical operating position: anode(+) on top.
31	OFR=Ozone Free
32	Lamp also available with connecting cable and plug-in contact. XBO R 100W/45 C OFR (Product Number 69191).
33	Lamp current not to exceed 7.2A.
34	The focus lies 45mm in front of the mounting rim (working distance).
35	C=Cable

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Footnote	Description
36	The connecting cables do not have a plug-in connector.
37	Lamp also available in ozone-free version XBO 150 W/1 OFR (Product Number 69235)
38	Lamp also available in Suprasil quartz glass version: XBO 150 W/4 (Product Number 69238).
39	Lamp uses Suprasil quartz glass.
40	Magnetic arc stabilization required.
41	Lamp is suitable for Crosfield color scanner (CR = Crosfield).
42	Lamp also available with connecting cable and plug-in contact. XBO 180W/45 C OFR (Product Number 69183).
43	Lamp focus is 60mm in front of reflector rim.
44	Lamp also available in ozone-free version XBO 450 W OFR (Product Number 69245)
45	Lamp also available in Suprasil quartz glass version XBO 450 W/4 (Product Number 69244)
46	Photometric data is measured in vertical operating position at rated wattage.
47	CA=Cable on anode base
48	TP=Threaded Pin
49	Lamp also available as XBO 2001 W/HTP OFR (Product Number 69310).
50	SHSC=Super short
51	Lamp has same dimensions as XBO 1600 W/HSC OFR (Product Number 69268).
52	Lamp also available as XBO 4200 W/GS with 60mm bulb diameter and 500 hrs life.
53	H=Suitable for horizontal operation
54	Magnetic arc stabilization: necessary for horizontal operation
55	Lamp XBO 10000 W/HS OFR also available with current control range 160-299 amps. Product Number 69342.
56	Lamp optimized for fluorescence microscopy.
57	Lamp also available with AMP plug contact. HBO R 103/45 C (Product Number 69311).
58	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.
59	Lamp also available with threaded pin 8-32 UNC-3A: HBO 200 W/2TM (Product Number 69223).
60	Technical data if operated on AC current: Volts=65, Lumens=10,000 lm, Luminous Efficacy=50 lm/W.
61	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.
62	Lamp also available with increased radiation in the wavelength range below 450nm for UV-curing. HBO 202W/4 (Product Number 69316).
63	2000hr warranty against non-passive lamp failure.
64	Lamp same as HBO 200 W/4 (Product Number 69224 but with increased radiation in the wavelength range below 450nm for UV-curing.
65	Lamp also available with 850 hrs (HBO 3500 W/PI, Product Number 69174)
66	Anode Base=Cooling fins with cable connection (M 8).
67	Anode and Cathode Base with UNC-3A thread.
68	Lamps suitable for pulse operation between 250W and 500W. Maximum permissible average power is 350W (also for constant power operation).
69	HBO 350W (Product Number 69226) replaces HBO 350 W/G (Product Number 69227).
70	Lamp service life is defined with a switch-on/switch off duty cycle of 12hours ON / 30 minutes OFF.
71	Maximum permitted base temperature: 200 degrees C (392 degrees F).
72	Lamp base(s) with M 5x0.9 thread.
73	Cathode base with M 5x 0.9 thread
74	Lamp anode base (hexagon) with thread M5x0.9
75	Anode Base=Hexagon base with M 6 thread.
76	Lamps suitable for pulse operation between 700W and 1000W. Maximum permissible average power is 750W (also for constant power operation).
77	Cathode Base=Sleeve base with M 6 thread.
78	Cathode base with cable connection (M 5)
79	Cathode Base with cooling fins.
80	Anode sleeve base without thread.

SYMBOLS & FOOTNOTES FOR PHOTO-OPTIC DISCHARGE LAMPS

Footnote	Description
81	Anode Base=Sleeve base with cable connection (M 5)
82	Anode Base=Sleeve base with cable connection (M 6).
83	Lamp has cooling fins on anode base.
84	Lamp also available as Longlife version HBO 1003 W/PIL (Product Number 69180) with 1500hr life.
85	Lamp also available as version HBO 1003 W/PI with 850hr life (Product Number 69195)
86	Anode Base with cable connection (M 8).
87	Lamp also available as Longlife version HBO 1500 W/CIL (Product Number 69179) with 1500hr life.
88	Cathode Base with cable connection (M 8).
89	Anode Base with cable connection (M 10).
90	Lamp also available as Longlife version HBO 1500 W/PIL (Product Number 69181) with 1500hr life.
91	Lamp also available with 850 hr HBO 1500 W/PI (Product Number 69319)
92	Lamp should not be ignited more than ten times over lifetime.
93	Lamp also available as version HBO 2001 W/CI with 850hr life (Product number 69219)
94	Lamp also available as version HBO 2001 W/CIL with 1500hr life (product number 69189)
95	Cathode Base with cable connection (M 6).
96	The average rated life of this lamp depends on the operating mode (initial power setting).
97	Lamp also available as version HBO 2500 W/PI with 850hr life (Product Number 69178)
98	Anode base with cable: length 340mm; connector 8/25.
99	Distance a = Distance (cold) of either anode base to anode tip or cathode base to cathode tip depending on lamp type.
100	Lamp also available as Longlife version HBO 3500 W/PIL with 1500hr life (Product Number 69169).
101	Average service life of lamp if operated with 400W is 100 hrs.
102	Also available with 850h, HBO 3501 W/PI: NAED 69127.
103	SHP - series (Super High Performance Technology).
104	Lamp life may vary depending on duty cycle and application.
105	The XERADEX® 20 lamp must be operated with DBD 20/110-240/ECG-XERADEX power supply (Product Number 69128 or 69129).
106	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 (VUV) radiation. This short-wave radiation will convert atmospheric oxygen (O ₂) surrounding the lamp into ozone (O ₃). 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).
107	XERADEX lamp life is rated in terms of 70% of initial UVC output on a continuous burn cycle.
108	Base is KF50 flange fitting; lamp is designed for use in vacuum environments at pressures above 300 mbar.
109	Base is KF50 flange fitting; lamp is designed for use in high vacuum environments at pressures above 200 mbar and below 10 ⁻³ mbar.
110	Base is KF40 flange fitting; lamp is designed for use in high vacuum environments at pressures above 30 mbar and below 10 ⁻³ mbar.
111	For Na 10 FL (product number 69284) use adapter no. 454/s using Pico 9 bases with P28 sockets.
112	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.

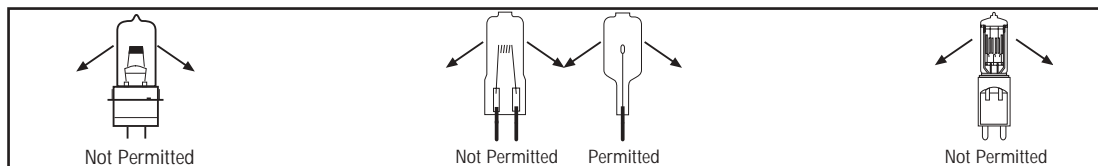
ALL OF THE FOLLOWING PROCEDURES MUST BE FOLLOWED FOR SAFETY AND TO OBTAIN SATISFACTORY LAMP PERFORMANCE.

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. Lamp users in North America may obtain specific state or province information concerning disposal regulations, toll free, by calling 1-866-666-6850.
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 (O₂) surrounding the lamp into ozone (O₃). Moreover, the oxygen molecules will link together with the nitrogen (N₂) 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. O₃ 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. Lamp users in North America may obtain specific state or province information concerning disposal regulations, toll free, by calling 1-866-666-6850.
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.



Lamp Contains Mercury

Manage in accordance with disposal laws
See www.lamprecycle.org or 1-866-666-6850

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. Lamp users in North America may obtain specific state or province information concerning disposal regulations, toll free, by calling 1-866-666-6850.
3. OSRAM SYLVANIA INC. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.



Lamp Contains Mercury

Manage in accordance with disposal laws
See www.lamprecycle.org or 1-866-666-6850

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.)

XBO® HIGH PRESSURE XENON LAMPS (continued)

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.

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. Lamp users in North America may obtain specific state or province information concerning disposal regulations, toll free, by calling 1-866-666-6850.
4. OSRAM SYLVANIA Products Inc. cannot advise lamp users as to general or specific disposal regulations for federal, state/provincial, and/or local municipalities.

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 upto 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.

HBO® HIGH PRESSURE MERCURY LAMPS (continued)

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.

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

HBO® HIGH PRESSURE MERCURY LAMPS (continued)

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 differ in their disposal requirements for lamps containing mercury.
2. Lamp users in North America may obtain specific state or province information concerning disposal regulations, toll free, by calling 1-866-666-6850.



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.

Lamp Disposal Labeling

The following information appears on the packages and/or stuffer of mercury-containing Photo-Optic lamps. For more information on lamp disposal labeling, see the inside back cover of this catalog.



Index by Ordering Abbreviation

Type	Page
10000/T6/RTFSS	179
1000T3Q/IR 230-250V	179
1000T6QRT/PX	179
1000TQ/RT/CR/BULK	179
120/T4/SPECIAL	175
1200T3Q/IR/CL/HT 144V	179
15000/T6/RTPGS	179
1600T3Q/IR 240V	179
1600T3Q/IR 277V	179
1600T3Q/IR/7 240V	179
220T4Q/2PPF	175
235T4Q/2PPF	176
2500T3Q/IR 480V	179
2500T3Q/IR/7 480V	179
350PAR56/SP	179
3650T3Q/IR/CL 480V	179
3800T3Q/IR 570V	179
4515 PAR36 30W	178
4551	179
4557	180
4559	179
500T3Q/IR 120V	179
500T3Q/IR/7 120V	179
5557	180
6.6A/100T4/64341/HLX	180
6.6A/100T4/64341Z/HLX	180
6.6A/100T4/64342/HLX	180
6.6A/105MR16/64339A	180
6.6A/105MR16/64339B	180
6.6A/105MR16/64339C	180
6.6A/115T4Q/58798/2PPF/EVW	180
6.6A/115T4Q/DCR/DL	180
6.6A/150T4/64361/HLX	180
6.6A/150T4Q/64354/EWR/DL	180
6.6A/150T4Q/64361Z/HLX	180
6.6A/175T4Q/58799/2PPF/DL	180
6.6A/200PAR64/2	180
6.6A/200PAR64Q/2P	180
6.6A/200T4/64382/HLX	180
6.6A/200T4/64382A/HLX	180
6.6A/200T4Q/2PPF/58750/EZL/DL	180
6.6A/200T4Q/64386	181
6.6A/200T4Q/CL/DCR/DL	181
6.6A/200T5/CL/64380	181
6.6A/204T14/2P	181
6.6A/30MR16/64331A/SP	180
6.6A/30MR16/64331AC/FL	180
6.6A/30T10/1P	180
6.6A/30T3.5/64322/EXL/DL	180
6.6A/40MR11/64333B	180
6.6A/45MR16/64337A45-15	180
6.6A/45MR16/64337B45-15	180
6.6A/45T10/P	180
6.6A/45T3.5/64320/EXM	180
6.6A/45T3.5Q/64321	180
6.6A/45T3/CL/64315	180
6.6A/45T4/64319 FEMALE	180
6.6A/45T4/64319Z	180
6.6A/45T4/CL/64317	180
6.6A/48MR16/64337A48-15	180
6.6A/48MR16/64338AC	180

Ordering Abbreviation	Page
6.6A/65T4/64328Z/HLX	180
60T4QCL	175
62138 HLX	175
64223	175
64251 HLX	175
64255	175
64258 HLX	175
64260	175
64261	175
64265 HLX	175
64275	175
64501	178
64514	179
64515	178
64516/300T6/CL	179
64573	178
64575	178
64602	175
64611 HLX	175
64614	178
64617	175
64617S	175
64621 HLX	175, 179
64624	175
64635 HLX	175
64637	175
64638 HLX	175
64650	175
64654 HLX	175
64664 HLX	175
64665 HLX	175
70313 (390158)	176
70314 (390153)	176
70335 BULK	176
750/120/T5/RTP	179
8013	176
8017	176
8018	176
8025	176
8029	176
8100	176
85T3/RM	175
91645	176
BAA	172
BBA 118V	172
BCK	172
BCM	176
BHC/DYS/DVW	172
BHC/DYS/DVW/X	172
BHC/DYS/DVW-5	172
BRJ/EVB 64633 HLX	172
BRL 64610 HLX	172
BRL 64610 HLX BULK	172
BRN	172
BTL	176
BTM	176
BTN	176
BTP	176
BTR	176
BVA	172
BVE	172
BVM 64540	176
BVT	176
BWV	176
BWV	176
CAX	172

Ordering Abbreviation	Page
CBA	172
CXZ	176
CYV	176
CYX	176
DDK	172
DDL	172
DDM	172
DDS	172
DED	172
DEK/DFW	172
DNE	172
DNF	172
DNS/FMC	176
DNT/FMD	176
DPY	176
DTA	176
DTY	176
DVY	172
DWE	176
DWT	176
DXW	176
DYH	172
DZE	172
EBV 118V	172
ECA 120V	172
ECT 120V	172
EFM 64607	172
EFN 64615 HLX	172
EFP 64627 HLX	172
EFP/X 64629 HLX	172
EFR 64634 HLX	172
EFR-5/X 64620 HLX	172
EFX	176
EGE	176
EGG	176
EGJ	176
EKG	176
EGN	176
EGR	177
EGT	177
EGW 64535	177
EHA	172
EHC/EHB	177
EHD	177
EHE 64626 HLX	173
EHF	177
EHG	177
EHJ 64655 HLX	173
EHP	177
EHR	177
EHZ	177
EJA	173
EJG	177
EJL	173
EJM	173
EJV	173
EKB	177
EKE	173
EKE/X	173
EKP/ENA	173
ELC	173
ELC 64653 HLX	173
ELC-3/X	173
ELC-7/X	173
ELC-7/X BULK	173
ELC-HL	173

Ordering Abbreviation	Page
ELD	173
ELH	173
ELS	173
ELV	173
ELZ	173
EMG	173
EMMWEKS	173
ENG	173
ENH	173
ENH-5	173
ENL	173
ENX	173
ENX-5	173
ENX-7	173
EPR	173
EPS	173
EPS/230	173
EPT	173
EPV	173
EPX	174
EPZ	174
ERK BULK	174
ERM BULK	174
ESA/FHD 64225	174
ESB 64250 HLX	174
ETJ	174
EVA 64623 HLX	174
EVC 64657 HLX	174
EVD 64663 HLX	174
EVD 64663 HLX BULK	174
EVW	174
EXC/230	178
EXC/240	178
EXD/230	178
EXD/240	178
EXE/230	178
EXE/240	179
EXG/230	179
EXR	174
EXR BULK	174
EXW	174
EXY	174
EYB	174
EYB-5	174
EYB-7	174
EZE	174
FAD	177
FAL	177
FBV	174
FCB	177
FCM	177
FCR 64625 HLX	174
FCS 64640 HLX	174
FCS 64640 HLX BULK	174
FDA	177
FDB	177
FDN	177
FDS/DZE 64643	174
FDT 64628	174
FDV 64642 HLX	174
FEL	177
FEP/220	177
FEP/240	177
FER	177
FEV	177
FEX/230 64781	177

Ordering Abbreviation	Page
FEX/240 64781	177
FEY	177
FFJ	177
FFM	177
FFN	179
FFP	179
FFR	179
FFS	179
FFT	177
FHM	177
FHS	174
FKT/EYH	174
FKW	177
FLE	174
FLK	177
FLT	174
FMR	177
FNS 64512	174
FNT 64656PT HLX	174
FNT 64656PT HLX BULK	175
FRG	177
FRK	177
FRN 2000T8Q	179
FSG	175
FSH	177
FSX/230	175
FSY	175
FTK	177
FVL	177
FVM	177
FXL	175
FXL-HL	175
GCA	177
GCB	175
GCC	175
GCD	175
CKV	178
GLA 575/115/2000	178
GLC 575/115/300	178
GLF	178
HBO 100 W/2	204
HBO 1000 W/CEL	209
HBO 1000 W/D	210
HBO 1000 W/G	209
HBO 1000 W/NEL	209
HBO 1002 W/CEL	209
HBO 1002 W/NEL	210
HBO 1002 W/NIL	210
HBO 1003 W/P1	210
HBO 1003 W/PIL	210
HBO 103 W/2	205
HBO 1500 W/CI	211
HBO 1500 W/CIEL	211
HBO 1500 W/CIL	211
HBO 1500 W/P1	211
HBO 1500 W/PIL	211
HBO 200 W/2 L1	205
HBO 200 W/2 L2	205
HBO 200 W/2 TM L1	206
HBO 200 W/2 TM L2	206
HBO 200 W/4	206
HBO 200 W/DC	206
HBO 2000 W/NIL	212
HBO 2001 W/CIEL	212
HBO 2001 W/CIL	213
HBO 2001 W/NIEL	212

Index by Ordering Abbreviation (cont.)

Type	Page
HBO 2001 W/NIL	212
HBO 2002 W/MA	213
HBO 2002 W/NIL	212
HBO 201 W/HS-D2	207
HBO 2011 W/NIL	213
HBO 202 W/4	207
HBO 250 W/BY	208
HBO 250 W/HS	207
HBO 2500 W/PIL	213
HBO 2501 W/NIL	214
HBO 2510 W/NIL	214
HBO 2700 W/CIL	214
HBO 350 W	208
HBO 350 W/S	208
HBO 3500 W/PI	214
HBO 3500 W/PIL	215
HBO 3501 W/PI	215
HBO 3501 W/PIL	215
HBO 450 W/GS	208
HBO 4500 W/CIL	215
HBO 50 W AC L1	204
HBO 50 W AC L2	204
HBO 50 W/3	204
HBO 500 W/A	208
HBO 500 W/B	209
HBO 5500 W/PI	215
HBO R 103 W/45	205
HMI 1200 W/GS	183
HMI 1200 W/S	183
HMI 1200 W/SE	182
HMI 12000 W/GS	183
HMI 12000 W/SE	182
HMI 123 W	182
HMI 18000 W	183
HMI 200 W	183
HMI 200 W/SE	182
HMI 250 W/SE	182
HMI 2500 W/GS	183
HMI 2500 W/S	183
HMI 2500 W/SE	182
HMI 400 W/SE	182
HMI 4000 W	183
HMI 4000 W/SE	182
HMI 575 W/GS	183
HMI 575 W/SE	182
HMI 6000 W	183
HMI 6000 W/SE	182
HMP 400 DE	184
HMP 575 DE	184
HMP 575 SE	184
HPL375/115 (UCF)	178
HPL375/115/X (UCF)	178
HPL550/64 (UCF)	178
HPL550/77 (UCF)	178
HPL550/77/X (UCF)	178
HPL575/100 (UCF)	178
HPL575/115 (UCF)	178
HPL575/115/X (UCF)	178
HPL575/120 (UCF)	178
HPL575/120/X (UCF)	178
HPL575/230 (UCF)	178
HPL575/240 (UCF)	178
HPL750/115 (UCF)	178
HPL750/115/X (UCF)	178

Ordering Abbreviation	Page
HPL750/120 (UCF)	178
HPL750/120/X (UCF)	178
HPL750/230 (UCF)	178
HPL750/240 (UCF)	178
HPL750/77 (UCF)	178
HPR 575/115	178
HSD 150/70	189
HSD 200	189
HSD 250/60	189
HSD 250/78	189
HSD 575/72	189
HSR 1200/60	188
HSR 400/60	188
HSR 575/60	188
HSR 575/72	188
HSR 700/60	188
HTI 1200 W/SE	186
HTI 150 W	185
HTI 152 W	185
HTI 250 W/22	187
HTI 250 W/32	187
HTI 250 W/32C	187
HTI 250 W/SE	185
HTI 2500 W/SE	186
HTI 300 W/DEL	187
HTI 300 W/DX	187
HTI 400 W/24	187
HTI 400 W/SE	185
HTI 4000 W/DE	187
HTI 403 W/24	187
HTI 404 W/SE	185
HTI 405 W/SE	186
HTI 600 W/D	187
HTI 600 W/SE	186
HTI 700 W/DE	187
HTI 705 W/SE	186
HTI S 35/12	185
Na 10 FL	216
Q4559	179
Q4559X	180
Q4681	179
STUDIOLINE 55W/3200	178
STUDIOLINE 55W/5600	178
VIP R 273/45	190
VIP S 170/13	190
XBO 100 W OFR	191
XBO 1000 W/HS OFR	196
XBO 1000 W/HSC OFR	196
XBO 1000 W/HTP OFR	197
XBO 10000 W/C OFR	203
XBO 10000 W/HS OFR	203
XBO 150 W/1	192
XBO 150 W/1 OFR	192
XBO 150 W/4	192
XBO 150 W/CR OFR	193
XBO 150 W/S	193
XBO 1600 W OFR	197
XBO 1600 W/CA OFR	197
XBO 1600 W/HS OFR	197
XBO 1600 W/HSC OFR	197
XBO 2000 W/H OFR	198
XBO 2000 W/HS OFR	198
XBO 2000 W/HTP OFR	198
XBO 2000 W/SHSC OFR	198
XBO 2001 W/HTP OFR	198
XBO 250 W OFR	194

Ordering Abbreviation	Page
XBO 2500 W OFR	199
XBO 2500 W/HS OFR	199
XBO 3000 W/H OFR	199
XBO 3000 W/HS OFR	199
XBO 3000 W/HTP OFR	199
XBO 4000 W OFR	200
XBO 4000 W/HS OFR	200
XBO 4000 W/HTP OFR	200
XBO 4200 W/CA OFR	200
XBO 4200 W/GS OFR	200
XBO 450 W	194
XBO 450 W OFR	195
XBO 450 W/1	195
XBO 450 W/2 OFR	195
XBO 450 W/4	195
XBO 4500 W/HS	201
XBO 4500 W/HTP	201
XBO 500 W/H OFR	196
XBO 5000 W/H OFR	201
XBO 5000 W/HTP OFR	201
XBO 6000 W/HS OFR	202
XBO 6000 W/HTP OFR	202
XBO 6500 W	202
XBO 700 W/HS OFR	196
XBO 7000 W/HS OFR	202
XBO 7000 W/SHS OFR	203
XBO 75 W/2	191
XBO 75 W/2 OFR	191
XBO 8000 W/HS OFR	203
XBO 900 W OFR	196
XBO R 100 W/45 OFR	191
XBO R 100 W/45C OFR	191
XBO R 101 W/45C OFR	192
XBO R 180 W/45/OFR	193
XBO R 180 W/45C OFR	193
XBO R 181 W/45C OFR	194
XBO R 300 W/60C OFR	194
XERADEX 20	216
XERADEX 20/HV	216
XERADEX 20/SY45/45	216

Index by Product Number

Type	Page
11558	172
11560	172
11619	172
13365	172
14936	179
14974	179
14985	180
14988	180
14994	180
15399	179
17980	180
17981	180
17983	181
20607	178
20608	178
53997	176
53998	175
53999	175
54001	178
54007	179
54008	179
54019	174
54021	175
54022	175
54023	175
54025	174
54026	175
54027	175
54028	175
54031	174
54032	175, 179
54034	172
54035	172
54036	174
54038	173
54039	172
54041	174
54042	174
54044	174
54045	173
54046	175
54047	174
54050	175
54052	174
54054	174
54055	174
54056	175
54057	175
54058	175
54059	182
54060	183
54061	182
54062	182
54063	182
54066	183
54067	182
54068	183
54069	183
54070	182
54071	183
54072	182
54073	183
54074	183
54075	183

Product Number	Page
54078	185
54079	185
54080	187
54081	187
54083	187
54084	185
54087	186
54088	183
54089	187
54091	185
54098	183
54099	182
54100	174
54102	188
54103	174
54104	187
54106	185
54107	188
54112	187
54113	182
54115	188
54116	188
54117	187
54118	189
54119	189
54120	175
54121	175
54122	175
54123	172
54124	175
54125	175
54126	172
54129	189
54130	186
54133	187
54136	175
54137	182
54138	175
54139	186
54140	187
54141	186
54142	186
54143	187
54144	184
54145	184
54146	184
54167	189
54168	188
54170	189
54189	172
54192	172
54210	172
54211	172
54212	173
54214	175
54232	178
54233	175
54350	177
54383	174
54386	174
54388	174
54392	174
54393	174
54394	174
54400	175
54409	172

Index by Product Number (cont.)

Type	Page	Product Number	Page	Product Number	Page	Product Number	Page	Product Number	Page
54411	172	54625	178	54837	177	58729	175	69195	210
54412	177	54629	177	54840	173	58730	180	69197	191
54428	177	54631	177	54841	173	58758	180	69198	205
54430	175	54633	179	54842	173	58759	180	69199	213
54432	175	54636	177	54845	175	58771	173	69200	210
54434	177	54647	176	54868	172	58775	180	69205	208
54435	177	54648	176	54875	177	58777	180	69206	209
54436	177	54649	178	54897	175	58779	180	69208	209
54440	174	54652	176	54898	175	58782	173	69213	204
54441	177	54653	178	54899	175	58785	180	69214	204
54442	177	54654	176	54904	175	58786	173	69215	204
54446	174	54655	176	54912	175	58787	180	69217	204
54448	174	54656	176	54913	173	58789	180	69221	206
54455	174	54658	176	54916	173	58792	180	69222	205
54459	177	54659	176	54924	172	58794	180	69223	206
54460	178	54660	172	54926	173	58795	180	69224	206
54466	175	54662	177	54927	174	58813	180	69225	206
54471	177	54664	177	54928	174	58815	181	69226	208
54483	177	54673	172	54944	172	58816	180	69228	208
54488	177	54685	176	54957	173	58819	180	69231	191
54499	178	54686	176	54960	173	58821	181	69232	191
54500	176	54687	176	54975	173	58831	172	69233	191
54506	177	54688	176	54977	173	58860	177	69234	192
54507	178	54689	176	54979	174	58862	177	69235	192
54508	177	54690	176	54984	173	58936	177	69236	193
54510	177	54691	176	54986	173	58937	176	69237	193
54511	178	54692	176	54988	173	58939	175	69238	192
54512	177	54694	176	55050	174	58941	176	69239	194
54514	177	54696	176	55054	174	58942	177	69241	194
54515	177	54698	172	56214	179	59803	179	69242	195
54516	178	54706	176	56215	179	59822	179	69243	195
54518	177	54711	177	56216	179	59841	179	69244	195
54528	172	54716	176	56217	179	59850	179	69245	195
54532	177	54717	176	56220	180	59859	179	69246	208
54534	177	54723	174	56222	179	59860	179	69247	198
54546	179	54726	172	56223	180	59864	179	69248	199
54547	174	54729	172	56229	179	59867	179	69249	199
54549	178	54730	173	56232	178	59870	179	69250	199
54550	177	54732	173	56233	178	59934	179	69251	199
54559	177	54734	173	56234	179	59936	179	69252	199
54560	179	54737	172	56280	178	69000	185	69253	200
54561	172	54743	174	56281	178	69127	215	69254	200
54568	174	54745	173	56282	179	69162	215	69256	198
54570	177	54747	173	56283	178	69164	215	69257	196
54571	177	54752	179	58537	180	69165	215	69258	198
54574	177	54753	173	58545	180	69166	212	69260	196
54576	172	54755	172	58635	174	69167	194	69261	196
54580	172	54765	173	58636	178	69168	207	69263	196
54584	179	54776	173	58637	177	69169	215	69264	196
54585	172	54787	176	58638	176	69171	211	69265	197
54588	179	54804	173	58639	178	69172	213	69266	197
54589	177	54807	178	58640	178	69174	214	69267	197
54598	177	54810	173	58649	180	69175	209	69268	197
54602	178	54811	173	58697	180	69176	209	69269	197
54603	178	54812	172	58703	180	69177	209	69270	198
54604	178	54813	178	58704	180	69179	211	69273	210
54605	178	54814	173	58705	180	69180	210	69284	216
54611	178	54815	178	58706	180	69181	211	69287	212
54613	176	54816	173	58707	181	69182	205	69288	213
54614	178	54817	178	58708	180	69183	193	69289	214
54618	178	54822	178	58709	180	69184	194	69292	212
54619	178	54825	178	58711	180	69185	211	69294	200
54622	178	54828	173	58717	180	69186	193	69295	202
54623	178	54829	173	58722	180	69189	213	69296	200
		54835	172	58724	180	69190	192	69297	203
		54836	172	58726	180	69191	191	69298	202

Index by Product Number (cont.)		Index by ANSI Code		ANSI	Page	ANSI	Page
Product Number	Page	Type	Page				
69299	.214	BAA	.172	EHD	.177	EXY	.174
69301	.203	BBA	.172	EHE	.173	EYB	.174
69303	.212	BCK	.172	EHF	.177	EYB-5	.174
69306	.212	BCM	.176	EHG	.177	EYB-7	.174
69310	.198	BHC/DYS/DYV	.172	EJH	.173	EZE	.174
69311	.205	BHC/DYS/DYV/X	.172	EHP	.177	EZL	.180
69315	.201	BHC/DYS/DYV-5	.172	EHR	.177	FAD	.177
69316	.207	BRJ/EVB	.172	EHZ	.177	FAL	.177
69319	.211	BRL	.172	EJA	.173	FBV	.174
69320	.190	BRN	.172	EJG	.177	FCB	.177
69327	.190	BTL	.176	EJL	.173	FCM	.177
69336	.201	BTM	.176	EJM	.173	FCR	.174
69338	.216	BTN	.176	EJV	.173	FCS	.174
69339	.202	BTP	.176	EKB	.177	FDA	.177
69340	.202	BTR	.176	EKE	.173	FDB	.177
69342	.203	BVA	.172	EKE/X	.173	FDN	.177
69343	.208	BVE	.172	EKP/ENA	.173	FDS/DZE	.174
69344	.214	BVM	.176	ELC	.173	FDT 64628	.174
69347	.210	BVT	.176	ELC-3/X	.173	FDV	.174
69349	.216	BVV	.176	ELC-7/X	.173	FEL	.177
69350	.200	BVW	.176	ELC-7/X	.173	FEP/220	.177
69351	.203	CAX	.172	ELC-HL	.173	FEP/240	.177
69352	.216	CBA	.172	ELD	.173	FER	.177
69359	.201	CXZ	.176	ELH	.173	FEV	.177
69360	.201	CYV	.176	ELS	.173	FEX/230	.177
69364	.207	CYX	.176	ELV	.173	FEX/240	.177
74440	.172	DDK	.172	ELZ	.173	FEY	.177
76302	.176	DDL	.172	EMG	.173	FFJ	.177
76304	.176	DDM	.172	EMM/EKS	.173	FFM	.177
76305	.176	DDS	.172	ENG	.173	FFN	.179
76311	.176	DED	.172	ENH	.173	FFP	.179
76313	.176	DEK/DFW	.172	ENH-5	.173	FFR	.179
76314	.176	DNE	.172	ENL	.173	FFS	.179
76317	.176	DNF	.172	ENX	.173	FFT	.177
76319	.176	DNS/FMC	.176	ENX-5	.173	FHM	.177
76321	.176	DNT/FMD	.176	ENX-7	.173	FHS	.174
76362	.176	DPY	.176	EPR	.173	FHT/EYH	.174
		DTA	.176	EPS	.173	FKW	.177
		DTY	.176	EPS/230	.173	FLE	.174
		DVY	.172	EPT	.173	FLK	.177
		DWE	.176	EPV	.173	FLT	.174
		DWT	.176	EPX	.174	FMR	.177
		DXW	.176	EPZ	.174	FNS	.174
		DYH	.172	ERK	.174	FNT	.174, 175
		DZE	.172	ERM	.174	FRG	.177
		EBV	.172	ESA/FHD	.174	FRK	.177
		ECA	.172	ESB	.174	FRN	.179
		ECT	.172	ETJ	.174	FSG	.175
		EFM	.172	EVA	.174	FSH	.177
		EFN	.172	EVC	.174	FSX	.175
		EFP	.172	EVD	.174	FSY	.175
		EFP/X	.172	EVV	.180	FTK	.177
		EFR	.172	EVW	.174	FVL	.177
		EFR-5/X	.172	EWR	.180	FVM	.177
		EFX	.176	EXC/230	.178	FXL	.175
		EGE	.176	EXC/240	.178	FXL-HL	.175
		EGG	.176	EXD/230	.178	GCA	.177
		EGJ	.176	EXD/240	.178	GCB	.175
		EGK	.176	EXE/230	.178	GCC	.175
		EGN	.176	EXE/240	.179	GCD	.175
		EGR	.177	EXG	.179	GKV	.178
		EGT	.177	EXL	.180	GLA	.178
		EGW	.177	EXM	.180	GLC	.178
		EHA	.172	EXR	.174	GLF	.178
		EHC/EHB	.177	EXW	.174		
				EXY	.174		