

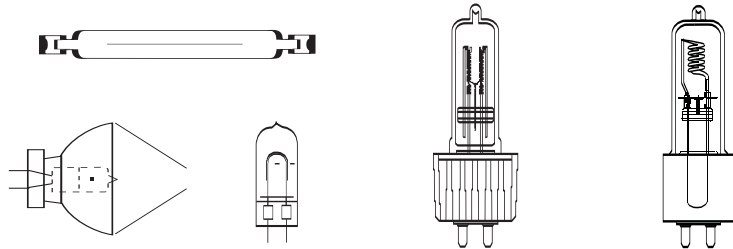
## OSRAM BRAND DISPLAY/OPTIC LIGHT SOURCES

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

### Display/Optic Lamp Types

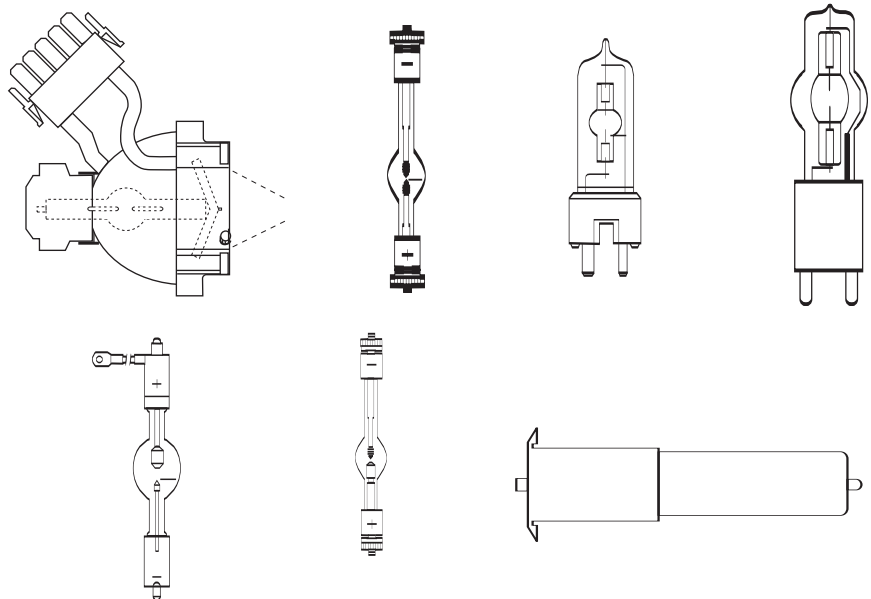
#### HALOGEN

**Airfield/Aircraft**  
**Audiovisual**  
**Special Purpose Heat Lamps**  
**Studio, Theatre, TV & Video**  
**aluPAR®**  
**HLX®**  
**HPL**  
**HPR®**  
**OSRAM STUDIOLINE®**  
**XENOPHOT®**



#### DISCHARGE

**HBO®**  
**HCD® 4ArXS**  
**HMI®**  
**HMP®**  
**HSD® 4ArXS**  
**HSR®**  
**HXP®**  
**HTI® SharXS®**  
**LINEX®**  
**P-VIP®**  
**VIP®**  
**XBO®**  
**XERADEX®**



#### IMPORTANT! DISPLAY/OPTIC WARNINGS

In accordance with ANSI/IESNA Standard RP-27, all Display/Optic Discharge lamps are Risk Group 3 products, and all Display/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 Display/Optic section.

# SOLUTIONS FOR TODAY

## UPGRADES FOR POPULAR PROJECTION LAMPS

| IF YOU ARE USING: | UPGRADE TO:       | BENEFITS                                       |
|-------------------|-------------------|------------------------------------------------|
| BHC/DYS/DYV       | BHC/DYS/DYV-5     | Double the life at 120V <sup>3</sup>           |
| EHJ 64655 HLX     | EHJ 64655 HLX /7X | Increase life by 14 times <sup>2</sup>         |
| EHJ 64655 HLX     | EVC 64657 HLX     | Increase life by 6 times <sup>2</sup>          |
| ELC               | ELC-HL            | Increase brightness by 150 lumens <sup>4</sup> |
| ENX               | ENX-5             | Double the life at 82V <sup>3</sup>            |
| ENX               | ENX-7             | Increase life by 2.5 times at 82V <sup>3</sup> |
| ENX               | FXL               | Increase light                                 |
| EVC 64657 HLX     | FNT 64656PT HLX   | Increase light by 10% <sup>1</sup>             |
| EVD 64663 HLX     | 64664 HLX         | Increase life by 3 times <sup>2</sup> at 36V   |
| EVD 64663 HLX     | 64665 HLX         | Increase life by 6 times <sup>2</sup> at 36V   |
| EYB               | EYB-5             | Double the life at 82V <sup>3</sup>            |
| EYB               | EYB-7             | Increase life by 2.5 times at 82V <sup>3</sup> |
| FCR 64625 HLX     | EVA 64623 HLX     | Increase life by 40 times <sup>2</sup>         |
| FCS 64640 HLX     | FDV 64642 HLX     | Increase life by 6 times <sup>2</sup>          |
| FXL or ENX        | FXL-HL            | Increase light <sup>1</sup>                    |

## TECHNICAL DATA

| Ordering Abbreviation | Product Number | Watts | Volts | Rated Life (hrs) | Fig. | Base   | "l" mm | "a" mm | "d" mm | Bulb Shape | Lumens           |
|-----------------------|----------------|-------|-------|------------------|------|--------|--------|--------|--------|------------|------------------|
| 64664 HLX             | 54273          | 400   | 36    | 150              | 2    | G6.35  | 57     | 36     | 18     | T6         | 14,500           |
| 64665 HLX             | 54274          | 400   | 36    | 300              | 2    | G6.35  | 60     | 36     | 18     | T6         | 12,200           |
| BHC/DYS/DYV           | 54836          | 600   | 120   | 75               | 3    | GZ9.5  | 64     | 36.5   | 20     | T6         | 17,500           |
| BHC/DYS/DYV-5         | 54835          | 600   | 125   | 75               | 3    | GZ9.5  | 63.5   | 36.5   | 20     | T6         | 17,500           |
| EHJ 64655 HLX         | 54254          | 250   | 24    | 50               | 2    | G6.35  | 55     | 33     | 13.5   | T4         | 10,000           |
| EHJ 64655 HLX/7X      | 54272          | 250   | 24    | 700              | 2    | G6.35  | 55     | 33     | 13.5   | T4         | 8,000            |
| ELC                   | 54840          | 250   | 24    | 50               | 1    | GX5.3  | 44.8   | 31.7   | 51     | T3.5       | 800 <sup>4</sup> |
| ELC 64653 HLX         | 54212          | 250   | 24    | 50               | 1    | GX5.3  | 44.5   | 35     | 51     | T3.5       | 800 <sup>4</sup> |
| ELC-3/X               | 54841          | 250   | 24    | 300              | 1    | GX5.3  | 44.8   | 31.7   | 51     | T3.5       | 550 <sup>4</sup> |
| ELC-7/X               | 54814          | 250   | 24    | 700              | 1    | GX5.3  | 44.8   | 31.7   | 51     | T3.5       | 475 <sup>4</sup> |
| ELC-HL                | 54804          | 250   | 24    | 50               | 1    | GX5.3  | 44.8   | 31.7   | 51     | T3.5       | 950 <sup>4</sup> |
| ENX                   | 54984          | 360   | 82    | 75               | 1    | GY5.3  | 45     | 299    | 51     | T3.5       | 460 <sup>4</sup> |
| ENX-5                 | 54913          | 360   | 86    | 75               | 1    | GY5.3  | 38.1   | 299    | 51     | T3.5       | 540 <sup>4</sup> |
| ENX-7                 | 54916          | 360   | 87.5  | 75               | 1    | GY5.3  | 38.1   | 299    | 51     | T3.5       | 540 <sup>4</sup> |
| EVA 64623 HLX         | 54251          | 100   | 12    | 2,000            | 2    | GY6.35 | 44     | 30     | 11.5   | T4         | 2,800            |
| EVC 64657 HLX         | 54255          | 250   | 24    | 300              | 2    | G6.35  | 55     | 33     | 13.5   | T4         | 9,000            |
| EVD 64663 HLX         | 54259          | 400   | 36    | 50               | 2    | G6.35  | 60     | 36     | 15     | T6         | 16,000           |
| EYB                   | 54446          | 360   | 82    | 75               | 4    | G5.3   | 57.2   | 31.8   | 11.2   | T3.5       | 10,000           |
| EYB-5                 | 54448          | 360   | 85.5  | 75               | 4    | G5.3   | 54     | 31.8   | 11.2   | T3.5       | 10,000           |
| EYB-7                 | 54455          | 360   | 87.5  | 75               | 4    | G5.3   | 57.2   | 31.8   | 11.2   | T3.5       | 10,000           |
| FCR 64625 HLX         | 54248          | 100   | 12    | 50               | 2    | GY6.35 | 44     | 30     | 11.5   | T3.5       | 3,600            |
| FCS 64640 HLX         | 54263          | 150   | 24    | 50               | 2    | G6.35  | 50     | 32     | 13.5   | T4         | 6,000            |
| FDV 64642 HLX         | 54264          | 150   | 24    | 300              | 2    | G6.35  | 50     | 32     | 13.5   | T4         | 5,000            |
| FNT 64656PT HLX       | 54253          | 275   | 24    | 75               | 2    | G6.35  | 55     | 33     | 13.5   | T4         | 10,000           |
| FXL                   | 54912          | 410   | 82    | 75               | 1    | GY5.3  | 38.1   | 299    | 51     | T3.5       | 640 <sup>4</sup> |
| FXL-HL                | 54904          | 410   | 82    | 40               | 1    | GY5.3  | 38.1   | 299    | 51     | T3.5       | 850 <sup>4</sup> |

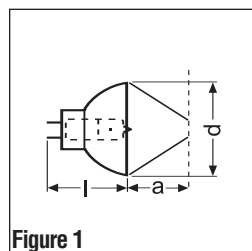


Figure 1

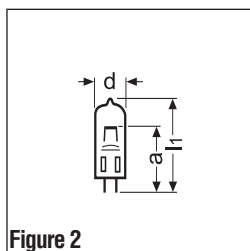


Figure 2

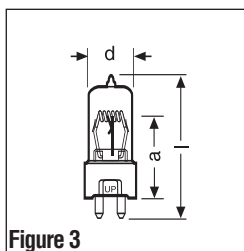


Figure 3

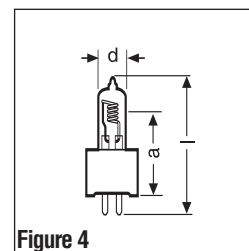


Figure 4

<sup>1</sup> Lamps designed for increased light output can have a reduced operating life

<sup>2</sup> Lamps designed with a longer operating life can produce fewer lumens

<sup>3</sup> Lamps operated at less than their rated voltage provide a longer life, reduced light output and lower color temperature. A 5% reduction in voltage can double lamp life, decrease luminous flux by 15% and decrease color temperature by 2%.

<sup>4</sup> Screen Lumens

## OSRAM Airfield Lamps

### Effective solutions for airfield lighting around the globe.



IRC Reflector



IRC PK30d



PK30d



R7s



GZ(Y)9.5

OSRAM lamps for the airfield lighting industry provide reliable solutions for complex optical systems. State-of-the-art manufacturing yields high quality lamps with precision filament alignment that is required in these demanding applications.

#### Why are airfield lighting systems necessary?

- Aviation safety
- Essential visual guidance for approach
- Landing
- Taxiing and take-off

#### Tungsten halogen technology

Reliability, longevity, and reasonable maintenance costs account for the success of tungsten halogen lamps as light sources for demanding airfield lighting applications.

#### Pre-focus technique

Simple replacement and easy adjustment reduces maintenance costs.

#### IRC technology (Infrared Reflective Coating)

The innovative IRC technology increases the efficiency of halogen lamps by reflecting a major part of the generated unwanted IR radiation back to the coil where it is converted into visible light. The infrared reflective coating at the outside of the burner acts as an IR mirror but lets nearly 100% of visible light pass.

- More light output
- Less electrical power
- Increased lifetime
- or
- A mix of all

#### Xenophot® technology (HLX)

Using xenon instead of krypton as the filling gas increases the luminous efficacy of a lamp- that's our basic idea behind our XENOPHOT technology.



## OSRAM aluPAR® Lamps with aluminum reflector *lighter, brighter, cooler*



**Seeing is believing!**

Don't get weighed down with old technology!

### Features and Benefits

- Tungsten halogen aluPAR lamps are made with an aluminum reflector which makes them up to 50% lighter than standard glass PAR lamps.
  - Lower transportation costs
  - Easier handling
- aluPAR is an environmentally preferable ECOLOGIC® product
- Fully compatible with current market standards



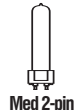
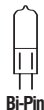
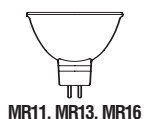
### Applications

- Stage, Studio, Film
- Concert/Disco lighting touring
- Architectural lighting



**SEE THE WORLD IN A NEW LIGHT OSRAM**





MR11, MR13, MR16

A21, A23

Bi-Pin

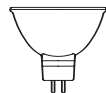
Med 2-pin

GZ9.5

PS25

## AUDIOVISUAL

| ANSI Code | Product Number | Ordering Abbreviation     | Application                              | Watts | Volts | Base       | Lumens | Avg Rated Life(hrs) | Bulb   | Pkg Qty | Footnotes |
|-----------|----------------|---------------------------|------------------------------------------|-------|-------|------------|--------|---------------------|--------|---------|-----------|
| BAA       | 54924          | <b>BAA</b>                | Projector                                | 75    | 28    | GX5.3      |        | 2000                | MR16   | 24      |           |
| BBA       | 11619          | <b>BBA 118V</b>           | Photoflood No.1/Enlarger & Printer       | 250   | 120   | Med        | 8700   | 4                   | A21    | 12      |           |
| BRJ/EVB   | 54250          | <b>BRJ/EVB 64633 HLX</b>  | Projector, Microfilm, Microscope, Studio | 150   | 15    | G6.35      | 5600   | 50                  | T3.25  | 40      | 58        |
| BRL       | 54249          | <b>BRL 64610 HLX</b>      | Projector, Microfilm, Microscope, Studio | 50    | 12    | G6.35      | 1600   | 50                  | T3     | 40      | 58        |
| BRN       | 54698          | <b>BRN</b>                | Projector                                | 1200  | 120   | G17t       |        | 20                  | T7     | 24      | 13,58     |
| BVE       | 54812          | <b>BVE</b>                | Projector, Microfilm, Stage & Studio     | 625   | 120   | GY9.5      |        | 50                  | T6     | 24      | 58        |
| CAX       | 58831          | <b>CAX</b>                | Projector, Microfilm, Microscope, Studio | 50    | 120   | DC Bayonet | 750    | 250                 | T4     | 24      |           |
| DDL       | 54660          | <b>DDL</b>                | Projector - Microfilm                    | 150   | 20    | GX5.3      |        | 500                 | MR16   | 24      | 117       |
| DDM       | 54737          | <b>DDM</b>                | Projector - Slide                        | 80    | 19    | GX5.3      | 400    | 50                  | MR16   | 24      | 117       |
| DDS       | 54944          | <b>DDS</b>                | Projector - Microfilm                    | 80    | 21    | GX5.3      |        | 1000                | MR16   | 24      | 117       |
| DED       | 54726          | <b>DED</b>                | Projector - Microfilm                    | 85    | 13.8  | GX5.3      | 150    | 1000                | MR16   | 24      | 60,117    |
| DNE       | 54409          | <b>DNE</b>                | Projector                                | 150   | 120   | G7.9       | 100    | 15                  | TB16   | 24      | 60,117    |
| DNF       | 54411          | <b>DNF</b>                | Projector - 8mm                          | 150   | 21    | GX7.9      | 300    | 25                  | MR18   | 24      | 60,117    |
| DYH       | 54561          | <b>DYH</b>                | Projector, Stage & Studio                | 600   | 120   | G5.3       | 17000  | 75                  | T6     | 24      |           |
| DZE/FDS   | 54755          | <b>DZE/FDS</b>            | Projector, Microfilm, Stage & Studio     | 150   | 24    | GZ9.5      | 4000   | 100                 | T4     | 24      |           |
| EBV       | 11558          | <b>EBV 118V</b>           | Super Photoflood/ No.2                   | 500   | 120   | Med        | 17800  | 8                   | PS25   | 24      |           |
| ECA       | 13365          | <b>ECA 120V</b>           | Super Photoflood                         | 250   | 120   | Med Brass  | 6500   | 20                  | A23    | 24      |           |
| ECT       | 11560          | <b>ECT 120V</b>           | Photoflood                               | 500   | 120   | Med        | 13650  | 60                  | PS25/5 | 24      |           |
| EFM       | 54123          | <b>EFM 64607</b>          | Projector - 8mm                          | 50    | 8     | GZ6.35     |        | 50                  | MR16   | 20      | 60,117    |
| EFN       | 54126          | <b>EFN 64615 HLX</b>      | Projector - 8mm                          | 75    | 12    | GZ6.35     |        | 50                  | MR16   | 20      | 60,117    |
| EFP       | 54189          | <b>EFP 64627 HLX</b>      | Projector - 8mm                          | 100   | 12    | GZ6.35     |        | 50                  | MR16   | 20      | 60,117    |
| EFP/X     | 54192          | <b>EFP/X 64629 HLX</b>    | Projector - 8mm                          | 100   | 12    | GZ6.35     |        | 600                 | MR16   | 20      | 60,117    |
| EFR       | 54210          | <b>EFR 64634 HLX</b>      | Projector - 8mm                          | 150   | 15    | GZ6.35     |        | 50                  | MR16   | 20      | 60,117    |
| EFR-5/X   | 54211          | <b>EFR-5/X 64620 HLX</b>  | Projector - 8mm                          | 150   | 15    | GY6.35     |        | 500                 | MR16   | 20      | 60,117    |
| EHA       | 54585          | <b>EHA</b>                | Projector, Microfilm, Stage & Studio     | 500   | 120   | GY9.5      |        | 50                  | T6     | 24      | 13        |
| EHE       | 54038          | <b>EHE 64626 HLX</b>      | Projector                                | 100   | 12    | PG22       | 3600   | 50                  | T4     | 30      | 58        |
| EHJ       | 54254          | <b>EHJ 64655 HLX</b>      | Projector, Microfilm, Microscope, Studio | 250   | 24    | G6.35      | 10000  | 50                  | T4     | 40      | 58        |
| EHJ       | 54231          | <b>EHJ 64655 HLX BULK</b> | Projector, Microfilm, Microscope, Studio | 250   | 24    | G6.35      | 10000  | 50                  | T4     | 250     |           |
| EHJ       | 54272          | <b>EHJ 64655 HLX/7X</b>   | Projector, Microfilm, Microscope, Studio | 250   | 24    | G6.35      | 8000   | 700                 | T4     | 24      | 58        |
| EJA       | 54753          | <b>EJA</b>                | Projector - Fiber-optics                 | 150   | 21    | GX5.3      | 354    | 40                  | MR16   | 24      | 117       |
| EJL       | 54730          | <b>EJL</b>                | Projector - 16mm Color printer           | 200   | 24    | GX5.3      | 725    | 50                  | MR16   | 24      | 117       |
| EJM       | 54747          | <b>EJM</b>                | Projector - 8mm                          | 150   | 21    | GX5.3      | 170    | 40                  | MR16   | 24      | 117       |
| EJV       | 54732          | <b>EJV</b>                | Projector - 8mm, Printer                 | 150   | 21    | GX5.3      | 270    | 100                 | MR16   | 24      | 117       |



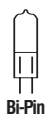
MR11, MR13, MR16



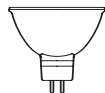
Bi-Pin

## AUDIOVISUAL

| ANSI Code | Product Number | Ordering Abbreviation   | Application                                     | Watts | Volts | Base   | Lumens | Avg Rated Life(hrs) | Bulb | Pkg Qty | Footnotes |
|-----------|----------------|-------------------------|-------------------------------------------------|-------|-------|--------|--------|---------------------|------|---------|-----------|
| EKE       | 54842          | <b>EKE</b>              | Projector - 8mm, Fiber-Optics                   | 150   | 21    | GX5.3  | 160    | 200                 | MR16 | 24      | 117       |
| EKE/X     | 58771          | <b>EKE/X</b>            | Projector - 8mm, Fiber-Optics                   | 150   | 21    | GX5.3  | 80     | 1000                | MR16 | 24      | 117       |
| EKP/ENA   | 54734          | <b>EKP/ENA</b>          | Projector - 8mm                                 | 80    | 30    | GX5.3  | 115    | 25                  | MR16 | 24      | 117       |
| ELC       | 54840          | <b>ELC</b>              | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 800    | 50                  | MR16 | 24      | 117       |
|           | 54804          | <b>ELC-HL</b>           | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 950    | 50                  | MR16 | 24      | 117       |
|           | 54212          | <b>ELC 64653 HLX</b>    | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 900    | 50                  | MR16 | 20      | 60,117    |
|           | 54841          | <b>ELC-3/X</b>          | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 550    | 300                 | MR16 | 24      | 117       |
|           | 54814          | <b>ELC-7/X</b>          | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 475    | 700                 | MR16 | 24      | 117       |
|           | 54811          | <b>ELC-7/X BULK</b>     | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 475    | 700                 | MR16 | 100     | 117       |
|           | 54366          | <b>ELC-10 64659 HLX</b> | Overhead projection, fiber-optic, entertainment | 250   | 24    | GX5.3  | 400    | 1000                | MR16 | 20      | 117       |
| ELD       | 54745          | <b>ELD</b>              | Projector - Microfilm                           | 150   | 21    | GX5.3  | 350    | 40                  | MR16 | 24      | 117       |
| ELH       | 54776          | <b>ELH</b>              | Projector - Overhead                            | 300   | 120   | GY5.3  | 525    | 35                  | MR16 | 24      | 58,117    |
| ENG       | 54957          | <b>ENG</b>              | Projector                                       | 300   | 120   | GY5.3  | 690    | 15                  | MR16 | 24      | 58,117    |
| ENH       | 54986          | <b>ENH</b>              | Projector - Slide                               | 250   | 120   | GY5.3  | 340    | 175                 | MR16 | 24      | 58,117    |
| ENH       | 55002          | <b>ENH SPOT</b>         | Projector - Slide                               | 250   | 120   | GY5.3  | 340    | 175                 | MR16 | 24      | 58,117    |
| ENH-5     | 54988          | <b>ENH-5</b>            | Projector - Overhead                            | 250   | 125   | GY5.3  | 340    | 175                 | MR16 | 24      | 58,117    |
| ENL       | 58786          | <b>ENL</b>              | Projector - Display, Fiber-Optics               | 50    | 12    | GX5.3  | 85     | 4000                | MR16 | 24      | 117       |
| ENX       | 54984          | <b>ENX</b>              | Projector - Overhead                            | 360   | 82    | GY5.3  | 460    | 75                  | MR16 | 24      | 58,117    |
| ENX-5     | 54913          | <b>ENX-5</b>            | Projector - Overhead                            | 360   | 86    | GY5.3  | 540    | 75                  | MR16 | 24      | 117       |
| ENX-7     | 54916          | <b>ENX-7</b>            | Projector - Overhead                            | 360   | 87.5  | GY5.3  | 540    | 75                  | MR16 | 24      | 117       |
| EPT       | 58782          | <b>EPT</b>              | Projector - Fiber-Optics                        | 42    | 10.8  | GX5.3  |        | 8000                | MR16 | 24      |           |
| EPX       | 54927          | <b>EPX</b>              | Projector - Microfilm                           | 90    | 14.5  | GX5.3  | 43     | 500                 | MR16 | 24      | 60,117    |
| EPZ       | 54743          | <b>EPZ</b>              | Projector - Microfilm                           | 50    | 13.8  | GX5.3  | 80     | 3000                | MR16 | 24      | 60,117    |
| ESA/FHD   | 54260          | <b>ESA/FHD 64225</b>    | Projector                                       | 10    | 6     | G4     | 200    | 100                 | T3   | 40      |           |
| ESB       | 54261          | <b>ESB 64250 HLX</b>    | Projector                                       | 20    | 6     | G4     | 480    | 100                 | T3.5 | 40      |           |
| ETJ       | 54928          | <b>ETJ</b>              | Projector                                       | 250   | 120   | GY5.3  | 600    | 175                 | MR16 | 24      | 58,117    |
| EVA       | 54251          | <b>EVA 64623 HLX</b>    | Projector, Microfilm, Microscope, Studio        | 100   | 12    | GY6.35 | 2800   | 2000                | T4   | 40      | 58        |
| EVC       | 54255          | <b>EVC 64657 HLX</b>    | Projector, Microfilm, Microscope, Studio        | 250   | 24    | G6.35  | 9000   | 300                 | T4   | 40      | 58        |
| EVD       | 54259          | <b>EVD 64663 HLX</b>    | Projector, Microfilm, Studio                    | 400   | 36    | GX6.35 | 16000  | 50                  | T6   | 40      | 58        |
| EVW       | 54723          | <b>EVW</b>              | Projector                                       | 250   | 82    | GY5.3  | 390    | 50                  | MR16 | 24      | 58,117    |
| EXR       | 54392          | <b>EXR</b>              | Projector - Slide                               | 300   | 82    | GX5.3  | 925    | 35                  | MR13 | 24      | 58,117    |
| EXW       | 54388          | <b>EXW</b>              | Projector - Slide                               | 300   | 82    | GX5.3  | 1050   | 15                  | MR13 | 24      | 58,117    |
| EXY       | 54394          | <b>EXY</b>              | Projector - Slide                               | 250   | 82    | GX5.3  | 400    | 200                 | MR13 | 24      | 58,117    |



Bi-Pin



MR11, MR13, MR16



Med 2-pin



GZ9.5



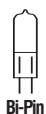
B15d



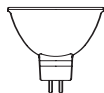
E14

## AUDIOVISUAL

| ANSI Code | Product Number | Ordering Abbreviation | Application                              | Watts | Volts | Base       | Lumens | Avg Rated Life(hrs) | Bulb | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------|------------------------------------------|-------|-------|------------|--------|---------------------|------|---------|-----------|
| EYB       | 54446          | <b>EYB</b>            | Projector, Stage & Studio                | 360   | 82    | G5.3       | 10000  | 75                  | T3.5 | 24      | 58        |
| EYB-5     | 54448          | <b>EYB-5</b>          | Projector, Microfilm, Stage & Studio     | 360   | 85.5  | G5.3       | 10000  | 75                  | T3.5 | 24      | 58        |
| EYB-7     | 54455          | <b>EYB-7</b>          | Projector, Microfilm, Stage & Studio     | 360   | 87.5  | G5.3       | 10000  | 75                  | T3.5 | 24      | 58        |
| EZE       | 54386          | <b>EZE</b>            | Projector, Stage & Studio                | 150   | 82    | GX5.3      | 350    | 150                 | MR13 | 24      | 58,117    |
| FCR       | 54248          | <b>FCR 64625 HLX</b>  | Projector, Microfilm, Microscope, Studio | 100   | 12    | GY6.35     | 3600   | 50                  | T3.5 | 40      | 58        |
| FCS       | 54263          | <b>FCS 64640 HLX</b>  | Projector                                | 150   | 24    | G6.35      | 6000   | 50                  | T4   | 40      | 58        |
| FDS/DZE   | 54277          | <b>FDS/DZE 64643</b>  | Projector, Microfilm, Microscope, Studio | 150   | 24    | GY9.5      | 5000   | 100                 | T5   | 12      | 58        |
| FDT       | 54276          | <b>FDT 64628</b>      | Projector, Stage & Studio                | 100   | 12    | GY9.5      | 3000   | 50                  | T4   | 12      | 58        |
| FDV       | 54264          | <b>FDV 64642 HLX</b>  | Projector, Microfilm, Microscope, Studio | 150   | 24    | G6.35      | 5000   | 300                 | T4   | 40      | 58        |
| FHS       | 54979          | <b>FHS</b>            | Projector - Slide                        | 300   | 82    | GX5.3      | 650    | 70                  | MR16 | 24      | 58,117    |
| FKT/EYH   | 54547          | <b>FKT/EYH</b>        | Projector - Video Camera                 | 250   | 120   | G5.3       | 5400   | 200                 | T6   | 24      |           |
| FLE       | 54383          | <b>FLE</b>            | Projector                                | 360   | 82    | GY5.3      | 1250   | 75                  | MR16 | 24      | 9,117     |
| FNS       | 58849          | <b>FNS 64512</b>      | Projector, Stage & Studio                | 300   | 120   | GX6.35     | 9300   | 15                  | T6   | 12      | 58        |
| FNT       | 54044          | <b>FNT 64656 HLX</b>  | Projector, Microfilm, Microscope, Studio | 275   | 24    | G6.35      | 10000  | 75                  | T4   | 100     | 58        |
| FNT       | 54253          | <b>FNT 64656 HLX</b>  | Projector, Microfilm, Microscope, Studio | 275   | 24    | G6.35      | 10000  | 75                  | T4   | 40      | 58        |
| FSX       | 54897          | <b>FSX/230</b>        | Projector                                | 400   | 230   | GY9.5      |        | 75                  | T6   | 24      | 13,58     |
| FSY       | 54898          | <b>FSY</b>            | Projector                                | 400   | 240   | GY9.5      |        | 75                  | T6   | 24      | 13,58     |
| FXL       | 54912          | <b>FXL</b>            | Projector - Overhead                     | 410   | 82    | GY5.3      | 640    | 75                  | MR16 | 24      | 58,117    |
| FXL-HL    | 54904          | <b>FXL-HL</b>         | Projector - Overhead                     | 410   | 82    | GY5.3      | 850    | 40                  | MR16 | 24      | 58,117    |
| GCB       | 54430          | <b>GCB</b>            | Projector, Stage & Studio, Video         | 200   | 30    | G5.3       | 5300   | 200                 | T3   | 24      |           |
|           | 54246          | <b>14V/35W/M/GZ4</b>  | Medical Overhead Projection              | 35    | 14    | GZ4        |        | 50                  | MR11 | 20      | 58,117    |
|           | 58729          | <b>60T4QCL</b>        | Medical Overhead Illumination            | 60    | 24    | DC Bayonet | 1280   | 500                 | T4   | 12      |           |
|           | 54400          | <b>85T3/RM</b>        | Projector                                | 85    | 82    | GX5.3      |        | 40                  | MR16 | 24      | 117       |
|           | 54466          | <b>120/T4/SPECIAL</b> | Projector                                | 120   | 24    | Special    | 2750   | 500                 | T4   | 24      |           |
|           | 58939          | <b>220T4Q/2PPF</b>    | Medical Overhead Illumination            | 220   | 22    | GY9.35     | 6200   | 200                 | T4   | 12      |           |
|           | 58941          | <b>235T4Q/2PPF</b>    | Medical Overhead Illumination            | 235   | 33    | GZ9.5      | 5800   | 200                 | T4   | 12      |           |
|           | 76311          | <b>8013</b>           | Projector                                | 10    | 6     | BA15d      |        | 200                 |      | 100     | 59        |
|           | 76313          | <b>8017</b>           | Projector                                | 15    | 6     | B15d       |        | 1000                |      | 100     |           |
|           | 76314          | <b>8018</b>           | Projector                                | 15    | 6     | B15d       |        | 100                 |      | 100     | 34,59     |
|           | 76321          | <b>8100</b>           | Projector                                |       | 5     | E14        |        | 600                 |      | 100     | 58        |
|           | 54256          | <b>62138 HLX</b>      | Projector                                | 100   | 12    | G6.35      | 2800   | 50                  | T3   | 40      | 60        |



Bi-Pin



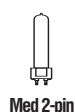
MR11, MR13, MR16



Med 2-pin

## AUDIOVISUAL

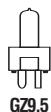
| ANSI Code | Product Number | Ordering Abbreviation | Application                              | Watts | Volts | Base     | Lumens | Avg Rated Life(hrs) | Bulb  | Pkg Qty | Footnotes     |
|-----------|----------------|-----------------------|------------------------------------------|-------|-------|----------|--------|---------------------|-------|---------|---------------|
|           | 54050          | 64223                 | Projector                                | 10    | 6     | G4       | 150    | 300                 | T3    | 100     |               |
|           | 54245          | 64223                 | Projector                                | 10    | 6     | G4       | 150    | 300                 | T3    | 40      |               |
|           | 54021          | 64251 HLX             | Projector                                | 20    | 6     | PG22     | 500    | 100                 | T3    | 30      |               |
|           | 54122          | 64255                 | Projector                                | 20    | 8     | GZX4     |        | 50                  | MR11  | 20      | 60,117        |
|           | 54901          | 64258 AHLX            | Projector                                | 20    | 12    | G4       | 350    | 2000                | T3    | 40      | 58            |
|           | 54262          | 64258 HLX             | Projector                                | 20    | 12    | G4       | 350    | 2000                | T3    | 40      | 58            |
|           | 54022          | 64260                 | Projector                                | 30    | 12    | PG22     | 800    | 50                  | T3    | 30      |               |
|           | 54247          | 64261                 | Projector                                | 30    | 12    | G6.35    | 750    | 50                  | T3.25 | 40      |               |
|           | 53999          | 64265 HLX             | Projector                                | 30    | 6     | G4       | 765    | 100                 | T2    | 100     |               |
|           | 54606          | 64265 HLX             | Projector                                | 30    | 6     | G4       | 765    | 100                 | T2    | 40      |               |
|           | 54258          | 64275                 | Projector                                | 35    | 6     | G4       | 780    | 50                  | T3    | 40      |               |
|           | 54301          | 64291 XIR 40W         | Medical                                  | 40    | 22.8  | G6.35    | 1200   | 600                 |       | 40      | 59,203        |
|           | 54302          | 64292 XIR 150W        | Medical                                  | 150   | 22.8  | G6.35    | 6000   | 600                 |       | 40      | 59,203        |
|           | 54275          | 64513                 | Projector, Stage & Studio                | 300   | 120   | GX6.35   | 7700   | 150                 | T6    | 12      | 58            |
|           | 54354          | 64514                 | Projector, Stage & Studio                | 300   | 120   | GX6.35   | 8100   | 75                  | T6    | 12      | 58            |
|           | 58524          | 64515                 | Projector, Stage & Studio                | 300   | 230   | GX6.35   | 9600   | 15                  | T6    | 12      | 58            |
|           | 54356          | 64516                 | Projector, Stage & Studio                | 300   | 230   | GX6.35   | 7400   | 75                  | T6    | 12      | 11,58,202,211 |
|           | 54138          | 64602                 | Projector, Microfilm, Microscope, Studio | 50    | 12    | G6.35    | 1000   | 1100                | T3.25 | 100     | 58            |
|           | 54607          | 64602                 | Projector, Microfilm, Microscope, Studio | 50    | 12    | G6.35    | 1000   | 1100                | T3.25 | 40      | 58            |
|           | 54028          | 64611 HLX             | Projector                                | 50    | 12    | G6.35    | 1350   | 100                 | T3.25 | 100     | 58            |
|           | 54608          | 64611 HLX             | Projector                                | 50    | 12    | G6.35    | 1350   | 100                 | T3.25 | 40      | 58            |
|           | 54124          | 64617                 | Projector                                | 75    | 12    | G5.3-4.8 |        | 25                  | MR11  | 20      | 60,117        |
|           | 54121          | 64617 SPOT            | Projector                                | 75    | 12    | G5.3-4.8 |        | 25                  | MR11  | 20      | 60,117        |
|           | 54032          | 64621 HLX             | Projector, Microfilm, Stage & Studio     | 100   | 12    | PG22     | 2750   | 2000                | T3    | 30      | 58            |
|           | 54125          | 64624                 | Projector                                | 100   | 12    | G5.3-4.8 |        | 25                  | MR11  | 20      | 60,117        |
|           | 54233          | 64635 HLX             | Projector, Fiber-Optic                   | 150   | 15    | GZ6.35   |        | 50                  | MR16  | 20      | 60,117        |
|           | 54214          | 64637                 | Projector                                | 100   | 12    | GZ6.35   |        | 1500                | MR16  | 20      | 58,117        |
|           | 54252          | 64638 HLX             | Projector                                | 100   | 24    | G6.35    | 2900   | 300                 | T3    | 40      |               |
|           | 54257          | 64650                 | Projector, Microfilm, Microscope, Studio | 50    | 23    | G6.35    | 1000   | 1300                | T4    | 40      |               |
|           | 54278          | 64654 HLX             | Projector, Microfilm, Microscope, Studio | 250   | 24    | GY9.5    | 9000   | 300                 | T6    | 12      | 58            |
|           | 54273          | 64664 HLX             | Projector, Microfilm, Microscope, Studio | 400   | 36    | G6.35    | 14500  | 150                 | T6    | 12      | 58,267        |
|           | 54274          | 64665 HLX             | Projector, Microfilm, Microscope, Studio | 400   | 36    | G6.35    | 400    | 300                 | T6    | 12      | 58            |
|           | 54303          | 64668 XIR 80W         | Medical                                  | 80    | 22.8  | G6.35    | 3000   | 750                 |       | 40      | 59,203        |
|           | 76305          | 70313 (390158)        | Special Purpose                          | 30    | 6     | P47d     |        |                     |       | 100     |               |
|           | 76304          | 70314 (390153)        | Special Purpose                          | 25    | 6     | P47d     |        |                     |       | 100     |               |



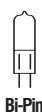
Med 2-pin



A21, A23



G29.5



Bi-Pin



P28s



P40s



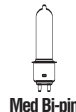
PAR36



R7s, RX7s



G22



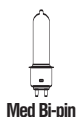
Med Bi-pin

## AUDIOVISUAL

| ANSI Code | Product Number | Ordering Abbreviation | Application                                     | Watts | Volts | Base    | Lumens | Avg Rated Life(hrs) | Bulb | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------|-------------------------------------------------|-------|-------|---------|--------|---------------------|------|---------|-----------|
|           | 76302          | <b>70335 BULK</b>     | Special Purpose                                 | 27    | 6     | Special |        |                     |      | 200     |           |
|           | 54793          | <b>JCP 650W/100V</b>  | Overhead projection, fiber-optic, entertainment | 650   | 100   | GY9.5   | 18750  | 100                 | T6   | 12      |           |

## STUDIO, THEATRE, TV & VIDEO

| ANSI Code     | Product Number | Ordering Abbreviation       | Color Temp (K) | Watts | Volts | Base   | Lumens | Avg Rated Life(hrs) | Bulb  | Pkg Qty | Footnotes |
|---------------|----------------|-----------------------------|----------------|-------|-------|--------|--------|---------------------|-------|---------|-----------|
| BCA           | 11655          | <b>BCA 118V</b>             | 4800           | 250   | 120   | Medium | 8912   | 12                  | A21   | 12      |           |
| BHC/DYS/DYV   | 54836          | <b>BHC/DYS/DYV</b>          |                | 600   | 120   | G29.5  | 17500  | 75                  | T6    | 24      | 58        |
| BHC/DYS/DYV-5 | 54835          | <b>BHC/DYS/DYV-5</b>        |                | 600   | 125   | G29.5  | 17500  | 75                  | T6    | 24      | 16,58     |
| BCM           | 54694          | <b>BCM</b>                  | 3200           | 20000 | 230   | G38    | 580000 | 350                 | T32   | 1       | 58        |
| BTL           | 54685          | <b>BTL</b>                  | 3050           | 500   | 120   | P28s   | 11000  | 750                 | T6    | 12      |           |
| BTM           | 54686          | <b>BTM</b>                  | 3200           | 500   | 120   | P28s   | 13000  | 100                 | T6    | 12      | 58        |
| BTN           | 54687          | <b>BTN</b>                  | 3200           | 750   | 120   | P28s   | 17000  | 500                 | T7    | 12      | 58        |
| BTP           | 54688          | <b>BTP</b>                  | 3200           | 750   | 120   | P28s   | 20000  | 200                 | T7    | 12      |           |
| BTR           | 54689          | <b>BTR</b>                  | 3200           | 1000  | 120   | P28s   | 27500  | 250                 | T6    | 12      | 58        |
| BVM           | 58827          | <b>BVM 64540</b>            | 3400           | 650   | 230   | GZ6.35 | 20000  | 15                  | T8    | 12      | 11        |
| BVT           | 54690          | <b>BVT</b>                  | 3050           | 1000  | 120   | P40s   | 23000  | 500                 | T7    | 6       |           |
| BWV           | 54691          | <b>BWV</b>                  | 3200           | 1000  | 120   | P40s   | 27500  | 200                 | T6    | 6       |           |
| BWV           | 54692          | <b>BWV</b>                  | 3200           | 2000  | 120   | P40s   | 59000  | 280                 | T9.5  | 6       |           |
| CXZ           | 54717          | <b>CXZ</b>                  | 3200           | 1500  | 120   | G38    | 38500  | 325                 | T8    | 6       |           |
| CYV           | 54706          | <b>CYV</b>                  | 3200           | 1000  | 120   | G38    | 27500  | 200                 | T7    | 6       |           |
| CYX           | 54613          | <b>CYX</b>                  | 3200           | 2000  | 120   | G38    | 55000  | 300                 | T11   | 6       | 58        |
| DNS/FMC       | 54655          | <b>DNS/FMC</b>              | 3050           | 500   | 120   | P28s   | 11000  | 500                 | T6    | 24      |           |
| DPY           | 54647          | <b>DPY</b>                  | 3200           | 5000  | 120   | G38    | 143000 | 500                 | T17   | 1       | 58        |
| DTA           | 54716          | <b>DTA</b>                  | 3200           | 1500  | 120   | P40s   | 39000  | 100                 | T8    | 6       |           |
| DTY           | 54696          | <b>DTY</b>                  | 3200           | 10000 | 120   | G38    | 290500 | 350                 | T24   | 1       | 58        |
| DWE           | 54500          | <b>DWE</b>                  | 3200           | 650   | 120   | G53    | 24000  | 100                 | PAR36 | 1       |           |
| DWT           | 58937          | <b>DWT</b>                  | 3000           | 1000  | 120   | RX7s   | 22000  | 2000                | T6    | 12      |           |
| DXW           | 53997          | <b>DXW</b>                  | 3200           | 1000  | 120   | R7s    | 28000  | 150                 | T5    | 12      | 101       |
|               | 58497          | <b>DYS/300</b>              | 3200           | 300   | 120   | G29.5  | 7500   | 100                 | T4    | 24      |           |
| ECR           | 54702          | <b>ECR 64815 CP/83 230V</b> | 3200           | 10000 | 230   | G38    | 280000 | 400                 | T22   | 6       | 58        |
| EFX           | 54787          | <b>EFX</b>                  | 3000           | 500   | 120   | G22    | 10000  | 2000                | T5    | 12      |           |
| EGE           | 54648          | <b>EGE</b>                  | 3000           | 500   | 120   | P28s   | 10000  | 2000                | T5    | 12      |           |
| EGG           | 54652          | <b>EGG</b>                  | 3000           | 750   | 120   | P28s   | 15000  | 2000                | T5    | 12      |           |
| EGJ           | 54654          | <b>EGJ</b>                  | 3200           | 1000  | 120   | P28s   | 25500  | 400                 | T6    | 12      |           |
| EGK           | 54656          | <b>EGK</b>                  | 3200           | 1000  | 120   | P28s   | 24500  | 400                 | T6    | 12      |           |
| EGN           | 54659          | <b>EGN</b>                  | 3200           | 500   | 120   | G22    | 13000  | 100                 | T6    | 12      | 58        |
| EGR           | 54662          | <b>EGR</b>                  | 3200           | 750   | 120   | G22    | 20000  | 200                 | T7    | 12      | 58        |
| EGT           | 54664          | <b>EGT</b>                  | 3200           | 1000  | 120   | G22    | 27500  | 250                 | T6    | 12      | 58        |
| EGW           | 58510          | <b>EGW 64535</b>            | 3400           | 650   | 120   | GY6.35 | 20000  | 15                  | T8    | 12      |           |
| EHC/EHB       | 54506          | <b>EHC/EHB</b>              | 3200           | 500   | 120   | G9.5   | 13000  | 300                 | T4    | 12      |           |



Med Bi-pin



R7s, RX7s



G29.5



Bi-Pin



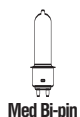
G22



Med 2-pin

## STUDIO, THEATRE, TV &amp; VIDEO

| ANSI Code | Product Number | Ordering Abbreviation       | Color Temp (K) | Watts | Volts | Base       | Lumens | Avg Rated Life (hrs) | Bulb | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------------|----------------|-------|-------|------------|--------|----------------------|------|---------|-----------|
| EHD       | 54508          | <b>EHD</b>                  | 3000           | 500   | 120   | G9.5       | 10600  | 2000                 | T4   | 12      |           |
| EHF       | 54510          | <b>EHF</b>                  | 3300           | 750   | 120   | G9.5       | 20400  | 300                  | T5   | 12      |           |
| EHG       | 54512          | <b>EHG</b>                  | 3000           | 750   | 120   | G9.5       | 15400  | 2000                 | T5   | 12      |           |
| EHP       | 58942          | <b>EHP</b>                  | 2900           | 300   | 120   | R7s        | 5000   | 2500                 | T4   | 12      |           |
| EHR       | 58936          | <b>EHR</b>                  | 3000           | 400   | 120   | R7s        | 7500   | 2000                 | T4   | 12      |           |
| EJG       | 54598          | <b>EJG</b>                  | 3200           | 750   | 120   | R7s        | 20600  | 400                  | T3   | 12      | 60        |
| EKB       | 54837          | <b>EKB</b>                  | 3200           | 420   | 120   | G29.5      | 11000  | 75                   | T6   | 24      | 58        |
| FAD       | 54574          | <b>FAD</b>                  | 3200           | 650   | 120   | R7s        | 16500  | 100                  | T4   | 12      |           |
| FAL       | 58860          | <b>FAL</b>                  | 3200           | 420   | 120   | R7s        | 11000  | 75                   | T4   | 24      | 24        |
| FCB       | 54483          | <b>FCB</b>                  | 3200           | 600   | 120   | R7s        | 16500  | 75                   | T4   | 24      |           |
| FCM       | 54442          | <b>FCM</b>                  | 3200           | 1000  | 120   | R7s        | 28000  | 400                  | T3   | 12      | 60        |
| FDA       | 54471          | <b>FDA</b>                  | 3200           | 400   | 120   | R7s        | 10400  | 250                  | T4   | 12      | 24        |
| FDB       | 54435          | <b>FDB</b>                  | 3200           | 1500  | 120   | R7s        | 41200  | 400                  | T4   | 12      | 60        |
| FDG       | 54387          | <b>64579 115-120V</b>       | 3200           | 1000  | 120   | R7s        | 33000  | 15                   | T4   | 12      | 12        |
| FDN       | 54534          | <b>FDN</b>                  | 3200           | 500   | 120   | R7s        | 12800  | 400                  | T2.5 | 12      | 60        |
| FEL       | 54570          | <b>FEL</b>                  | 3200           | 1000  | 120   | G9.5       | 27500  | 300                  | T6   | 12      |           |
| FEP       | 54515          | <b>FEP/240</b>              | 3200           | 1000  | 240   | G9.5       | 23000  | 150                  | T6   | 12      |           |
| FER       | 54571          | <b>FER</b>                  | 3200           | 1000  | 120   | RX7s       | 27500  | 500                  | T6   | 12      |           |
| FEV       | 54441          | <b>FEV</b>                  | 3200           | 200   | 120   | DC Bayonet | 5500   | 50                   | T4   | 12      |           |
| FEX       | 54514          | <b>FEX/230</b>              | 3200           | 2000  | 230   | RX7s       | 50000  | 300                  | T8   | 12      | 11        |
| FEX       | 54518          | <b>FEX/240</b>              | 3200           | 2000  | 240   | RX7s       | 50000  | 300                  | T8   | 12      |           |
| FEY       | 54559          | <b>FEY</b>                  | 3200           | 2000  | 120   | RX7s       | 57400  | 400                  | T8   | 12      |           |
| FFJ       | 54488          | <b>FFJ</b>                  | 3200           | 600   | 120   | R7s        | 16500  | 75                   | T4   | 24      | 24        |
| FFM       | 58862          | <b>FFM</b>                  | 3200           | 420   | 120   | R7s        | 11000  | 75                   | T4   | 24      | 24        |
| FFT       | 54350          | <b>FFT</b>                  | 3200           | 1000  | 120   | R7s        | 27000  | 300                  | T3   | 12      |           |
| FHM       | 54532          | <b>FHM</b>                  | 3200           | 1000  | 120   | R7s        | 27300  | 300                  | T3   | 12      | 60        |
| FKJ       | 54681          | <b>FKJ CP/71</b>            | 3200           | 1000  | 230   | G22        | 26000  | 200                  | T6   | 20      | 58        |
| FKK       | 54699          | <b>FKK CP/73</b>            | 3200           | 2000  | 230   | G38        | 52000  | 400                  | T11  | 1       | 58        |
| FKW       | 54711          | <b>FKW</b>                  | 3200           | 300   | 120   | GY9.5      | 7800   | 200                  | T6   | 24      | 58        |
| FLK       | 54589          | <b>FLK</b>                  | 3200           | 575   | 115   | G9.5       | 16500  | 300                  | T5   | 12      | 188       |
| FLK       | 54551          | <b>FLK/X 115V</b>           | 3200           | 575   | 115   | G9.5       | 10000  | 2000                 | T5   | 12      | 188       |
|           | 54549          | <b>FLK PLUS HPR 575/115</b> | 3200           | 575   | 115   | G9.5       | 16500  | 300                  | T6   | 12      | 187       |
| FMR       | 54412          | <b>FMR</b>                  | 3000           | 600   | 120   | GY9.35     | 12500  | 2000                 | T5   | 24      |           |
| FRG       | 54629          | <b>FRG</b>                  | 3200           | 500   | 120   | GY9.35     | 13000  | 150                  | T6   | 24      | 58        |
| FRK       | 54631          | <b>FRK</b>                  | 3200           | 650   | 120   | GY9.5      | 16900  | 200                  | T7   | 24      | 58        |
| FRL       | 54638          | <b>FRL CP/89</b>            | 3200           | 650   | 230   | GY9.5      | 16250  | 150                  | T7   | 25      | 58        |
| FSH       | 54436          | <b>FSH</b>                  | 3200           | 125   | 120   | G5.3       | 2500   | 200                  | T3   | 24      |           |
| FTK       | 54875          | <b>FTK</b>                  | 3200           | 500   | 120   | GY9.5      | 12000  | 200                  | T6   | 24      | 58        |
| FVL       | 54459          | <b>FVL</b>                  | 3200           | 200   | 120   | GX5.3      | 5200   | 200                  | T4   | 24      |           |
| FVM       | 54900          | <b>FVM</b>                  | 3200           | 105   | 120   | GX5.3      | 2250   | 250                  | T4   | 24      |           |
| GCA       | 54428          | <b>GCA</b>                  | 3200           | 250   | 120   | G5.3       | 5700   | 200                  | T3   | 24      |           |
| GLA       | 54516          | <b>GLA 575/115/2000</b>     | 3050           | 575   | 115   | G9.5       | 10500  | 2000                 | T6   | 12      | 18        |



Med Bi-pin



Bi-Pin



S11



S14



R7s, RX7s



PAR36



A21, A23



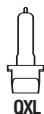
HPL



G22

## STUDIO, THEATRE, TV & VIDEO

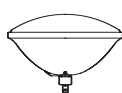
| ANSI Code | Product Number | Ordering Abbreviation | Color Temp (K) | Watts | Volts | Base         | Lumens | Avg Rated Life(hrs) | Bulb  | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------|----------------|-------|-------|--------------|--------|---------------------|-------|---------|-----------|
| GLC       | 54507          | GLC 575/115/300       | 3250           | 575   | 115   | G9.5         | 15500  | 300                 | T6    | 12      | 18,20     |
| GLD       | 54522          | GLD 750/115/300       | 3250           | 750   | 115   | G9.5         | 19000  | 300                 | T6    | 12      | 18        |
| GLE       | 54523          | GLE 750/115/1500      | 3050           | 750   | 115   | G9.5         | 17400  | 1500                | T6    | 12      |           |
| GLF       | 54460          | GLF                   | 3100           | 235   | 230   | G5.3         | 5100   | 100                 | T4    | 24      |           |
|           | 11624          | 111A                  | 2900           | 75    | 120   | SC Bayonet   | 1120   | 15                  | S11   | 24      |           |
|           | 11625          | 140                   | 2900           | 75    | 120   | Medium       | 1150   | 35                  | S14   | 24      |           |
|           | 58930          | 150/25T4              | 2700           | 150   | 25    | R7s          | 2700   | 3000                | T4    | 25      |           |
|           | 55052          | 20PAR36/CAP/WFL       |                | 20    | 12    | G53          |        | 4000                | PAR36 | 12      |           |
|           | 11657          | 211 118V              | 3200           | 75    | 120   | Medium       | 1215   | 200                 | A21   | 12      |           |
|           | 11656          | 212 118V              | 3050           | 150   | 120   | Medium       | 2700   | 200                 | A21   | 12      |           |
|           | 54499          | 4515 PAR36 30W        |                | 30    | 6     | G53          | 67000  | 100                 | PAR36 | 12      |           |
|           | 54001          | 64501                 | 3400           | 150   | 120   | GX6.35       | 4500   | 25                  | T4    | 25      |           |
|           | 58639          | 64573                 | 3400           | 1000  | 120   | GX6.35       | 33000  | 15                  | T8    | 25      |           |
|           | 58958          | 64573                 | 3400           | 1000  | 120   | GZ6.35       | 33000  | 15                  | T8    | 12      |           |
|           | 58525          | 64575                 | 3400           | 1000  | 230   | GX6.35       | 33000  | 15                  | T8    | 12      |           |
|           | 54232          | 64614                 |                | 75    | 12    | G5.3-4.8     |        | 25                  | T2.5  | 20      | 60        |
|           | 54701          | 64805 CP/85 (CP/29)   | 3200           | 5000  | 230   | G38          | 135000 | 400                 | T19   | 1       | 58        |
|           | 58497          | DYS/300               | 3200           | 300   | 115   | GZ9.5        | 7500   | 100                 | T6    | 24      |           |
|           | 54625          | HPL 375/115 (UCF)     | 3200           | 375   | 115   | Sp Med Bipin | 10540  | 300                 | T6    | 12      | 26        |
|           | 54649          | HPL 375/115/X (UCF)   | 2950           | 375   | 115   | Sp Med Bipin | 8000   | 1000                | T8    | 12      | 26        |
|           | 54623          | HPL 550/77 (UCF)      | 3265           | 550   | 77    | Sp Med Bipin | 16170  | 300                 | T6    | 12      | 26        |
|           | 54604          | HPL 550/77/X (UCF)    | 3065           | 550   | 77    | Sp Med Bipin | 12160  | 1500                | T6    | 12      | 26        |
|           | 54622          | HPL 575/115 (UCF)     | 3265           | 575   | 115   | Sp Med Bipin | 16520  | 300                 | T6    | 12      | 26        |
|           | 54807          | HPL 575/115/X (UCF)   | 3065           | 575   | 115   | Sp Med Bipin | 12360  | 1500                | T6    | 12      | 26        |
|           | 54817          | HPL 575/120 (UCF)     | 3265           | 575   | 120   | Sp Med Bipin | 16460  | 300                 | T6    | 12      | 26        |
|           | 54815          | HPL 575/120/X (UCF)   | 3050           | 575   | 120   | Sp Med Bipin | 12360  | 1500                | T6    | 12      | 26        |
|           | 54618          | HPL 575/230 (UCF)     | 3200           | 575   | 230   | Sp Med Bipin | 14900  | 400                 | T6    | 12      | 26        |
|           | 54665          | HPL 575/230/X (UCF)   | 3050           | 575   | 230   | Sp Med Bipin | 11780  | 1500                | T6    | 12      | 26        |
|           | 54619          | HPL 575/240 (UCF)     | 3200           | 575   | 240   | Sp Med Bipin | 14900  | 400                 | T6    | 12      | 26        |
|           | 54703          | HPL 575/240/X (UCF)   | 3050           | 575   | 240   | Sp Med Bipin | 11780  | 1500                | T6    | 12      | 26        |
|           | 54602          | HPL 750/115 (UCF)     | 3265           | 750   | 115   | Sp Med Bipin | 21900  | 300                 | T6    | 12      | 26        |
|           | 54611          | HPL 750/115/X (UCF)   | 3050           | 750   | 115   | Sp Med Bipin | 16400  | 1500                | T6    | 12      | 26        |
|           | 54605          | HPL 750/120 (UCF)     | 3250           | 750   | 120   | Sp Med Bipin | 21900  | 300                 | T6    | 12      | 26        |
|           | 54653          | HPL 750/120/X (UCF)   | 3065           | 750   | 120   | Sp Med Bipin | 16400  | 1500                | T6    | 12      | 26        |
|           | 54603          | HPL 750/230 (UCF)     | 3200           | 750   | 230   | Sp Med Bipin | 19750  | 300                 | T6    | 12      | 26        |
|           | 54670          | HPL 750/230/X (UCF)   | 3050           | 750   | 230   | Sp Med Bipin | 15600  | 1500                | T6    | 12      | 26        |
|           | 54614          | HPL 750/240 (UCF)     | 3200           | 750   | 240   | Sp Med Bipin | 19750  | 300                 | T6    | 12      | 26        |
|           | 54704          | HPL 750/240/X (UCF)   | 3050           | 750   | 240   | Sp Med Bipin | 15600  | 1500                | T6    | 12      | 26        |
|           | 54825          | HPL 750/77 (UCF)      | 3265           | 750   | 77    | Sp Med Bipin | 22950  | 300                 | T6    | 12      | 26        |
|           | 54798          | HWHV 1200W/220V       | 3200           | 1200  | 220   | GX9.5        | 33500  | 300                 | T7    | 12      | 207       |
|           | 54799          | HWLW 1200W/80V        | 3200           | 1200  | 80    | G22          | 37500  | 300                 | T7    | 12      | 207       |
|           | 54796          | HWMV 1200W/115V       | 3200           | 1200  | 115   | GX9.5        | 37000  | 300                 | T7    | 12      | 207       |



QXL



STUDIOLINE



PAR 56, 64

## STUDIO, THEATRE, TV & VIDEO

| ANSI Code | Product Number | Ordering Abbreviation      | Color Temp (K) | Watts | Volts | Base | Lumens | Avg Rated Life (hrs) | Bulb | Pkg Qty | Footnotes       |
|-----------|----------------|----------------------------|----------------|-------|-------|------|--------|----------------------|------|---------|-----------------|
|           | 54882          | <b>QXL 750/77</b>          | 3250           | 750   | 77    | QXL  | 22950  | 300                  | T6   | 12      | 178,180,181,184 |
|           | 54883          | <b>QXL 750/77/X</b>        | 3050           | 750   | 77    | QXL  | 18000  | 1500                 | T6   | 12      | 178,180,181,184 |
|           | 20607          | <b>STUDIOLINE 55W/3200</b> | 3200           | 55    |       | 2G11 | 3800   | 8000                 | T5   | 10      |                 |
|           | 20608          | <b>STUDIOLINE 55W/5600</b> | 5600           | 55    |       | 2G11 | 3800   | 8000                 | T5   | 10      |                 |

### LARGE PAR - ALUPAR®

| ANSI Code | Product Number | Ordering Abbreviation           | Luminous Intensity (cd) | Watts | Volts | Base  | Color Temp (K) | Avg Rated Life (hrs) | Bulb  | Pkg Qty | Footnotes  |
|-----------|----------------|---------------------------------|-------------------------|-------|-------|-------|----------------|----------------------|-------|---------|------------|
|           | 56003          | <b>aluPAR 56/NSP/300W/120V</b>  | 68000                   | 300   | 120   | GX16d | 2950           | 2000                 | PAR56 | 6       | 30,198,199 |
|           | 56004          | <b>aluPAR 56/MFL/300W/120V</b>  | 24000                   | 300   | 120   | GX16d | 2950           | 2000                 | PAR56 | 6       | 29,198,199 |
|           | 56005          | <b>aluPAR 56/WFL/300W/120V</b>  | 11000                   | 300   | 120   | GX16d | 2950           | 2000                 | PAR56 | 6       | 31,198,199 |
|           | 56000          | <b>aluPAR 56/NSP/300W/230V</b>  | 70000                   | 300   | 230   | GX16d | 2950           | 2000                 | PAR56 | 6       | 30,198,199 |
|           | 56001          | <b>aluPAR 56/MFL/300W/230V</b>  | 30000                   | 300   | 230   | GX16d | 2950           | 2000                 | PAR56 | 6       | 29,198,199 |
|           | 56002          | <b>aluPAR 56/WFL/300W/230V</b>  | 10000                   | 300   | 230   | GX16d | 2950           | 2000                 | PAR56 | 6       | 31,198,199 |
|           | 56086          | <b>aluPAR 56/NSP/500W/120V</b>  | 96000                   | 500   | 120   | GX16d | 2950           | 4000                 | PAR56 | 6       | 30,198,199 |
|           | 56213          | <b>aluPAR 56/MFL/500W/120V</b>  | 45000                   | 500   | 120   | GX16d | 2950           | 4000                 | PAR56 | 6       | 29,198,199 |
|           | 56006          | <b>aluPAR 56/WFL/500W/120V</b>  | 21000                   | 500   | 120   | GX16d | 2950           | 4000                 | PAR56 | 6       | 31,198,199 |
|           | 56007          | <b>aluPAR 64/NSP/500W/120V</b>  | 110000                  | 500   | 120   | GX16d | 2950           | 2000                 | PAR64 | 6       | 30,198,199 |
|           | 56008          | <b>aluPAR 64/MFL/500W/120V</b>  | 37000                   | 500   | 120   | GX16d | 2950           | 2000                 | PAR64 | 6       | 29,198,199 |
|           | 56009          | <b>aluPAR 64/WFL/500W/120V</b>  | 13000                   | 500   | 120   | GX16d | 2950           | 2000                 | PAR64 | 6       | 31,198,199 |
|           | 56018          | <b>aluPAR 64/NSP/500W/230V</b>  | 140000                  | 500   | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 30,198,199 |
|           | 56019          | <b>aluPAR 64/MFL/500W/230V</b>  | 65000                   | 500   | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 29,198,199 |
|           | 56017          | <b>aluPAR 64/NSP/1000W/120V</b> | 400000                  | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 32,198,199 |
|           | 56010          | <b>aluPAR 64/NSP/1000W/120V</b> | 330000                  | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 30,198,199 |
|           | 56011          | <b>aluPAR 64/MFL/1000W/120V</b> | 12000                   | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 29,198,199 |
|           | 56012          | <b>aluPAR 64/WFL/1000W/120V</b> | 40000                   | 1000  | 120   | GX16d | 3200           | 300                  | PAR64 | 6       | 31,198,199 |
|           | 56014          | <b>aluPAR 64/NSP/1000W/230V</b> | 297000                  | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 30,198,199 |
|           | 56015          | <b>aluPAR 64/MFL/1000W/230V</b> | 138000                  | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 29,198,199 |
|           | 56016          | <b>aluPAR 64/WFL/1000W/230V</b> | 38000                   | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 31,198,199 |

### LARGE PAR - OTHER

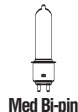
| ANSI Code | Product Number | Ordering Abbreviation | Luminous Intensity (cd) | Watts | Volts | Base  | Color Temp (K) | Avg Rated Life (hrs) | Bulb  | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------|-------------------------|-------|-------|-------|----------------|----------------------|-------|---------|-----------|
| EXC       | 56280          | <b>EXC/230</b>        | 320000                  | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 27,30     |
| EXC       | 56232          | <b>EXC/240</b>        | 320000                  | 1000  | 240   | GX16d | 3200           | 300                  | PAR64 | 6       | 27,30     |
| EXD       | 56281          | <b>EXD/230</b>        | 270000                  | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 27        |
| EXD       | 56233          | <b>EXD/240</b>        | 270000                  | 1000  | 240   | GX16d | 3200           | 300                  | PAR64 | 6       | 27        |
| EXE       | 56283          | <b>EXE/230</b>        | 125000                  | 1000  | 230   | GX16d | 3200           | 300                  | PAR64 | 6       | 27        |
| EXE       | 56234          | <b>EXE/240</b>        | 125000                  | 1000  | 240   | GX16d | 3200           | 300                  | PAR64 | 6       | 27        |
| FFN       | 56214          | <b>FFN</b>            | 400000                  | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 27,32     |
| FFP       | 56215          | <b>FFP</b>            | 330000                  | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 27,30     |
| FFR       | 56217          | <b>FFR</b>            | 125000                  | 1000  | 120   | GX16d | 3200           | 800                  | PAR64 | 6       | 27,29     |



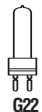
PAR 56, 64



RSC



Med Bi-pin



G22



B15d



E14

## STUDIO, THEATRE, TV & VIDEO

### LARGE PAR - OTHER

| ANSI Code | Product Number | Ordering Abbreviation | Luminous Intensity (cd) | Watts | Volts | Base  | Color Temp (K) | Avg Rated Life(hrs) | Bulb  | Pkg Qty | Footnotes |
|-----------|----------------|-----------------------|-------------------------|-------|-------|-------|----------------|---------------------|-------|---------|-----------|
| FFS       | 56216          | FFS                   | 40000                   | 1000  | 120   | GX16d | 3200           | 800                 | PAR64 | 6       | 27,31     |
|           | 14974          | 350PAR56/SP           |                         | 350   | 75    | MEP   |                | 750                 | PAR56 | 12      | 27        |

## SPECIAL PURPOSE HEAT LAMPS

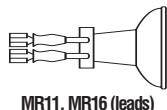
| ANSI Code | Product Number | Ordering Abbreviation | Watts | Volts | Base            | Lumens | Avg Rated Life(hrs) | Bulb | Pkg Qty | Footnotes   |
|-----------|----------------|-----------------------|-------|-------|-----------------|--------|---------------------|------|---------|-------------|
|           | 59850          | 500T3Q/IR 120V        | 500   | 120   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 59822          | 500T3Q/IR/7 120V      | 500   | 120   | RSC             |        | 5000                | T3   | 12      | 139         |
|           | 54555          | 1000Q/T6/RTP/C        | 1000  | 120   | G9.5            | 27500  | 300                 | T6   | 12      | 121         |
|           | 54584          | 1000Q/T6/RTPFS        | 1000  | 120   | G9.5            | 27500  | 300                 | T6   | 12      |             |
|           | 54752          | 1000T6Q RTP/X         | 1000  | 120   | G9.5            | 25000  | 2000                | T6   | 12      |             |
|           | 54560          | 1000TQ/RTP/CR/BULK    | 1000  | 120   | G9.5            | 25000  | 2000                | T6   | 12      | 127         |
|           | 54633          | 1500T6Q/RTP/GS        | 1500  | 120   | G9.5            | 42000  | 300                 | T6   | 12      |             |
|           | 54537          | 2000T8Q/120V/G22      | 2000  | 120   | G22             | 45000  | 2000                | T8   | 12      | 184         |
| FRN       | 54588          | FRN 2000T7Q           | 2000  | 120   | G9.5            | 56500  | 200                 | T7   | 12      |             |
|           | 54548          | 2500T8Q/120V          | 2500  | 120   | GY9.5           | 75000  | 300                 | T6   | 12      |             |
|           | 59934          | 1200T3Q/IR/CL/HT 144V | 1200  | 144   | Flex Nick Leads |        | 3000                | T3   | 12      | 121,125,139 |
|           | 59860          | 1000T3Q/IR 230-250V   | 1000  | 240   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 54521          | 1000/240V/G9.5        | 1000  | 240   | G9.5            | 23000  | 150                 | T6   | 12      |             |
|           | 59864          | 1600T3Q/IR 240V       | 1600  | 240   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 59841          | 1600T3Q/IR/7 240V     | 1600  | 240   | RSC             |        | 5000                | T3   | 12      | 139         |
|           | 59936          | 1600T3Q/IR 277V       | 1600  | 277   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 59867          | 2500T3Q/IR 480V       | 2500  | 480   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 59803          | 2500T3Q/IR/7 480V     | 2500  | 480   | RSC             |        | 5000                | T3   | 12      | 139         |
|           | 59859          | 3650T3Q/IR/CL 480V    | 3650  | 480   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |
|           | 59870          | 3800T3Q/IR 570V       | 3800  | 570   | Flex Nick Leads |        | 5000                | T3   | 12      | 139         |

## OPTOELECTRONICS

| Ordering Abbreviation | Product Number | Watts | Volts | Base    | Operating Position | Avg Rated Life(hrs) | Pkg Qty | Footnotes |
|-----------------------|----------------|-------|-------|---------|--------------------|---------------------|---------|-----------|
| 8013                  | 76311          | 10    | 6     | BA15d   | h 105              | 200                 | 100     | 59        |
| 8017                  | 76313          | 15    | 6     | BA15d   | Any                | 1000                | 100     |           |
| 8018                  | 76314          | 15    | 6     | BA15d   | h 30               | 100                 | 100     | 34,59     |
| 8100                  | 76321          |       | 6     | E14     | s 105              | 600                 | 100     | 58        |
| 70314 (390153)        | 76304          | 25    | 6     | P47d    |                    |                     | 100     |           |
| 70335 BULK            | 76302          | 27    | 6     | Special |                    |                     | 200     |           |

## 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             | Aircraft    |           |      |          | 2000                | 48       | 30      | 58        |



PAR46,64

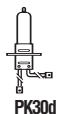
MR11, MR16 (leads)

## AIRCRAFT

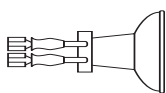
| Watts | Bulb  | Volts | Base | Product Number | Ordering Abbreviation | Application                | Beam Type | CBCP   | Filament | Avg Rated Life(hrs) | MOL (mm) | Pkg Qty | Footnotes |
|-------|-------|-------|------|----------------|-----------------------|----------------------------|-----------|--------|----------|---------------------|----------|---------|-----------|
| 250   | PAR46 | 28    | G53  | 15399          | <b>4551</b>           | Aircraft Taxiing           | VNSP      | 75000  | CC-6     | 25                  | 95.25    | 12      | 32        |
| 450   | PAR46 | 28    | G53  | 56229          | <b>Q4681</b>          | Aircraft Landing / Taxiway | VNSP      | 310000 | CC-6     | 50                  | 63.5     | 12      | 27,32     |
| 600   | PAR64 | 28    | G53  | 14936          | <b>4559</b>           | Aircraft Landing / Taxiway | VNSP      | 600000 | CC-8     | 25                  | 101.6    | 6       | 32        |
|       |       |       |      | 56222          | <b>Q4559</b>          | Aircraft Landing / Taxiway | VNSP      | 600000 | CC-8     | 100                 | 101.6    | 6       | 27,32     |
|       |       |       |      | 56223          | <b>Q4559X</b>         | Aircraft Landing / Taxiway | VNSP      | 765000 | CC-8     | 100                 | 101.6    | 6       | 27,32     |
| 1000  | PAR64 | 28    | G53  | 14988          | <b>4557</b>           | Aircraft Landing/Taxiway   | VNSP      | 540000 | CC-8     | 25                  | 101.6    | 6       | 32        |
|       |       |       |      | 14994          | <b>5557</b>           | Aircraft Landing/Taxiway   | VNSP      | 540000 | CC-8     | 50                  | 101.6    | 6       | 32,67     |

## 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      | Leads-A      | 58964          | <b>6.6A/30MR16/64331A/FL</b>     | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 20      | 205            |
|       |           |              | 58506          | <b>6.6A/30MR16/64331A/SP</b>     | Airfield/Airport   | 6.6         |        |          | 1000                |          | 45.6     | 20      | 205            |
|       |           | Leads-A/C    | 58730          | <b>6.6A/30MR16/64331AC/FL</b>    | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 10      | 138            |
|       |           |              | 58938          | <b>6.6A/30MR16/64331AC/FL</b>    | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 20      | 138            |
|       | T3.5      | GZ9.5        | 58850          | <b>6.6A/30T3.5/64322/EXL/DL</b>  | Airfield/Airport   | 6.6         | 400    | C-8      | 2000                | 25.4     | 44.5     | 12      |                |
|       |           |              | 58893          | <b>6.6A/30T3.5/EXL</b>           | Airfield/Airport   | 6.6         | 600    | C-8      | 1000                | 25.4     | 44.5     | 12      |                |
| 40    | MR11      | Leads-A      | 58899          | <b>6.6A/40MR11/64333A</b>        | Airfield / Airport | 6.6         |        |          | 1500                |          | 37       | 20      | 205            |
|       |           | Leads-B      | 58787          | <b>6.6A/40MR11/64333B</b>        | Airfield / Airport | 6.6         |        |          | 1500                |          | 37       | 10      | 208            |
|       |           |              | 58889          | <b>6.6A/40MR11/64333B</b>        | Airfield / Airport | 6.6         |        |          | 1500                |          | 37       | 20      | 208            |
|       | T10       | Med Prefocus | 17980          | <b>6.6A/30T10/1P</b>             | Airfield/Airport   | 6.6         | 400    | C-2V     | 1000                | 38.1     | 100      | 60      |                |
| 45    | MR16      | Leads-A      | 58545          | <b>6.6A/45MR16/64337A 45-15</b>  | Airfield / Airport | 6.6         |        |          | 1500                |          | 45.6     | 10      | 205            |
|       |           |              | 58907          | <b>6.6A/45MR16/64337A 45-15</b>  | Airfield / Airport | 6.6         |        |          | 1500                |          | 45.6     | 20      | 205            |
|       |           | Leads-B      | 58758          | <b>6.6A/45MR16/64337B 45-15</b>  | Airfield / Airport | 6.6         |        |          | 1500                |          | 45.6     | 10      | 208            |
|       |           |              | 58908          | <b>6.6A/45MR16/64337B 45-15</b>  | Airfield / Airport | 6.6         |        |          | 1500                |          | 45.6     | 20      | 208            |
|       | T3        | R7s          | 58704          | <b>6.6A/45T3/CL/64315</b>        | Airfield/Airport   | 6.6         | 750    | C-8      | 1000                | 23       | 47.5     | 25      |                |
|       |           |              | 59928          | <b>6.6A/45T3.5Q/64321</b>        | Airfield / Airport | 6.6         | 840    | C-8      | 1200                | 33       | 45       | 40      | 58,60          |
|       | T3.5      | G6.35        | 58813          | <b>6.6A/45T3.5Q/64321</b>        | Airfield / Airport | 6.6         | 840    | C-8      | 1200                | 33       | 45       | 100     | 58,60          |
|       |           |              | 58846          | <b>6.6A/45T3.5/64320/EXM</b>     | Airfield/Airport   | 6.6         | 875    | C-8      | 1000                | 25.4     | 44.5     | 12      | 58,60          |
|       |           | GZ9.5        | 58892          | <b>6.6A/45T3.5/EXM</b>           | Airfield/Airport   | 6.6         | 875    | C-8      | 1000                | 25.4     | 44.5     | 12      | 58,60          |
|       |           |              | 58697          | <b>6.6A/45T4/64319 FEMALE</b>    | Airfield/Airport   | 6.6         | 800    | C-8      | 1000                | 20       | 53       | 100     | 58,120,205,271 |
|       | T4        | PK30d-A      | 58877          | <b>6.6A/45T4CL/64318</b>         | Airfield/Airport   | 6.6         | 800    | C-8      | 1000                | 16       | 58       | 100     | 58,205,271     |
|       |           |              | 58705          | <b>6.6A/45T4/CL/64317</b>        | Airfield/Airport   | 6.6         | 800    | C-8      | 1000                | 16       | 58       | 100     | 58,209         |
|       |           | PK30d-C      | 58722          | <b>6.6A/45T4/64319Z</b>          | Airfield/Airport   | 6.6         | 800    | C-8      | 1000                | 20       | 53       | 100     | 58,121,209,268 |
|       |           |              | 17981          | <b>6.6A/45T10/P</b>              | Airfield/Airport   | 6.6         | 675    | C-2V     | 1000                | 38.1     | 100      | 60      |                |
| 48    | MR16      | Leads-A      | 58891          | <b>6.6A/48MR16/64337A 48-15</b>  | Airfield/Airport   | 6.6         |        |          | 1500                |          | 45.6     | 20      | 205,271        |
|       |           |              | 58905          | <b>6.6A/48MR16/64337A LL IRC</b> | Airfield/Airport   | 6.6         |        |          | 3000                |          | 45.6     | 20      | 205,271        |
|       | Leads-A/C |              | 58894          | <b>6.6A/48W/MR16/64338AC</b>     | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 20      | 58             |



PK30d



MR11, MR16 (leads)



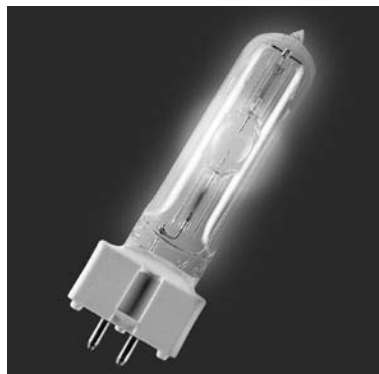
Med 2-pin

## AIRFIELD

| Watts | Bulb  | Base      | Product Number | Ordering Abbreviation                | Application        | Current (A) | Lumens | Filament | Avg Rated Life(hrs) | LCL (mm) | MOL (mm) | Pkg Qty | Footnotes      |
|-------|-------|-----------|----------------|--------------------------------------|--------------------|-------------|--------|----------|---------------------|----------|----------|---------|----------------|
| 48    | MR16  | Leads-B   | 58906          | <b>6.6A/48MR16/64337B LL IRC</b>     | Airfield/Airport   | 6.6         |        |          | 3000                |          | 45.6     | 20      | 208,271        |
|       |       | Leads-C   | 58952          | <b>6.6A/48MR16/64337C LL IRC</b>     | Airfield/Airport   | 6.6         |        |          | 3000                |          | 45.6     | 20      | 209            |
| 62    | MR16  | Leads-A   | 58493          | <b>6.6A/62W/MR16/64336A</b>          | Airfield/Airport   | 6.6         |        |          | 1500                |          | 44       | 20      | 205            |
| 65    | T4    | PK30d-C   | 58726          | <b>6.6A/65T4/64328Z/HLX</b>          | Airfield/Airport   | 6.6         | 1450   | C Bar 6  | 1000                | 20       | 53       | 100     | 58,123,209,268 |
| 100   | T4    | PK30d-A   | 58709          | <b>6.6A/100T4/64341/HLX</b>          | Airfield/Airport   | 6.6         |        | C Bar 6  | 1000                | 20       | 55       | 100     | 58,205,271     |
|       |       | PK30d-C   | 58703          | <b>6.6A/100T4/64341Z/HLX</b>         | Airfield/Airport   | 6.6         | 2700   | C Bar 6  | 1000                | 20       | 55       | 100     | 125,209,268    |
|       |       |           | 58706          | <b>6.6A/100T4/64342/HLX</b>          | Airfield/Airport   | 6.6         | 2700   | C Bar 6  | 1000                | 20       | 58       | 100     | 58,209         |
| 105   | MR16  | Leads-A   | 58953          | <b>6.6A/105MR16/64339A</b>           | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 20      | 205,271        |
|       |       | Leads-A/C | 58960          | <b>6.6A/105MR16/64339AC</b>          | Airfield/Airport   | 6.6         |        |          | 1000                |          | 45.6     | 20      | 138            |
|       |       | Leads-B   | 58759          | <b>6.6A/105MR16/64339B</b>           | Airfield/Airport   | 6.6         |        |          | 1000                |          | 45.6     | 10      | 208            |
|       |       |           | 58961          | <b>6.6A/105MR16/64339B</b>           | Airfield/Airport   | 6.6         |        |          | 1000                |          | 45.6     | 20      | 208            |
|       |       | Leads-C   | 58963          | <b>6.6A/105MR16/64339C</b>           | Airfield / Airport | 6.6         |        |          | 1000                |          | 45.6     | 20      | 209,268        |
| 115   | T4    | GY9.5     | 58854          | <b>6.6A/115T4Q/58798/2PPF/EVV</b>    | Airfield/Airport   | 6.6         | 2900   | C Bar 6  | 1000                | 39.1     | 57       | 12      | 140            |
| 150   | T4    | GY9.5     | 58855          | <b>6.6A/150T4Q/64354/EWR/DL</b>      | Airfield/Airport   | 6.6         | 4000   | C Bar 6  | 1500                | 39.1     | 56.5     | 12      | 140            |
|       |       |           | 58777          | <b>6.6A/150T4Q/64354/EWR/DL</b>      | Airfield/Airport   | 6.6         | 4000   | C Bar 6  | 1500                | 39.1     | 56.5     | 30      | 58,140         |
|       |       | PK30d-A   | 58717          | <b>6.6A/150T4/64361/HLX</b>          | Airfield/Airport   | 6.6         | 3600   | C Bar 6  | 1000                | 20       | 58       | 100     | 58,205,271,274 |
|       |       | PK30d-C   | 58724          | <b>6.6A/150T4Q/64361Z/HLX</b>        | Airfield/Airport   | 6.6         | 3600   | C Bar 6  | 1000                | 20       | 58       | 100     | 58,209,268     |
|       |       |           |                |                                      |                    |             |        |          |                     |          |          |         |                |
| 200   | PAR64 | GX16d     | 56220          | <b>6.6A/200PAR64Q/2P</b>             | Airfield/Airport   | 6.6         |        | CC-6     | 2000                |          | 114.3    | 6       | 27,278         |
|       | T4    | G6.35     | 59078          | <b>6.6A/200T4Q/64386</b>             | Airfield / Airport | 6.6         | 4700   | C Bar 6  | 1200                | 33       | 47       | 40      | 58,60          |
|       |       |           | 58815          | <b>6.6A/200T4Q/64386</b>             | Airfield / Airport | 6.6         | 4700   | C Bar 6  | 1200                | 33       | 47       | 100     | 58             |
|       |       | GY9.5     | 58851          | <b>6.6A/200T4Q/2PPF/58750/EZL/DL</b> | Airfield/Airport   | 6.6         | 5200   | CC-6     | 1000                | 39.1     | 65       | 12      | 140            |
|       |       | P30d      | 58821          | <b>6.6A/200T4Q/CL/DCR/58746/DL</b>   | Airfield/Airport   | 6.6         | 5000   | CC-6     | 1000                | 27       | 80.9     | 100     | 58,60          |
|       |       | PK30d-A   | 58649          | <b>6.6A/200T4/64382A/HLX</b>         | Airfield/Airport   | 6.6         | 4800   | CC-6     | 1000                | 20       | 64       | 100     | 58,205         |
|       |       | PK30d-C   | 58708          | <b>6.6A/200T4/64382C/HLX</b>         | Airfield/Airport   | 6.6         | 4800   | CC-6     | 1000                | 20       | 64       | 100     | 58,209,273     |
|       | T5    | R7s       | 58707          | <b>6.6A/200T5/CL/64380</b>           | Airfield/Airport   | 6.6         | 4400   | CC-8     | 1000                | 21.3     | 60.2     | 25      |                |

## 4ArXS (For Architainment eXtreme Seal)

Innovative metal halide lamps for creative architectural and effect lighting



### 4 ArXS HSD®

4ArXS HSD are new powerful metal halide lamps from OSRAM with innovative eXtreme Seal technology. The 4ArXS opens up new prospects for creative architectural and effect lighting.

#### Features and Benefits:

- Average service life of 2000 to 6000 hours
- Outstanding luminous intensity and color consistency throughout the life of the lamp
- Low devitrification of the bulb wall
- Daylight type (6000 K) and "bright light" type (7000 – 8000K)
- Simple and reliable cold starting

#### Applications:

- Architectural lighting
- Projected advertising
- Nightclub lighting
- TV shows, concerts, musicals and theatre

Optimized lamp seal technology to withstand interior base temperatures up to 450 °C.

## LIGHT THEM UP!



## SharXS® HTI® from OSRAM

*The original light with a bite*



The SharXS (Short arc eXtreme Seal) HTI family uses state-of-the-art HTI technology to achieve a particularly high luminous efficacy. The arc in these innovative light sources has been reduced to 3-7mm. What this means for you is the SharXS HTI produces a higher luminance from the same wattage and therefore saves electricity and reduces operating costs.

### Features and Benefits

- Less sensitive to heat
- Always ready for a hot restart
- Allows more compact luminaire design
- Pre-focus base for accurate lamp installation
- OSRAM SFC10-4 Pre-focus socket with its unique high performance contact system pairs with all lamp wattages

### eXtreme-Seal (XS) Technology

Optimized lamp seal technology to withstand interior base temperatures up to 450 °C.

### Ideal for intelligent luminaires

- Moving heads
- Scanners
- Projectors
- Color changers

### SharXS HTI in its element

SharXS lamps are at home in all areas of entertainment lighting

- Shows
- Clubs
- Special Events
- Concerts
- TV studios
- Advertising and retail

## Baby SharXS® HTI® from OSRAM

*An offspring with just as sharp of a bite*



### SharXS HTI now in just 93mm

Measuring only 93mm, the latest offspring in the family has all the benefits of the full-size OSRAM SharXS HTI.

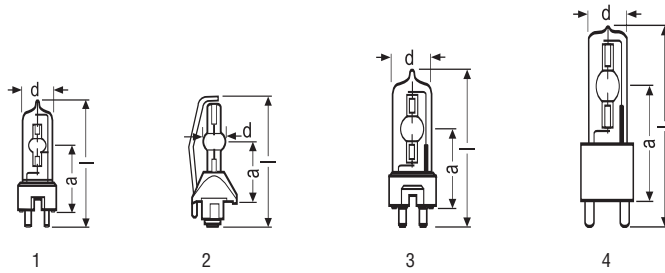
- Short 5mm arc for greater efficiency
- eXtreme Seal(XS) technology for improved thermal loading
- Modular design with the same dimensions for all wattages

### Good genes: the new Baby SharXS

The tiny Baby SharXS develops all its power from just 93mm. The small dimensions of the Baby SharXS will inspire designers to create compact luminaires. Because of their lower weight, not only will these luminaires be easier to handle but more of them will fit on a lighting rig.

**NOTES:**

# HMI® METAL HALIDE



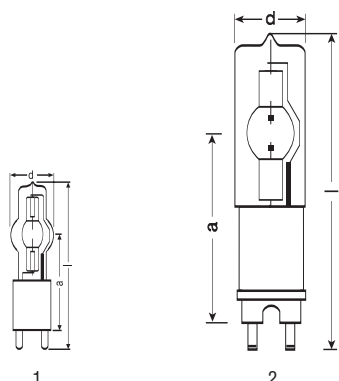
## HMI® SINGLE-ENDED

| Ordering Abbreviation     | HMI 200 W/SE | HMI 250 W/SE | HMI 400 W/SE |
|---------------------------|--------------|--------------|--------------|
| Product Number            | 54061        | 54062        | 54137        |
| Watts (W)                 | 200          | 270          | 400          |
| Volts (V)                 | 70           | 50           | 70           |
| Current (A)               | 3.0          | 5.0          | 6.9          |
| CRI                       | >90          | >90          | >90          |
| Lumens (lm)               | 16000        | 16200        | 33000        |
| Color Temp (K)            | 6000         | 6000         | 6000         |
| Length l max (mm)         | 80           | 84           | 110          |
| Distance a (mm)           | 39           | 35           | 60           |
| Diameter d (mm)           | 20           | 12           | 23           |
| Electrode Gap - cold (mm) | 5            | 5            | 6            |
| Avg Rated Life (hrs)      | 200          | 250          | 650          |
| Operating Position        | Any          | p 45         | Any          |
| Base                      | GZY9.5       | FaX1.5       | GZ9.5        |
| Hot Restart               | Yes          | Yes          | Yes          |
| Fig No                    | 1            | 2            | 3            |
| Symbols & Footnotes       | 1            | 1,60         | 90           |

## HMI® SINGLE-ENDED

| Ordering Abbreviation     | HMI 575 W/SEL XS | HMI 700 W/SE XS | HMI 1200 W/SEL XS |
|---------------------------|------------------|-----------------|-------------------|
| Product Number            | 54063            | 54310*          | 54067             |
| Watts (W)                 | 575              | 700             | 1200              |
| Volts (V)                 | 95               | 95              | 100               |
| Current (A)               | 7.0              | 9.0             | 13.8              |
| CRI                       | >90              | >90             | >90               |
| Lumens (lm)               | 49000            | 55000           | 110000            |
| Color Temp (K)            | 6000             | 6000            | 6000              |
| Length l max (mm)         | 145              | 145             | 200               |
| Distance a (mm)           | 70               | 70              | 107               |
| Diameter d (mm)           | 30               | 30              | 42                |
| Electrode Gap - cold (mm) | 7                | 7               | 10                |
| Avg Rated Life (hrs)      | 1000             | 750             | 1000              |
| Operating Position        | Any              | Any             | Any               |
| Base                      | G22              | G22             | G38               |
| Hot Restart               | Yes              | Yes             | Yes               |
| Fig No                    | 4                | 4               | 4                 |
| Symbols & Footnotes       | 90,161           | 161             | 90,161            |

## HMI® METAL HALIDE



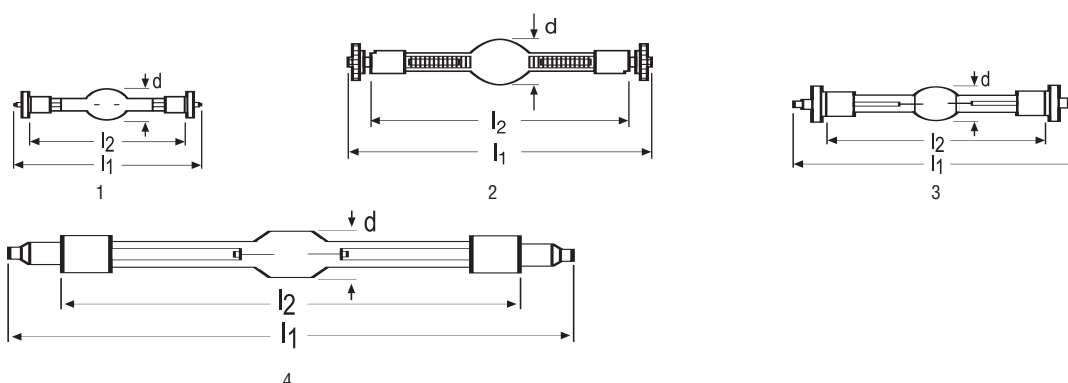
### HMI® SINGLE-ENDED

| Ordering Abbreviation     | HMI 2500 W/SE XS | HMI 4000 W/SE XS | HMI 6000 W/SE XS |
|---------------------------|------------------|------------------|------------------|
| Product Number            | 54070            | 54321☼           | 54099            |
| Watts (W)                 | 2500             | 4000             | 6000             |
| Volts (V)                 | 115              | 200              | 123              |
| Current (A)               | 25.6             | 24.0             | 55.0             |
| CRI                       | >90              | >90              | >90              |
| Lumens (lm)               | 240000           | 380000           | 600000           |
| Color Temp (K)            | 6000             | 6000             | 6000             |
| Length l max (mm)         | 225              | 250              | 360              |
| Distance a (mm)           | 127              | 142              | 210              |
| Diameter d (mm)           | 60               | 75               | 75               |
| Electrode Gap - cold (mm) | 14               | 20               | 23               |
| Avg Rated Life (hrs)      | 500              | 500              | 500              |
| Operating Position        | Any              | Any              | s 135            |
| Base                      | G38              | G38              | GX38             |
| Hot Restart               | Yes              | Yes              | Yes              |
| Fig No                    | 1                | 1                | 2                |
| Symbols & Footnotes       | 90,161           | 90,161           | 58,90,139,161    |

### HMI® SINGLE-ENDED

| Ordering Abbreviation     | HMI 12000 W/SE XS | HMI 12000W/SE/GX51 | HMI 18000 W/SE/GX51 |
|---------------------------|-------------------|--------------------|---------------------|
| Product Number            | 54113             | 54357☼             | 54289☼              |
| Watts (W)                 | 12000             | 12000              | 18000               |
| Volts (V)                 | 160               | 160                | 225                 |
| Current (A)               | 84.0              | 84.0               | 88.0                |
| CRI                       | >90               | >90                | >90                 |
| Lumens (lm)               | 1150000           | 1150000            | 1600000             |
| Color Temp (K)            | 6000              | 6000               | 6000                |
| Length l max (mm)         | 450               | 460                | 495                 |
| Distance a (mm)           | 255               | 260                | 260                 |
| Diameter d (mm)           | 100               | 100                | 100                 |
| Electrode Gap - cold (mm) | 27                | 27                 | 44                  |
| Avg Rated Life (hrs)      | 300               | 300                | 300                 |
| Operating Position        | s 135             | s 135              | s 135               |
| Base                      | GX38              | GX51               | GX51                |
| Hot Restart               | Yes               | Yes                | Yes                 |
| Fig No                    | 2                 | 2                  | 2                   |
| Symbols & Footnotes       | 58,90,139,161     | 58,90,161          | 58,90,161           |

## HMI® METAL HALIDE



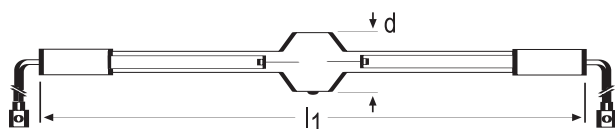
### HMI® DOUBLE-ENDED

| Ordering Abbreviation     | HMI 575 W/DXS | HMI 575 W/GS       | HMI 1200 W/DXS     | HMI 1200 W/GS      | HMI 1200 W/S XS    |
|---------------------------|---------------|--------------------|--------------------|--------------------|--------------------|
| Product Number            | 54313         | 54098 <sup>⚡</sup> | 55139 <sup>⚡</sup> | 54066 <sup>⚡</sup> | 54088 <sup>⚡</sup> |
| Watts (W)                 | 575           | 575                | 1200               | 1200               | 1200               |
| Volts (V)                 | 95            | 95                 | 100                | 100                | 100                |
| Current (A)               | 7.0           | 7.0                | 13.8               | 13.8               | 13.8               |
| CRI                       | >90           | >90                | >90                | >90                | >90                |
| Lumens (lm)               | 49000         | 49000              | 110000             | 110000             | 110000             |
| Color Temp (K)            | 6000          | 6000               | 6000               | 6000               | 6000               |
| Length l1 max (mm)        | 135           | 135                | 220                | 220                | 135                |
| Length l2 max (mm)        | 115           | 115                | 180                | 180                | 115                |
| Diameter d (mm)           | 21            | 21                 | 27                 | 27                 | 21                 |
| Electrode Gap - cold (mm) | 7             | 7                  | 10                 | 10                 | 7                  |
| Avg Rated Life (hrs)      | 1000          | 1000               | 750                | 750                | 750                |
| Operating Position        | Any           | Any                | Any                | Any                | Any                |
| Base                      | SFc10-4       | SFc10-4            | SFc15.5            | SFc15.5            | SFc10-4            |
| Hot Restart               | Yes           | Yes                | Yes                | Yes                | Yes                |
| Fig No                    | 1             | 1                  | 2                  | 2                  | 3                  |
| Symbols & Footnotes       | 55,90,161     | 52,90              | 55,90,161          | 52,90              | 43,90,161,196,201  |

### HMI® DOUBLE-ENDED

| Ordering Abbreviation     | HMI 2500 W/DXS     | HMI 2500 W/S XS  | HMI 4000 W         | HMI 4000 W/DXS     |  |
|---------------------------|--------------------|------------------|--------------------|--------------------|--|
| Product Number            | 54265 <sup>⚡</sup> | 54068            | 54071 <sup>⚡</sup> | 54314 <sup>⚡</sup> |  |
| Watts (W)                 | 2500               | 2500             | 4000               | 4000               |  |
| Volts (V)                 | 115                | 115              | 200                | 200                |  |
| Current (A)               | 25.6               | 25.6             | 24.0               | 24.0               |  |
| CRI                       | >90                | >90              | >90                | >90                |  |
| Lumens (lm)               | 240000             | 240000           | 380000             | 380000             |  |
| Color Temp (K)            | 6000               | 6000             | 6000               | 6000               |  |
| Length l1 max (mm)        | 355                | 210              | 405                | 405                |  |
| Length l2 max (mm)        | 290                | 150              | 340                | 340                |  |
| Diameter d (mm)           | 31.5               | 31.5             | 36                 | 36                 |  |
| Electrode Gap - cold (mm) | 14                 | 14               | 34                 | 34                 |  |
| Avg Rated Life (hrs)      | 500                | 500              | 500                | 500                |  |
| Operating Position        | p 30               | p 30             | p 15               | p 15               |  |
| Base                      | SFa21              | SFa21            | SFa21              | SFa21              |  |
| Hot Restart               | Yes                | Yes              | Yes                | Yes                |  |
| Fig No                    | 4                  | 4                | 4                  | 4                  |  |
| Symbols & Footnotes       | 55,60,161          | 43,60,90,161,201 | 60,90,219          | 55,60,90,161,219   |  |

## HMI® METAL HALIDE



2

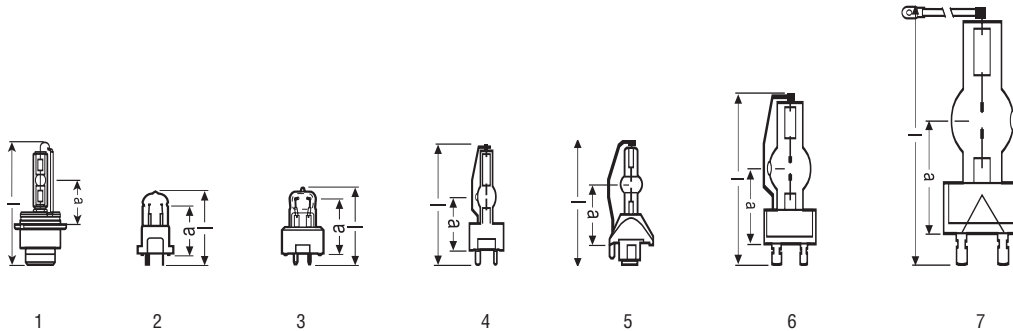
### HMI® DOUBLE-ENDED

| Ordering Abbreviation     | HMI 6000 W         | HMI 6000 W/DXS     | HMI 12000 W/DXS    | HMI 12000 W/XS     |
|---------------------------|--------------------|--------------------|--------------------|--------------------|
| Product Number            | 54073 <sup>⚡</sup> | 54315 <sup>⚡</sup> | 54316 <sup>⚡</sup> | 54074 <sup>⚡</sup> |
| Watts (W)                 | 6000               | 6000               | 12000              | 12000              |
| Volts (V)                 | 123                | 123                | 160                | 160                |
| Current (A)               | 55.0               | 55.0               | 84.0               | 84.0               |
| CRI                       | >90                | >90                | >90                | >90                |
| Lumens (lm)               | 570000             | 570000             | 1150000            | 1150000            |
| Color Temp (K)            | 6000               | 6000               | 6000               | 6000               |
| Length I1 max (mm)        | 450                | 450                | 470                | 470                |
| Length I2 max (mm)        |                    |                    |                    |                    |
| Diameter d (mm)           | 54                 | 54                 | 64                 | 64                 |
| Electrode Gap - cold (mm) | 21                 | 21                 | 25                 | 25                 |
| Avg Rated Life (hrs)      | 500                | 500                | 500                | 500                |
| Operating Position        | p 15               | p 15               | p 15               | p 15               |
| Base                      | S25.5              | S25.5              | S30                | S30                |
| Hot Restart               | Yes                | Yes                | Yes                | Yes                |
| Fig No                    | 2                  | 2                  | 2                  | 2                  |
| Symbols & Footnotes       | 60,90              | 55,60,90,161       | 55,60,90,161       | 60,90,161          |

### HMI® DOUBLE-ENDED

| Ordering Abbreviation     | HMI 18000 W/DXS    |  |  |
|---------------------------|--------------------|--|--|
| Product Number            | 54317 <sup>⚡</sup> |  |  |
| Watts (W)                 | 18000              |  |  |
| Volts (V)                 | 225                |  |  |
| Current (A)               | 88.0               |  |  |
| CRI                       | >90                |  |  |
| Lumens (lm)               | 1700000            |  |  |
| Color Temp (K)            | 6000               |  |  |
| Length I1 max (mm)        | 500                |  |  |
| Length I2 max (mm)        |                    |  |  |
| Diameter d (mm)           | 70                 |  |  |
| Electrode Gap - cold (mm) | 44                 |  |  |
| Avg Rated Life (hrs)      | 300                |  |  |
| Operating Position        | p 15               |  |  |
| Base                      | S30                |  |  |
| Hot Restart               | Yes                |  |  |
| Fig No                    | 2                  |  |  |
| Symbols & Footnotes       | 55,60,90,161,219   |  |  |

## HTI® METAL HALIDE



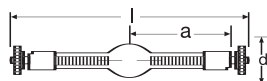
### HTI® SINGLE-ENDED

| Ordering Abbreviation                   | HTI S 35/12 | HTI 150 W            | HTI 152 W            | HTI 405 W/SE XS      | HTI 600 W/SE    |
|-----------------------------------------|-------------|----------------------|----------------------|----------------------|-----------------|
| Product Number                          | 69000       | 54078                | 54079                | 54139                | 54087           |
| Watts (W)                               | 35          | 150                  | 150                  | 400                  | 600             |
| Volts (V)                               | 85          | 90                   | 95                   | 55                   | 95              |
| Current (A)                             | 2.5         | 1.8                  | 1.8                  | 7.3                  | 7.7             |
| CRI                                     | >90         | >70                  | >90                  | >90                  | >90             |
| Lumens (lm)                             | 3200        | 9500                 | 9500                 | 28000                | 48000           |
| Average Luminance (cd/cm <sup>2</sup> ) | 6500        | 5000                 | 4200                 | 40000                | 25000           |
| Color Temp (K)                          | 4250        | 6500                 | 5000                 | 5800                 | 5300            |
| Length l max (mm)                       | 79.5        | 46                   | 48                   | 80                   | 84              |
| Distance a (mm)                         | 27.1        | 30                   | 30                   | 36.5                 | 35              |
| Electrode Gap - cold (mm)               | 4.2         | 5.0                  | 6.75                 | 3.0                  | 5.5             |
| Avg Rated Life (hrs)                    | 3000        | 750                  | 2000                 | 500                  | 300             |
| Operating Position                      | p 10        | Any                  | Any                  | p 45                 | p 45            |
| Base                                    | P32d-2      | GY9.5 Bipin Prefocus | GY9.5 Bipin Prefocus | GY9.5 Bipin Prefocus | FaX1.5          |
| Hot Restart                             | Yes         | No                   | No                   | No                   | Yes             |
| Fig No                                  | 1           | 2                    | 3                    | 4                    | 5               |
| Symbols & Footnotes                     | 60          | 2,90                 | 90                   | 1,10,48,53,60,161    | 10,37,60,90,112 |

### HTI® SINGLE-ENDED

| Ordering Abbreviation                   | HTI 700 W/SE/75 | HTI 705 W/SE XS      | HTI 1200 W/SE XS | HTI 1800W/SE XS | HTI 2500 W/SE XS |
|-----------------------------------------|-----------------|----------------------|------------------|-----------------|------------------|
| Product Number                          | 54329*          | 54130                | 54141            | 54770*          | 54142            |
| Watts (W)                               | 700             | 700                  | 1200             | 1800            | 2500             |
| Volts (V)                               | 70              | 70                   | 100              | 100             | 115              |
| Current (A)                             | 10              | 10                   | 13.8             | 20              | 25.6             |
| CRI                                     | >80             | >80                  | >90              | >90             | >90              |
| Lumens (lm)                             | 59000           | 59000                | 99000            | 155000          | 240000           |
| Average Luminance (cd/cm <sup>2</sup> ) |                 |                      | 26000            | 35000           | 30000            |
| Color Temp (K)                          | 7500            | 5500                 | 5400             | 5600            | 6000             |
| Length l max (mm)                       | 85              | 85                   | 135              | 135             | 180              |
| Distance a (mm)                         | 39              | 39                   | 59               | 59              | 85               |
| Electrode Gap - cold (mm)               | 4               | 4                    | 7                | 7               | 14               |
| Avg Rated Life (hrs)                    | 500             | 500                  | 600              | 750             | 600              |
| Operating Position                      | p 45            | p 45                 | s 135            | s 135           | s 135            |
| Base                                    | FaX1.5          | GY9.5 Bipin Prefocus | GY22             | GY22            | G22+ Cable       |
| Hot Restart                             | Yes             | No                   | Yes              | Yes             | Yes              |
| Fig No                                  | 5               | 4                    | 6                | 6               | 7                |
| Symbols & Footnotes                     | 10,60,161       | 10,60,161            | 10,19,58,90,161  | 10,19,58,90,161 | 28,58,90,161     |

## HTI® METAL HALIDE



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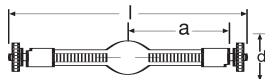
### HTI® SHARXS® DOUBLE-ENDED

| Ordering Abbreviation                   | HTI 400W/D3/75 SHARXS | HTI 400W/D3/75 SHARXS BULK | HTI 575W/D4/60 SHARXS |
|-----------------------------------------|-----------------------|----------------------------|-----------------------|
| Product Number                          | 54241                 | 54280                      | 54296                 |
| Watts (W)                               | 400                   | 400                        | 575                   |
| Volts (V)                               | 49                    | 49                         | 69                    |
| Current (A)                             | 8.5                   | 8.5                        | 8.3                   |
| CRI                                     | >80                   | >80                        | >85                   |
| Lumens (lm)                             | 26000                 | 26000                      | 49000                 |
| Average Luminance (cd/cm <sup>2</sup> ) | 55000                 | 55000                      | 49000                 |
| Color Temp (K)                          | 7500                  | 7500                       | 6000                  |
| Length l max (mm)                       | 136                   | 136                        | 136                   |
| Distance a (mm)                         | 57.5                  | 57.5                       | 57.5                  |
| Diameter d (mm)                         | 18                    | 18                         | 20                    |
| Electrode Gap - cold (mm)               | 3                     | 3                          | 4                     |
| Avg Rated Life (hrs)                    | 1000                  | 1000                       | 750                   |
| Operating Position                      | Any                   | Any                        | Any                   |
| Base                                    | SFc10-4               | SFc10-4                    | SFc10-4               |
| Hot Restart                             | Yes                   | Yes                        | yes                   |
| Fig No                                  | 1                     | 1                          | 1                     |
| Symbols & Footnotes                     | 90,161,166,167        | 90,161,166,167,290         | 90,161,166,167        |

### HTI® SHARXS® DOUBLE-ENDED

| Ordering Abbreviation                   | HTI 575W/D4/75 SHARXS | HTI 700W/D4/60 SHARXS | HTI 700W/D4/60 SHARXS BULK |
|-----------------------------------------|-----------------------|-----------------------|----------------------------|
| Product Number                          | 54270                 | 54282                 | 54283                      |
| Watts (W)                               | 575                   | 700                   | 700                        |
| Volts (V)                               | 64                    | 70                    | 70                         |
| Current (A)                             | 9                     | 10.0/11.0             | 10.0/11.0                  |
| CRI                                     | >80                   | >80                   | >80                        |
| Lumens (lm)                             | 44000                 | 59000                 | 59000                      |
| Average Luminance (cd/cm <sup>2</sup> ) | 49000                 | 60000                 | 60000                      |
| Color Temp (K)                          | 7500                  | 6000                  | 6000                       |
| Length l max (mm)                       | 136                   | 136                   | 136                        |
| Distance a (mm)                         | 57.5                  | 57.5                  | 57.5                       |
| Diameter d (mm)                         | 20.5                  | 20                    | 20                         |
| Electrode Gap - cold (mm)               | 4                     | 4                     | 4                          |
| Avg Rated Life (hrs)                    | 750                   | 750                   | 750                        |
| Operating Position                      | Any                   | Any                   | Any                        |
| Base                                    | SFc10-4               | SFc10-4               | SFc10-4                    |
| Hot Restart                             | yes                   | Yes                   | Yes                        |
| Fig No                                  | 1                     | 1                     | 1                          |
| Symbols & Footnotes                     | 90,161,166,167        | 90,161,166,167        | 90,161,166,167,290         |

# HTI® METAL HALIDE



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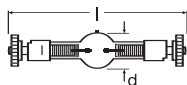
## HTI® SHARXS® DOUBLE-ENDED

| Ordering Abbreviation                   | HTI 700W/D4/75 SHARXS | HTI 700W/D4/75 SHARXS BULK | HTI 1200W/D7/60 SHARXS |
|-----------------------------------------|-----------------------|----------------------------|------------------------|
| Product Number                          | 54242                 | 54281☼                     | 54268☼                 |
| Watts (W)                               | 700                   | 700                        | 1200                   |
| Volts (V)                               | 70                    | 70                         | 100                    |
| Current (A)                             | 10.0/11.0             | 10.0/11.0                  | 12.7/13.8              |
| CRI                                     | >80                   | >80                        | >90                    |
| Lumens (lm)                             | 59000                 | 59000                      | 110000                 |
| Average Luminance (cd/cm <sup>2</sup> ) | 60000                 | 60000                      | 41000                  |
| Color Temp (K)                          | 7500                  | 7500                       | 6000                   |
| Length l max (mm)                       | 136                   | 136                        | 136                    |
| Distance a (mm)                         | 57.5                  | 57.5                       | 57.5                   |
| Diameter d (mm)                         | 20.5                  | 20.5                       | 21                     |
| Electrode Gap - cold (mm)               | 4                     | 4                          | 7                      |
| Avg Rated Life (hrs)                    | 750                   | 750                        | 750                    |
| Operating Position                      | Any                   | Any                        | Any                    |
| Base                                    | SFc10-4               | SFc10-4                    | SFc10-4                |
| Hot Restart                             | Yes                   | Yes                        | Yes                    |
| Fig No                                  | 1                     | 1                          | 1                      |
| Symbols & Footnotes                     | 90,161,166,167        | 90,161,166,167,290         | 90,161,166,167,196     |

## HTI® SHARXS® DOUBLE-ENDED

| Ordering Abbreviation                   | HTI 1200W/D7/60 SHARXS BULK | HTI 1200W/D7/75 SHARXS | HTI 1500W/D7/60 SHARXS |
|-----------------------------------------|-----------------------------|------------------------|------------------------|
| Product Number                          | 54202☼                      | 54269☼                 | 54319☼                 |
| Watts (W)                               | 1200                        | 1200                   | 1500                   |
| Volts (V)                               | 100                         | 100                    | 110                    |
| Current (A)                             | 12.7/13.8                   | 12.7/13.8              | 13.6                   |
| CRI                                     | >90                         | >80                    | >90                    |
| Lumens (lm)                             | 110000                      | 110000                 | 155000                 |
| Average Luminance (cd/cm <sup>2</sup> ) | 41000                       | 41000                  |                        |
| Color Temp (K)                          | 6000                        | 7500                   | 6000                   |
| Length l max (mm)                       | 136                         | 136                    | 136                    |
| Distance a (mm)                         | 57.5                        | 57.5                   | 57.5                   |
| Diameter d (mm)                         | 21                          | 21                     | 25                     |
| Electrode Gap - cold (mm)               | 7                           | 7                      | 7                      |
| Avg Rated Life (hrs)                    | 750                         | 750                    | 750                    |
| Operating Position                      | Any                         | Any                    | Any                    |
| Base                                    | SFc10-4                     | SFc10-4                | SFc10-4                |
| Hot Restart                             | Yes                         | Yes                    | Yes                    |
| Fig No                                  | 1                           | 1                      | 1                      |
| Symbols & Footnotes                     | 90,161,166,167,196,290      | 90,161,166,167         | 90,161,166,167         |

## HTI® METAL HALIDE



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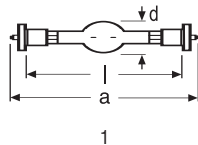
### HTI® BABY SHARXS® DOUBLE-ENDED

| Ordering Abbreviation     | HTI 250W/D5/80 BABY SHARXS | HTI 300W/D5/57 BABY SHARXS | HTI 300W/D5/65 BABY SHARXS |
|---------------------------|----------------------------|----------------------------|----------------------------|
| Product Number            | 54297*                     | 54298*                     | 54299*                     |
| Watts (W)                 | 250                        | 300                        | 300                        |
| Volts (V)                 | 90                         | 80                         | 80                         |
| Current (A)               | 3.2                        | 4.3                        | 4.3                        |
| CRI                       | >80                        | >85                        | >85                        |
| Lumens (lm)               | 18000                      | 20000                      | 22000                      |
| Color Temp (K)            | 8000                       | 5700                       | 6500                       |
| Length L max (mm)         | 93                         | 93                         | 93                         |
| Distance a (mm)           | 35                         | 35                         | 35                         |
| Diameter d (mm)           | 16                         | 16                         | 16                         |
| Electrode Gap - cold (mm) | 5                          | 5.5                        | 5.5                        |
| Avg Rated Life (hrs)      | 3000                       | 3000                       | 750                        |
| Operating Position        | Any                        | Any                        | Any                        |
| Base                      | SFc10-4                    | SFc10-4                    | SFc10-4                    |
| Hot Restart               | Yes                        | Yes                        | Yes                        |
| Fig No                    | 1                          | 1                          | 1                          |
| Symbols & Footnotes       | 1,161,167,206              | 1,161,167,206              | 1,161,167,206              |

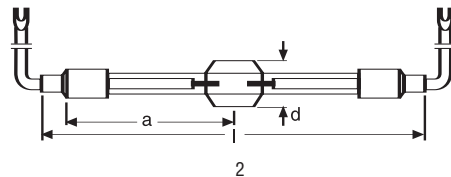
### HTI® BABY SHARXS® DOUBLE-ENDED

| Ordering Abbreviation     | HTI 400W/D5/60 BABY SHARXS | HTI 575W/D5/56 BABY SHARXS |  |
|---------------------------|----------------------------|----------------------------|--|
| Product Number            | 54300*                     | 54359*                     |  |
| Watts (W)                 | 400                        | 575                        |  |
| Volts (V)                 | 95                         | 95                         |  |
| Current (A)               | 7.0                        | 7.0                        |  |
| CRI                       | >85                        | >85                        |  |
| Lumens (lm)               | 33000                      | 43000                      |  |
| Color Temp (K)            | 6000                       | 5600                       |  |
| Length L max (mm)         | 93                         | 93                         |  |
| Distance a (mm)           | 35                         | 35                         |  |
| Diameter d (mm)           | 18                         | 18                         |  |
| Electrode Gap - cold (mm) | 5.5                        | 5                          |  |
| Avg Rated Life (hrs)      | 750                        | 500                        |  |
| Operating Position        | Any                        | Any                        |  |
| Base                      | SFc10-4                    | SFc10-4                    |  |
| Hot Restart               | Yes                        | Yes                        |  |
| Fig No                    | 1                          | 1                          |  |
| Symbols & Footnotes       | 1,161,167,206              | 1,161,167,206              |  |

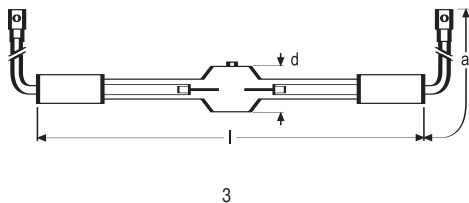
## HTI® METAL HALIDE



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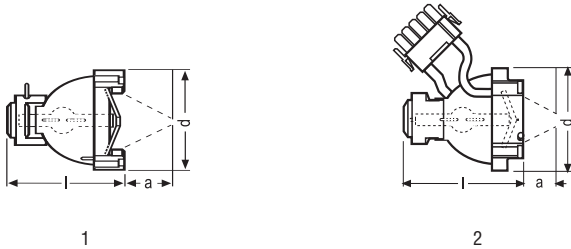


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### HTI® DOUBLE-ENDED - OTHER

| Ordering Abbreviation                   | HTI 300 W/DX       | HTI 2500 W/DEL | HTI 4000 W/DE |
|-----------------------------------------|--------------------|----------------|---------------|
| Product Number                          | 54143 <sup>2</sup> | 54399          | 54133         |
| Watts (W)                               | 300                | 2500           | 4000          |
| Volts (V)                               | 100                | 115            | 115           |
| Current (A)                             | 3.6                | 26.0           | 39.0          |
| CRI                                     | 90                 | 90             | 90            |
| Lumens (lm)                             | 22000              | 270000         | 360000        |
| Average Luminance (cd/cm <sup>2</sup> ) | 20000              |                | 35000         |
| Color Temp (K)                          | 6500               | 6000           | 6300          |
| Length l max (mm)                       | 92                 | 295            | 270           |
| Distance a (mm)                         | 70                 | 108            | 140           |
| Diameter d (mm)                         | 16                 | 31.5           | 40            |
| Electrode Gap - cold (mm)               | 5.5                | 25             | 15            |
| Avg Rated Life (hrs)                    | 750                | 2000           | 500           |
| Operating Position                      | p 45               | p 45           | p 30          |
| Base                                    | SFc10-4            | Special        | S25.5         |
| Hot Restart                             | Yes                | Yes            | Yes           |
| Fig No                                  | 1                  | 2              | 3             |
| Symbols & Footnotes                     | 60,90              | 60,90          | 60,90         |

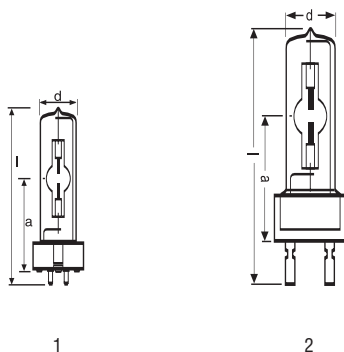
## HTI® METAL HALIDE



## 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)               | 6.0          | 6.0          | 6.0           | 7.3          | 7.3          |
| CRI                       | 70           | 70           | 70            | 70           | 70           |
| 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                    | 1            | 1            | 2             | 2            | 2            |
| Symbols & Footnotes       | 1,60         | 1,60,63      | 60,90         | 1,60         | 1,60         |

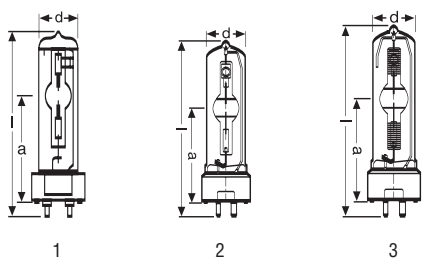
## HSR® METAL HALIDE



### HSR® WITH OUTER JACKET

| Ordering Abbreviation                   | HSR 400/60 | HSR 575/60 | HSR 575/72 | HSR 700/60 | HSR 1200/60 |
|-----------------------------------------|------------|------------|------------|------------|-------------|
| Product Number                          | 54102      | 54115      | 54116      | 54107      | 54168       |
| Watts (W)                               | 400        | 575        | 575        | 700        | 1200        |
| Volts (V)                               | 67         | 95         | 95         | 72         | 100         |
| Current (A)                             | 6.9        | 7.0        | 7.0        | 11.0       | 13.8        |
| CRI                                     | >85        | >85        | >85        | >85        | >85         |
| Lumens (lm)                             | 33000      | 49000      | 49000      | 58000      | 110000      |
| Average Luminance (cd/cm <sup>2</sup> ) | 20000      | 10000      | 10000      | 10000      | 20000       |
| Color Temp (K)                          | 6000       | 6000       | 7200       | 6000       | 6000        |
| Length l max (mm)                       | 110        | 125        | 125        | 155        | 175         |
| Distance a (mm)                         | 62         | 65         | 65         | 75         | 85          |
| Diameter d (mm)                         | 23         | 30         | 30         | 30         | 40          |
| Electrode Gap - cold (mm)               | 5          | 7          | 7          | 8          | 10          |
| Avg Rated Life (hrs)                    | 650        | 1000       | 1000       | 1000       | 1000        |
| Operating Position                      | Any        | Any        | Any        | Any        | Any         |
| Base                                    | GX9.5      | GX9.5      | GX9.5      | G22        | G22         |
| Hot Restart                             | No         | No         | No         | NO         | No          |
| Fig No                                  | 1          | 1          | 1          | 2          | 2           |
| Symbols & Footnotes                     | 90         | 90         | 90         | 90         | 90          |

## HSD® METAL HALIDE



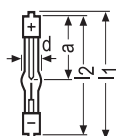
### HSD® 4ARXS METAL HALIDE

| Ordering Abbreviation     | HSD 150W/70 4ARXS | HSD 150W/UL/75 4ARXS | HSD 200W/60 4ARXS | HSD 250W/60 4ARXS |  |
|---------------------------|-------------------|----------------------|-------------------|-------------------|--|
| Product Number            | 54311☼            | 54312☼               | 54167             | 54170             |  |
| Watts (W)                 | 150               | 150                  | 200               | 250               |  |
| Volts (V)                 | 97                | 97                   | 70                | 90                |  |
| Current (A)               | 1.8               | 1.8                  | 3.3               | 3.1               |  |
| CRI                       | >85               | >85                  | >80               | >85               |  |
| Lumens (lm)               | 12000             | 11000                | 13000             | 17000             |  |
| Color Temp (K)            | 7000              | 7500                 | 6000              | 6000              |  |
| Length l (mm)             | 105               | 105                  | 108               | 108               |  |
| Distance a (mm)           | 56                | 56                   | 55                | 55                |  |
| Diameter d (mm)           | 20                | 20                   | 23                | 23                |  |
| Electrode Gap - cold (mm) | 5.5               | 5.5                  | 5                 | 5                 |  |
| Avg Rated Life (hrs)      | 3000              | 6000                 | 2000              | 2000              |  |
| Operating Position        | Any               | Any                  | Any               | Any               |  |
| Base                      | G12               | G12                  | GY9.5             | GY9.5             |  |
| Hot Restart               | No                | No                   | No                | No                |  |
| Fig No                    | 1                 | 1                    | 2                 | 2                 |  |
| Symbols & Footnotes       | 90,161            | 90,161               | 90,161,191        | 90,161            |  |
|                           |                   |                      |                   |                   |  |

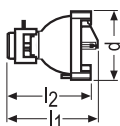
### HSD® 4ARXS METAL HALIDE

| Ordering Abbreviation     | HSD 250W/80 4ARXS | HSD 575W/72 4ARXS | HSD 250W/UL/75 4ARXS | HSD 575W/60 4ARXS | HSD 575W/UL/75 4ARXS |
|---------------------------|-------------------|-------------------|----------------------|-------------------|----------------------|
| Product Number            | 54243             | 54129             | 54288☼               | 54271☼            | 54287☼               |
| Watts (W)                 | 250               | 575               | 250                  | 575               | 575                  |
| Volts (V)                 | 95                | 88                | 90                   | 88                | 88                   |
| Current (A)               | 3.2               | 7.4               | 3.1                  | 7.4               | 7.4                  |
| CRI                       | >85               | >85               | >85                  | >85               | >80                  |
| Lumens (lm)               | 17000             | 45000             | 15000                | 45000             | 43000                |
| Color Temp (K)            | 8000              | 7200              | 7500                 | 6000              | 7500                 |
| Length l (mm)             | 108               | 135               | 108                  | 135               | 135                  |
| Distance a (mm)           | 55                | 65                | 55                   | 65                | 65                   |
| Diameter d (mm)           | 23                | 30                | 23                   | 30                | 30                   |
| Electrode Gap - cold (mm) | 5                 | 7                 | 5                    | 7                 | 7                    |
| Avg Rated Life (hrs)      | 3000              | 3000              | 6000                 | 3000              | 6000                 |
| Operating Position        | Any               | Any               | Any                  | Any               | Any                  |
| Base                      | GY9.5             | GX9.5             | GY9.5                | GX9.5             | GX9.5                |
| Hot Restart               | No                | No                | No                   | No                | No                   |
| Fig No                    | 2                 | 3                 | 2                    | 3                 | 3                    |
| Symbols & Footnotes       | 90,161            | 90,161            | 90,161               | 90,161            | 90,161               |
|                           |                   |                   |                      |                   |                      |

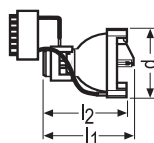
# XBO® ≤450W XENON SHORT ARC



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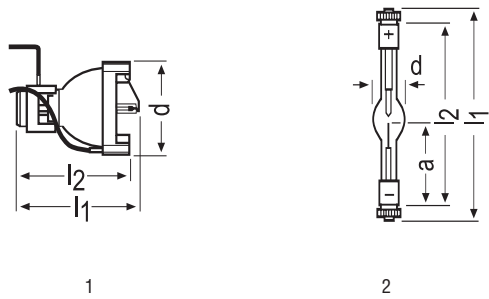
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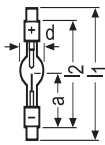
| Ordering Abbreviation                   | XBO 75 W/2        | XBO 75 W/2 OFR    | XBO 100 W OFR     | XBO R 100 W/45 OFR        | XBO R 100 W/45C OFR  |
|-----------------------------------------|-------------------|-------------------|-------------------|---------------------------|----------------------|
| 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 <sup>2</sup> ) | 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 l1 max (mm)                      | 90                | 90                | 90                | 83                        | 83                   |
| Length l2 max (mm)                      | 82                | 82                | 82                | 75                        | 75                   |
| Distance a (mm)                         | 43                | 43                | 44.5              | 0                         | 0                    |
| 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                 |
| Cooling                                 | 0                 | 0                 | 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                     | 38,58,129,157,179 | 56,58,129,157,179 | 56,58,129,157,179 | 56,60,129,146,157,168,190 | 44,56,60,129,157,190 |
|                                         |                   |                   |                   |                           |                      |

XBO® ≤450W XENON SHORT ARC

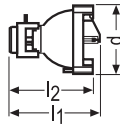


| Ordering Abbreviation                   | XBO R 101 W/45C OFR      | XBO 150 W/1           | XBO 150 W/1 OFR       | XBO 150 W/4       | XBO 150 W/CR OFR            |
|-----------------------------------------|--------------------------|-----------------------|-----------------------|-------------------|-----------------------------|
| Product Number                          | 69190                    | 69234                 | 69235                 | 69238             | 69237                       |
| Watts (W)                               | 100                      | 150                   | 150                   | 150               | 150                         |
| Volts (V)                               | 13                       | 20                    | 20                    | 20                | 18                          |
| Type of Current                         | DC                       | DC                    | DC                    | DC                | DC                          |
| Current (A)                             | 7.0                      | 7.5                   | 7.5                   | 7.5               | 8.5                         |
| Current Control Range (A)               |                          |                       |                       |                   |                             |
| Lumens (lm)                             |                          | 3000                  | 3000                  | 3000              | 2900                        |
| Luminous Intensity (cd)                 |                          | 300                   | 300                   | 300               | 290                         |
| Average Luminance (cd/cm <sup>2</sup> ) |                          | 15000                 | 15000                 | 15000             | 20000                       |
| Luminous Area -- w x h (mm)             | 0                        | 0.5 x 2.2             | 0.5 x 2.2             | 0.5 x 2.2         | 0.5 x 1.6                   |
| Length l1 max (mm)                      | 83                       | 150                   | 150                   | 150               | 150                         |
| Length l2 max (mm)                      | 75                       | 127                   | 127                   | 127               | 127                         |
| Distance a (mm)                         | 0                        | 57                    | 57                    | 57                | 57                          |
| Diameter d (mm)                         | 67                       | 20                    | 20                    | 20                | 20                          |
| Avg Rated Life Vertical (hrs)           |                          | 1200                  | 1200                  | 1200              | 3000                        |
| Avg Rated Life Horizontal (hrs)         | 500                      |                       |                       |                   | 1200                        |
| Operating Position                      | p 15                     | s 15                  | s 15                  | s 15              | s15 p15                     |
| Cooling                                 | Required                 | Required              | Required              | Required          | Required                    |
| Base Anode                              |                          | SFc12-4               | SFc12-4               | SFc12-4           | SFc12-4                     |
| Base Cathode                            |                          | SFcX12-4              | SFcX12-4              | SFcX12.4          | SFcX12-4                    |
| Fig No                                  | 1                        | 2                     | 2                     | 2                 | 2                           |
| Symbols & Footnotes                     | 44,56,60,129,157,190,202 | 39,58,129,157,179,212 | 56,58,129,157,179,212 | 40,58,129,157,179 | 56,58,60,68,129,157,179,213 |
|                                         |                          |                       |                       |                   |                             |

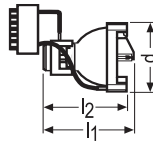
## XBO® ≤450W XENON SHORT ARC



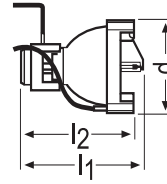
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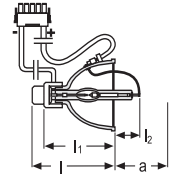
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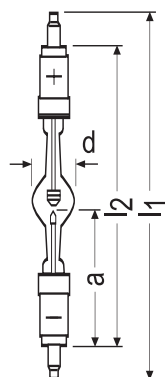
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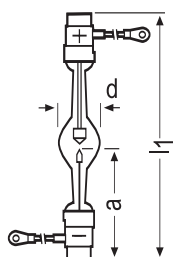
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| Ordering Abbreviation                   | XBO 150 W/S             | XBO R 180 W/45/OFR   | XBO R 180 W/45C OFR  | XBO R 181 W/45C OFR      | XBO R 300 W/60C OFR  |
|-----------------------------------------|-------------------------|----------------------|----------------------|--------------------------|----------------------|
| Product Number                          | 69236                   | 69186                | 69183                | 69184                    | 69167                |
| Watts (W)                               | 150                     | 180                  | 180                  | 180                      | 300                  |
| Volts (V)                               | 20                      | 14                   | 14                   | 14                       | 17                   |
| Type of Current                         | DC                      | DC                   | DC                   | DC                       | DC                   |
| Current (A)                             | 7.5                     | 12.0                 | 12.0                 | 12.0                     | 16.0                 |
| Current Control Range (A)               |                         |                      |                      |                          | 14 - 19              |
| Lumens (lm)                             | 2200                    |                      |                      |                          |                      |
| Luminous Intensity (cd)                 | 220                     |                      |                      |                          |                      |
| Average Luminance (cd/cm <sup>2</sup> ) | 18000                   |                      |                      |                          |                      |
| Luminous Area -- w x h (mm)             | 0.5 x 1.9               | 0                    | 0                    | 0                        | 0                    |
| Length l1 max (mm)                      | 117                     | 90                   | 90                   | 90                       | 62                   |
| Length l2 max (mm)                      | 96                      | 75                   | 75                   | 75                       | 30                   |
| Distance a (mm)                         | 47.5                    | 0                    | 0                    | 0                        | 60                   |
| Diameter d (mm)                         | 20                      | 67                   | 67                   | 67                       | 82.5                 |
| Avg Rated Life Vertical (hrs)           | 1000                    | 500                  | 500                  | 500                      |                      |
| Avg Rated Life Horizontal (hrs)         | 800                     |                      |                      |                          | 1000                 |
| Operating Position                      | s15 p15                 | p 15                 | p 15                 | p 15                     | p20                  |
| Cooling                                 | Required                | Required             | Required             | Required                 | Required             |
| Base Anode                              | SFa12-11                |                      |                      |                          |                      |
| Base Cathode                            | SFa12-11                |                      |                      |                          |                      |
| Fig No                                  | 1                       | 2                    | 3                    | 4                        | 5                    |
| Symbols & Footnotes                     | 43,58,60,68,129,157,179 | 36,56,60,129,157,190 | 44,56,60,129,157,190 | 44,56,60,129,157,190,202 | 44,56,60,129,157,165 |

# XBO® ≤450W XENON SHORT ARC



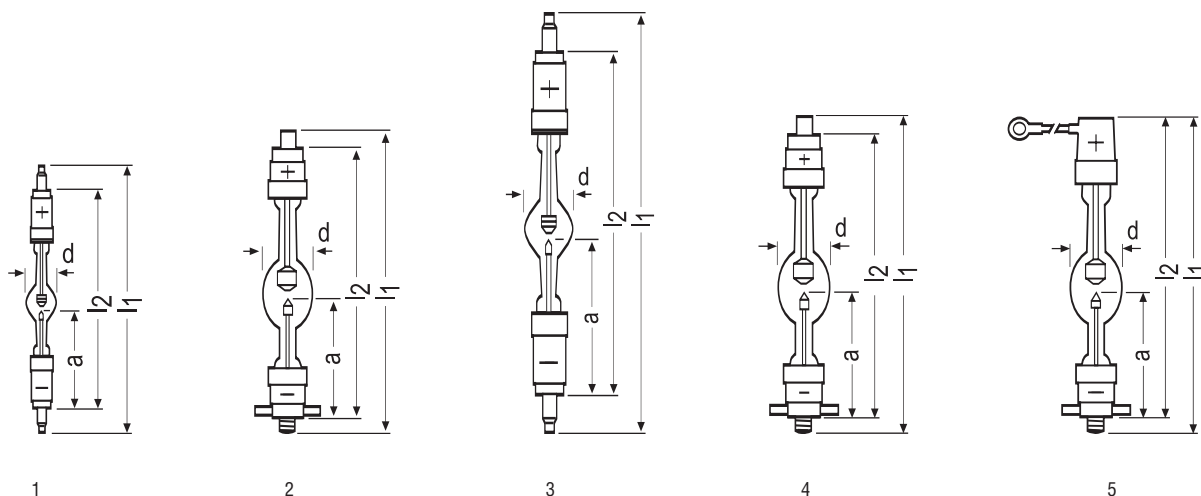
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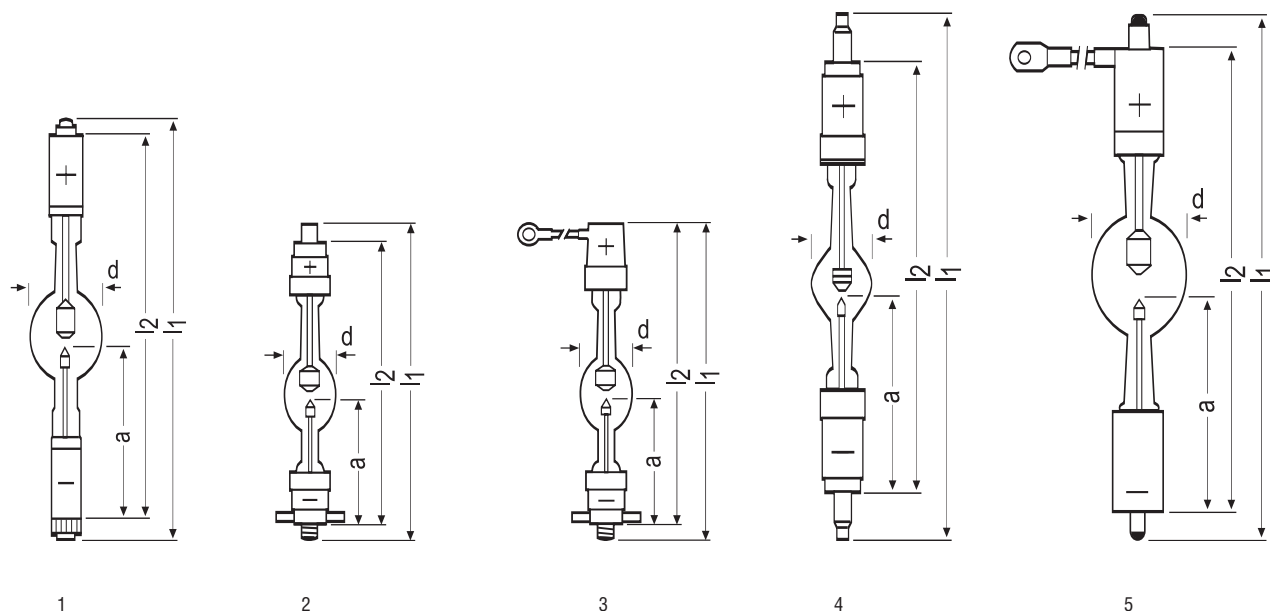
| Ordering Abbreviation                   | XBO 450 W            | XBO 450 W OFR     | XBO 450 W/1    | XBO 450 W/2 OFR   | XBO 450 W/4       |
|-----------------------------------------|----------------------|-------------------|----------------|-------------------|-------------------|
| Product Number                          | 69241                | 69245             | 69242          | 69243             | 69244             |
| Watts (W)                               | 450                  | 450               | 450            | 450               | 450               |
| Volts (V)                               | 17                   | 17                | 17             | 17                | 17                |
| Type of Current                         | DC                   | DC                | DC             | DC                | DC                |
| Current (A)                             | 25.0                 | 25.0              | 25.0           | 25.0              | 25.0              |
| Current Control Range (A)               | 17-30                | 17-30             | 17-30          | 17-30             | 17-30             |
| Lumens (lm)                             | 13000                | 13000             | 13000          | 13000             | 13000             |
| Luminous Intensity (cd)                 | 1300                 | 1300              | 1300           | 1300              | 1300              |
| Average Luminance (cd/cm <sup>2</sup> ) | 35000                | 35000             | 45000          | 35000             | 35000             |
| Luminous Area -- w x h (mm)             | 0.9 x 2.7            | 0.9 x 2.7         | 0.7 x 2.2      | 0.9 x 2.7         | 0.9 x 2.7         |
| Length l1 max (mm)                      | 260                  | 260               | 260            | 177               | 260               |
| Length l2 max (mm)                      |                      | 212               | 212            | 0                 | 212               |
| Distance a (mm)                         | 95.5                 | 95.5              | 95.5           | 79                | 95.5              |
| Diameter d (mm)                         | 29                   | 29                | 29             | 29                | 29                |
| Avg Rated Life Vertical (hrs)           | 2000                 | 2000              | 800            | 2000              | 2000              |
| Avg Rated Life Horizontal (hrs)         |                      |                   | 800            |                   |                   |
| Operating Position                      | s 30                 | s 30              | s 100          | s 30              | s 30              |
| Cooling                                 | Required             | Required          | Required       | Required          | Required          |
| Base Anode                              | SFa20-8              | SFa20-8           | SFa20-8        | SK19/36           | SFa20-8           |
| Base Cathode                            | SFa20-10             | SFa20-10          | SFa20-10       | SK19/36           | SFa20-10          |
| Fig No                                  | 1                    | 1                 | 1              | 2                 | 1                 |
| Symbols & Footnotes                     | 41,42,58,129,157,179 | 56,58,129,157,179 | 58,129,157,179 | 56,58,129,157,179 | 40,58,129,157,179 |

# XBO® >450W XENON SHORT ARC CINEMA FILM PROJECTION



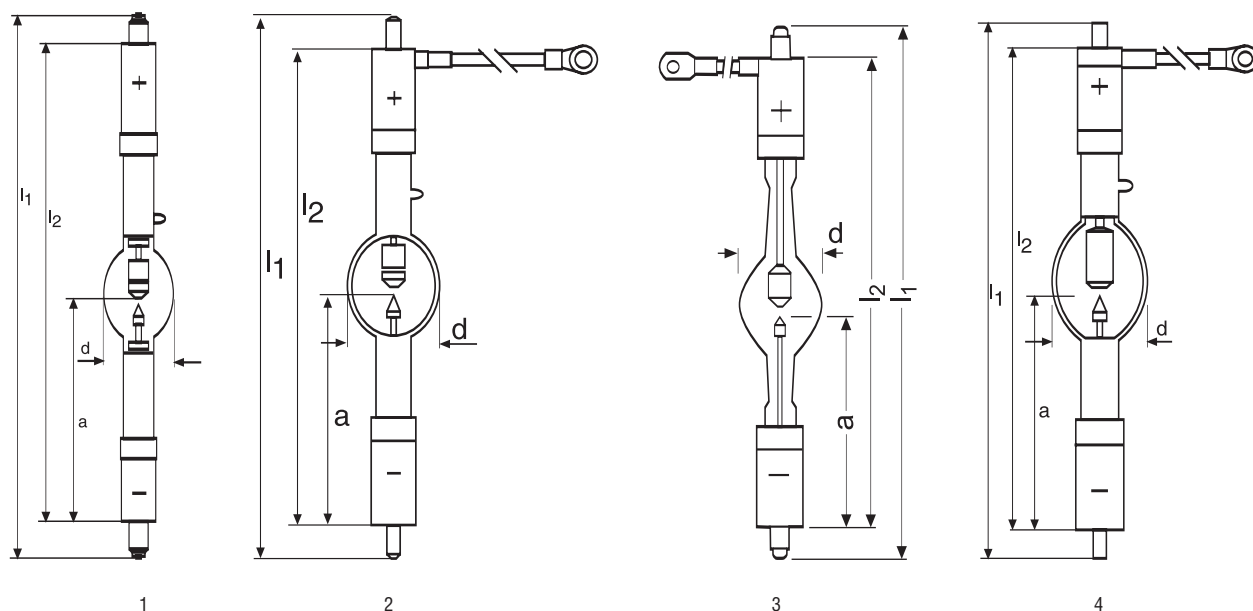
| Ordering Abbreviation                   | XBO 500 W/H OFR             | XBO 700 W/HS OFR           | XBO 900 W OFR     | XBO 1000 W/HS OFR          | XBO 1000 W/HSC OFR            |
|-----------------------------------------|-----------------------------|----------------------------|-------------------|----------------------------|-------------------------------|
| 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 <sup>2</sup> ) | 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 l1 max (mm)                      | 190                         | 235                        | 325               | 235                        | 236                           |
| Length l2 max (mm)                      | 165                         | 205                        | 277               | 205                        | 222                           |
| Distance a (mm)                         | 75                          | 95                         | 123               | 95                         | 95                            |
| Diameter d (mm)                         | 35                          | 40                         | 40                | 40                         | 40                            |
| Warranty                                | 2000                        | 1500                       | 2400              | 2000                       | 2000                          |
| Operating Position                      | s30 p30                     | s20 p20                    | s 30              | s20 p20                    | s20 p20                       |
| 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                     | 45,56,58,60,109,129,157,179 | 43,45,56,58,60,129,157,179 | 56,58,129,157,179 | 43,45,56,58,60,129,157,179 | 43,44,45,56,58,60,129,157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



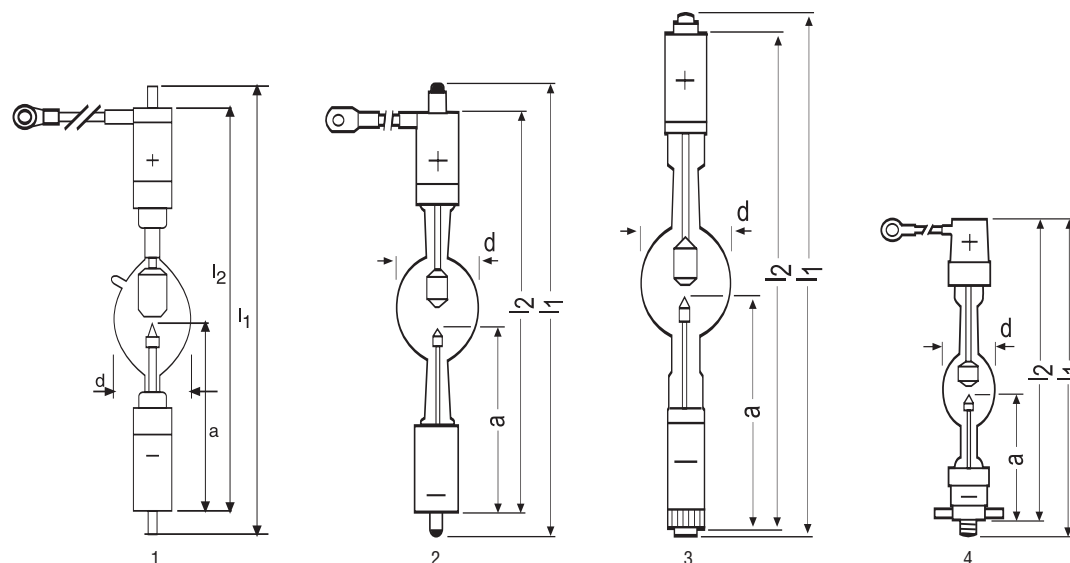
| Ordering Abbreviation                   | XBO 1000 W/HTP OFR             | XBO 1600 W/HS OFR          | XBO 1600 W/HSC OFR            | XBO 1600 W OFR    | XBO 1600 W/CA OFR    |
|-----------------------------------------|--------------------------------|----------------------------|-------------------------------|-------------------|----------------------|
| 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                          | 50-75                      | 50-70                         | 45-75             | 45-75                |
| Lumens (lm)                             | 35000                          | 70000                      | 70000                         | 60000             | 60000                |
| Luminous Intensity (cd)                 | 3200                           | 5500                       | 5500                          | 6000              | 6000                 |
| Average Luminance (cd/cm <sup>2</sup> ) | 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 l1 max (mm)                      | 330                            | 235                        | 236                           | 370               | 370                  |
| Length l2 max (mm)                      | 277                            | 205                        | 222                           | 322               | 322                  |
| Distance a (mm)                         | 123                            | 95                         | 95                            | 142.5             | 143                  |
| Diameter d (mm)                         | 46                             | 46                         | 46                            | 52                | 52                   |
| Warranty                                | 2400                           | 2000                       | 2000                          | 2400              | 2400                 |
| Operating Position                      | s30 p30                        | s20 p20                    | s20 p20                       | s 30              | s 30                 |
| Cooling                                 | Required                       | Required                   | Required                      | Required          | Required             |
| Magnetic Arc Stabilization              | Required                       |                            |                               |                   |                      |
| Base Anode                              | SFa25-14                       | SFa27-11                   | SK27/50                       | SFa27-10          | SFaX27-10            |
| Base Cathode                            | SFc25-14                       | SFcX27-8                   | SFcX27-8                      | SFa27-12          | SFa27-12             |
| Fig No                                  | 1                              | 2                          | 3                             | 4                 | 5                    |
| Symbols & Footnotes                     | 45,51,56,58,60,109,129,157,179 | 43,45,56,58,60,129,157,179 | 43,44,45,56,58,60,129,157,179 | 56,58,129,157,179 | 47,56,58,129,157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



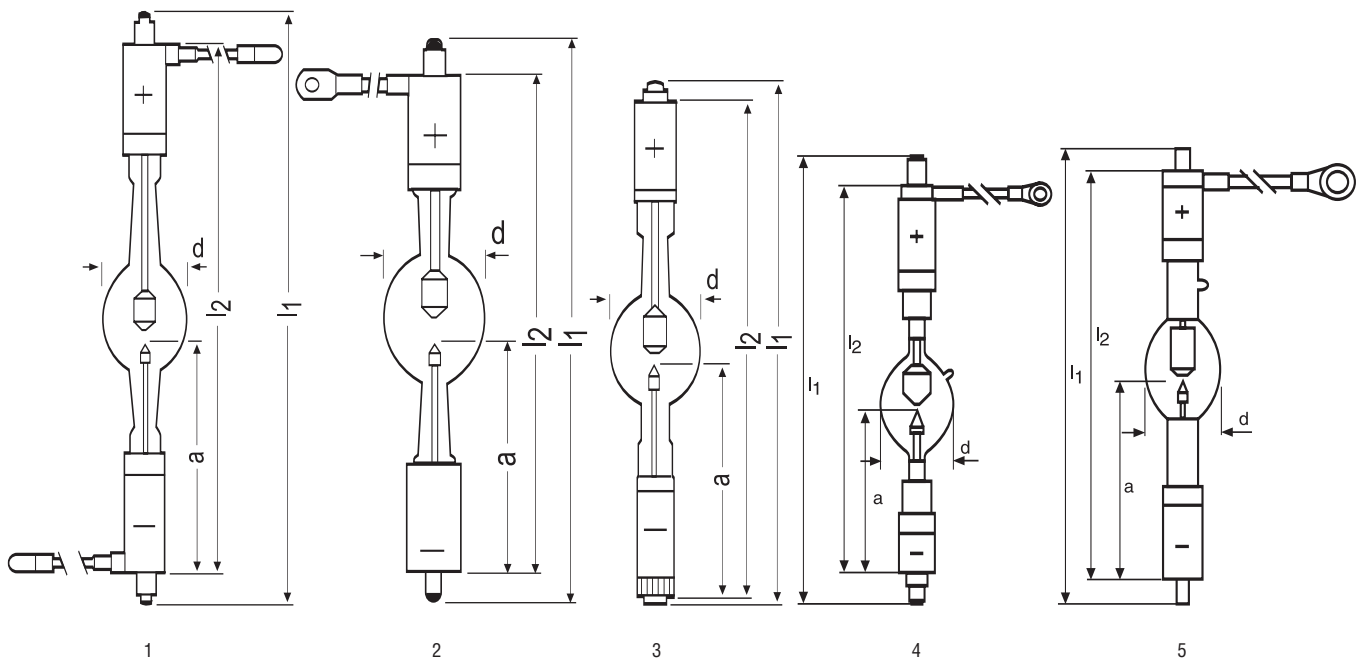
| Ordering Abbreviation                   | XBO 2000 W/DTP OFR              | XBO 2000 W/H CL OFR         | XBO 2000 W/H OFR            | XBO 2000 W/H XL OFR         | XBO 2000 W/HCC OFR             |
|-----------------------------------------|---------------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------------------|
| Product Number                          | 69155☼                          | 69470☼                      | 69385☼                      | 69477☼                      | 69384☼                         |
| Watts (W)                               | 2000                            | 2000                        | 2000                        | 2000                        | 2000                           |
| Volts (V)                               | 25                              | 28                          | 28                          | 27                          | 28                             |
| Type of Current                         | DC                              | DC                          | DC                          | DC                          | DC                             |
| Current (A)                             | 80                              | 70                          | 70                          | 70                          | 70                             |
| 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 <sup>2</sup> ) | 75000                           | 80000                       | 80000                       | 75000                       | 80000                          |
| Luminous Area -- w x h (mm)             | 1.3 x 4.0                       | 1.3 x 4.8                   | 1.3 x 4.8                   | 1.3 x 4.8                   | 1.3 x 4.8                      |
| Length l1 max (mm)                      | 403                             | 370                         | 370                         | 365                         | 370                            |
| Length l2 max (mm)                      | 354                             | 322                         | 322                         | 320                         | 322                            |
| Distance a (mm)                         | 160                             | 142.5                       | 142.5                       | 142.5                       | 142.5                          |
| Diameter d (mm)                         | 52                              | 46                          | 52                          | 52                          | 52                             |
| Warranty                                | 2400                            | 2400                        | 2400                        | 3500                        | 2400                           |
| Operating Position                      | s30 p30                         | s30 p30                     | s30 p30                     | s30 p30                     | s30 p30                        |
| Cooling                                 | Required                        | Required                    | Required                    | Required                    | Required                       |
| Magnetic Arc Stabilization              | Required                        |                             |                             | Required                    |                                |
| Base Anode                              | SFa 25-14                       | SFaX27-10                   | SFaX27-10                   | SFaX27-10                   | SFaX27-10                      |
| Base Cathode                            | SFc25-14                        | SFaX27-12                   | SFaX27-12                   | SFaX27-12                   | SFaX27-12                      |
| Fig No                                  | 1                               | 2                           | 3                           | 4                           | 3                              |
| Symbols & Footnotes                     | 51,56,58,60,109,129,157,179,279 | 45,56,58,60,129,157,179,281 | 45,56,58,60,129,157,179,193 | 45,56,58,60,129,157,179,280 | 44,45,56,58,60,129,157,179,195 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



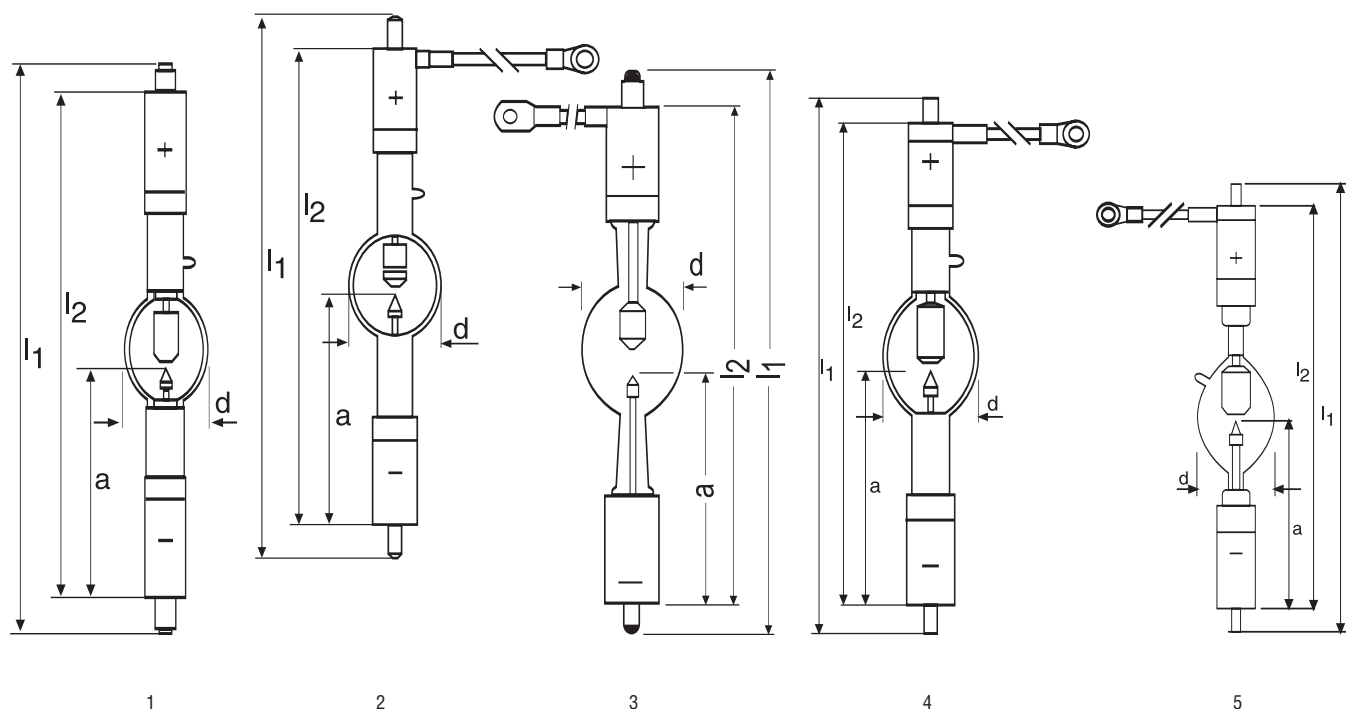
| Ordering Abbreviation                   | XBO 2000 W/HPS OFR            | XBO 2000 W/HS OFR           | XBO 2000 W/HTP OFR              | XBO 2000 W/SHSC OFR     | XBO 2001 W/HTP OFR              |
|-----------------------------------------|-------------------------------|-----------------------------|---------------------------------|-------------------------|---------------------------------|
| Product Number                          | 69486                         | 69270                       | 69247                           | 69256                   | 69310                           |
| Watts (W)                               | 2000                          | 2000                        | 2000                            | 2000                    | 2000                            |
| Volts (V)                               | 25                            | 24                          | 27                              | 27                      | 25                              |
| Type of Current                         | DC                            | DC                          | DC                              | DC                      | DC                              |
| Current (A)                             | 80                            | 80                          | 70                              | 70                      | 80                              |
| Current Control Range (A)               | 60-90                         | 50-85                       | 50-85                           | 50-85                   | 50-85                           |
| Lumens (lm)                             | 75000                         | 80000                       | 80000                           | 80000                   | 80000                           |
| Luminous Intensity (cd)                 | 8000                          | 7500                        | 7500                            | 7500                    | 7500                            |
| Average Luminance (cd/cm <sup>2</sup> ) | 160000                        | 80000                       | 75000                           | 80000                   | 75000                           |
| Luminous Area -- w x h (mm)             | 1.3 x 3.2                     | 1.3 x 4.0                   | 1.3 x 4.8                       | 1.3 x 4.0               | 1.3 x 4.0                       |
| Length l1 max (mm)                      | 332                           | 342                         | 375                             | 236                     | 375                             |
| Length l2 max (mm)                      | 295                           | 302                         | 322                             | 222                     | 322                             |
| Distance a (mm)                         | 128                           | 145                         | 142.5                           | 95                      | 142.5                           |
| Diameter d (mm)                         | 46                            | 60                          | 52                              | 46                      | 60                              |
| Warranty                                | 2400                          | 2400                        | 2400                            | 2000                    | 2400                            |
| Operating Position                      | s15 p15                       | s30 p30                     | s30 p30                         | s20 p20                 | s30 p30                         |
| Cooling                                 | Required                      | Required                    | Required                        | Required                | Required                        |
| Magnetic Arc Stabilization              |                               |                             | Required                        |                         | Required                        |
| Base Anode                              | SFaX30-14/68                  | SFaX27-9.5                  | SFa25-14                        | SK27/50                 | SFa25-14                        |
| Base Cathode                            | SFc30-20/50                   | SFa27-7.9                   | SFc25-14                        | SFcX27-8                | SFc25-14                        |
| Fig No                                  | 1                             | 2                           | 3                               | 4                       | 3                               |
| Symbols & Footnotes                     | 56,58,60,129,157,179, 282,283 | 43,45,56,58,60,129, 157,179 | 45,51,56,58,60,109, 129,157,179 | 49,56,58,60,129,157,179 | 45,51,56,58,60,109,129, 157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



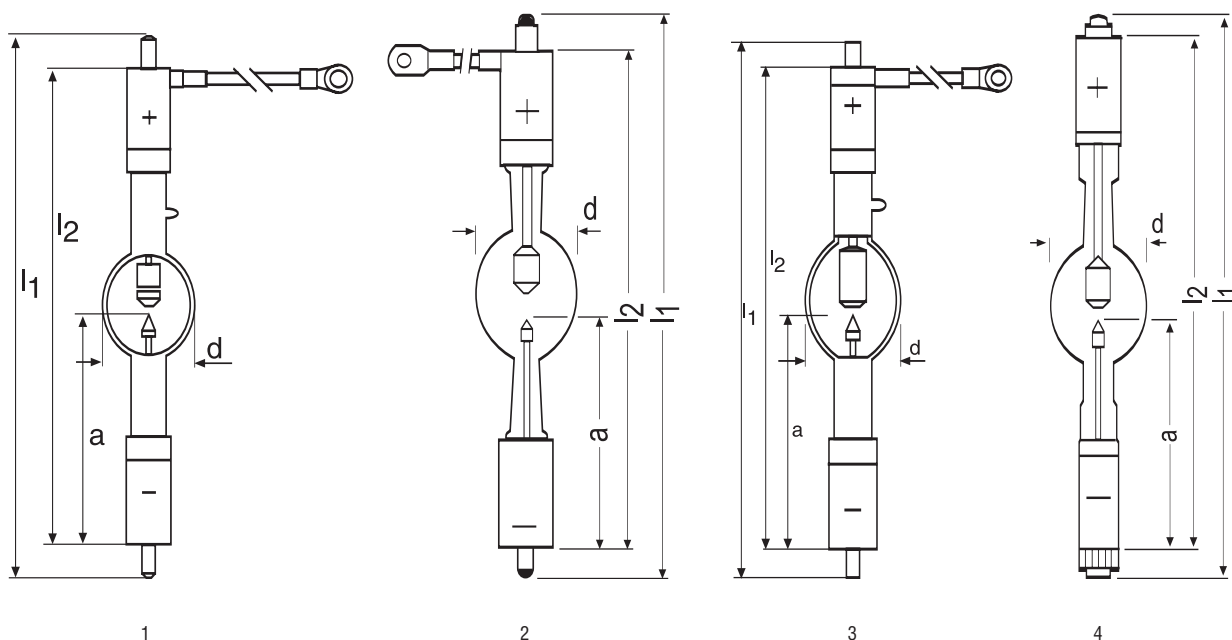
| Ordering Abbreviation                   | XBO 2500 W OFR    | XBO 2500 W/HS OFR          | XBO 2500 W/HTP OFR             | XBO 3000 W/DHP OFR           | XBO 3000 W/DHS OFR             |
|-----------------------------------------|-------------------|----------------------------|--------------------------------|------------------------------|--------------------------------|
| Product Number                          | 69248             | 69249                      | 69160*                         | 69480*                       | 69462*                         |
| Watts (W)                               | 2500              | 2500                       | 2500                           | 2600                         | 3000                           |
| Volts (V)                               | 29                | 28                         | 28                             | 29                           | 29                             |
| Type of Current                         | DC                | DC                         | DC                             | DC                           | DC                             |
| Current (A)                             | 85                | 90                         | 90                             | 90                           | 110                            |
| Current Control Range (A)               | 60-95             | 70-100                     | 70-100                         | 80-110                       | 60-120                         |
| Lumens (lm)                             | 100000            | 100000                     | 100000                         | 140000                       | 130000                         |
| Luminous Intensity (cd)                 | 9500              | 10000                      | 9500                           | 13500                        | 12000                          |
| Average Luminance (cd/cm <sup>2</sup> ) | 61000             | 80000                      | 60000                          | 180000                       | 105000                         |
| Luminous Area -- w x h (mm)             | 1.5 x 6.0         | 1.5 x 4.5                  | 1.5 x 6.0                      | 1.3 x 3.5                    | 1.7 x 4.0                      |
| Length l1 max (mm)                      | 428               | 342                        | 398                            | 340                          | 340                            |
| Length l2 max (mm)                      | 382               | 302                        | 357                            | 294                          | 300                            |
| Distance a (mm)                         | 167.5             | 145                        | 165                            | 123                          | 145                            |
| Diameter d (mm)                         | 60                | 60                         | 60                             | 55                           | 55                             |
| Warranty                                | 2000              | 1500                       | 1500                           | 1500                         | 1500                           |
| Operating Position                      | s 30              | s30 p20                    | s30 p30                        | s15 p15                      | s30 p30                        |
| Cooling                                 |                   | Required                   | Required                       | Required                     | Required                       |
| Magnetic Arc Stabilization              |                   |                            | Required                       |                              | Required                       |
| Base Anode                              | SFaX27-13         | SFaX27-9.5                 | SFa27-14                       | SFaX27-14/80                 | SFaX 27-9.5                    |
| Base Cathode                            | SFaX27-14         | SFa27-7.9                  | SFc27-14                       | SFc27-16/45                  | SFa 27-7.9                     |
| Fig No                                  | 1                 | 2                          | 3                              | 4                            | 5                              |
| Symbols & Footnotes                     | 56,58,129,157,179 | 43,45,56,58,60,129,157,179 | 45,51,56,58,60,109,129,157,179 | 56,58,60,129,157,179,279,282 | 43,45,56,58,60,129,157,179,279 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



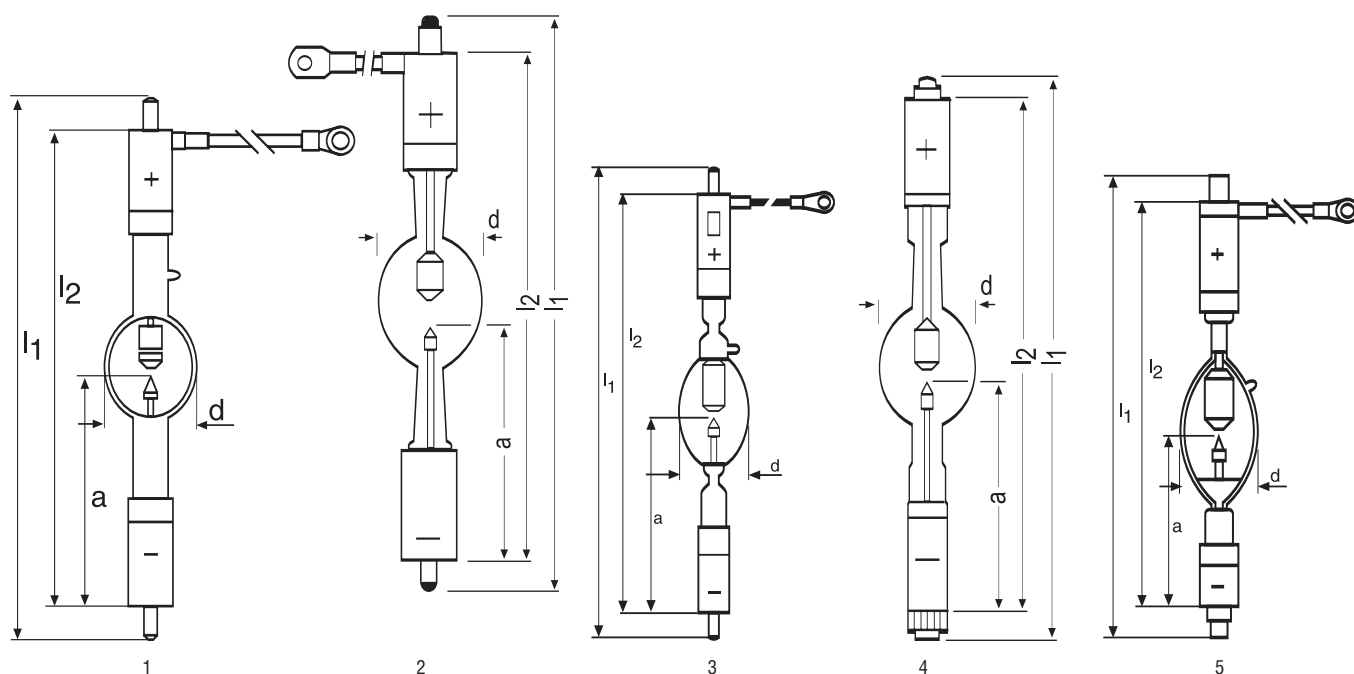
| Ordering Abbreviation                   | XBO 3000 W/DTP OFR    | XBO 3000 W/H CL OFR         | XBO 3000 W/H OFR            | XBO 3000 W/H XL OFR         | XBO 3000 W/HPS OFR           |
|-----------------------------------------|-----------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|
| Product Number                          | 69154☼                | 69475☼                      | 69251                       | 69478☼                      | 69487☼                       |
| Watts (W)                               | 3000                  | 3000                        | 3000                        | 3000                        | 3000                         |
| Volts (V)                               | 27                    | 30                          | 30                          | 30                          | 29                           |
| Type of Current                         | DC                    | DC                          | DC                          | DC                          | DC                           |
| Current (A)                             | 110                   | 100                         | 100                         | 100                         | 105                          |
| Current Control Range (A)               | 60-120                | 60-110                      | 60-110                      | 70-110                      | 70-110                       |
| Lumens (lm)                             | 130000                | 130000                      | 130000                      | 130000                      | 140000                       |
| Luminous Intensity (cd)                 | 15000                 | 12000                       | 12000                       | 12000                       | 13500                        |
| Average Luminance (cd/cm <sup>2</sup> ) | 120000                | 85000                       | 85000                       | 90000                       | 180000                       |
| Luminous Area -- w x h (mm)             | 1.5 x 4.0             | 1.7 x 5.0                   | 1.7 x 5.0                   | 1.7 x 5.0                   | 1.3 x 3.5                    |
| Length l1 max (mm)                      | 403                   | 428                         | 428                         | 423                         | 332                          |
| Length l2 max (mm)                      | 352                   | 382                         | 382                         | 380                         | 295                          |
| Distance a (mm)                         | 160                   | 167.5                       | 167.5                       | 167.5                       | 128                          |
| Diameter d (mm)                         | 60                    | 55                          | 66                          | 60                          | 55                           |
| Warranty                                | 1500                  | 1500                        | 1500                        | 2200                        | 1000                         |
| Operating Position                      | s30 p30               | s30 p30                     | s30 p30                     | s30 p30                     | s15 p15                      |
| Cooling                                 | Required              | Required                    | Required                    | Required                    | Required                     |
| Magnetic Arc Stabilization              | Required              | Required                    | Required                    | Required                    |                              |
| Base Anode                              | SFc27-14              | SFaX27-13                   | SFaX27-13                   | SFaX27-13                   | SFaX30-14/68                 |
| Base Cathode                            | SFa27-14              | SFa27-14                    | SFa27-14                    | SFa27-14                    | SFc30-20/50                  |
| Fig No                                  | 1                     | 2                           | 3                           | 4                           | 5                            |
| Symbols & Footnotes                     | 51,56,129,157,179,279 | 45,56,58,60,129,157,179,281 | 45,56,58,60,109,129,157,179 | 45,56,58,60,129,157,179,280 | 56,58,60,129,157,179,282,283 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



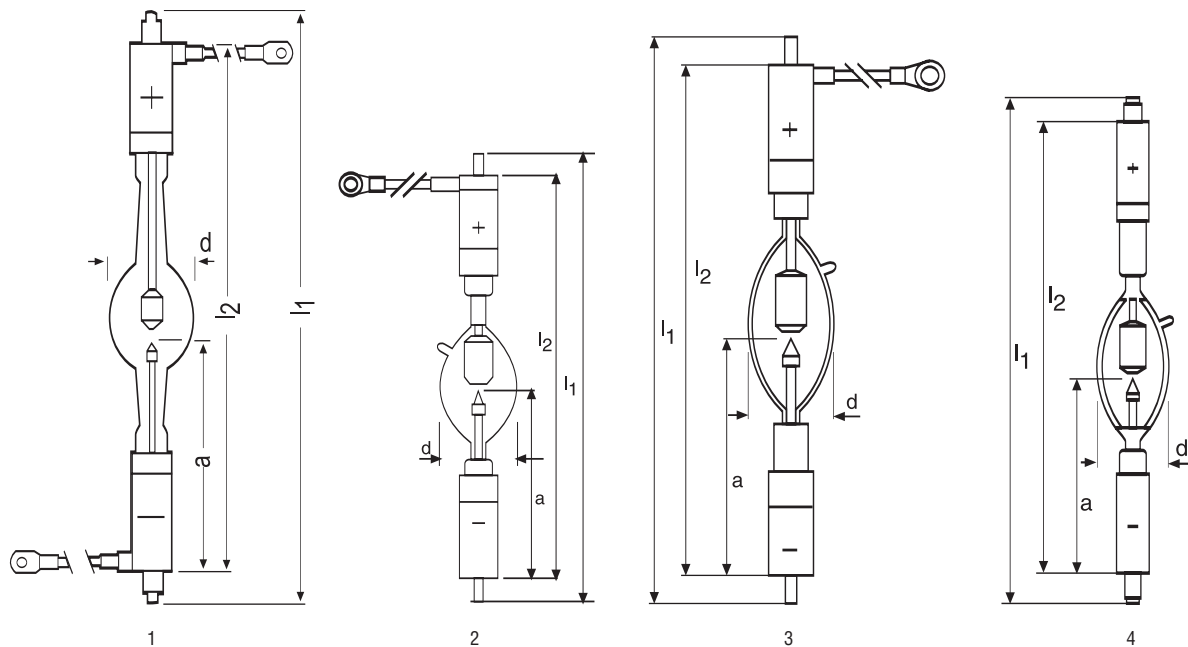
| Ordering Abbreviation                   | XBO 3000 W/HS CL OFR     | XBO 3000 W/HS OFR              | XBO 3000 W/HS XL OFR           | XBO 3000 W/HS LA OFR               | XBO 3000 W/HTP OFR         |
|-----------------------------------------|--------------------------|--------------------------------|--------------------------------|------------------------------------|----------------------------|
| Product Number                          | 69153                    | 69250                          | 69479                          | 69390                              | 69252                      |
| Watts (W)                               | 3000                     | 3000                           | 3000                           | 3000                               | 3000                       |
| Volts (V)                               | 29                       | 29                             | 30                             | 29                                 | 29                         |
| Type of Current                         | DC                       | DC                             | DC                             | DC                                 | DC                         |
| Current (A)                             | 100                      | 100                            | 100                            | 110                                | 100                        |
| Current Control Range (A)               | 60-110                   | 60-110                         | 70-110                         | 60-120                             | 60-110                     |
| Lumens (lm)                             | 130000                   | 130000                         | 130000                         | 130000                             | 130000                     |
| Luminous Intensity (cd)                 | 12000                    | 12000                          | 12000                          | 12000                              | 12000                      |
| Average Luminance (cd/cm <sup>2</sup> ) | 90000                    | 90000                          | 90000                          | 105000                             | 85000                      |
| Luminous Area -- w x h (mm)             | 1.7 x 5.0                | 1.7 x 5.0                      | 1.7 x 5.0                      | 1.7 x 4.0                          | 1.7 x 5.0                  |
| Length l1 max (mm)                      | 342                      | 342                            | 340                            | 342                                | 405                        |
| Length l2 max (mm)                      | 302                      | 302                            | 300                            | 302                                | 357                        |
| Distance a (mm)                         | 145                      | 145                            | 145                            | 145                                | 162.5                      |
| Diameter d (mm)                         | 55                       | 60                             | 60                             | 54                                 | 66                         |
| Warranty                                | 1500                     | 1500                           | 2200                           | 1500                               | 1500                       |
| Operating Position                      | s30 p30                  | s30 p30                        | s30 p30                        | s30 p30                            | s30 p30                    |
| Cooling                                 | Required                 | Required                       | Required                       | Required                           | Required                   |
| Magnetic Arc Stabilization              | Required                 | Required                       | Required                       | Required                           |                            |
| Base Anode                              | SFaX27-9.5               | SFaX27-9.5                     | SFaX27-9.5                     | SFaX 27-9.5                        | SFa27-14                   |
| Base Cathode                            | SFa27-7.9                | SFa27-7.9                      | SFa27-7.9                      | SFa 27-7.9                         | SFc27-14                   |
| Fig No                                  | 1                        | 2                              | 3                              | 2                                  | 4                          |
| Symbols & Footnotes                     | 56,58,60,129,157,179,281 | 43,45,56,58,60,109,129,157,179 | 43,45,56,58,60,129,157,179,280 | 43,45,56,58,60,109,129,157,179,210 | 45,51,56,58,60,129,157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



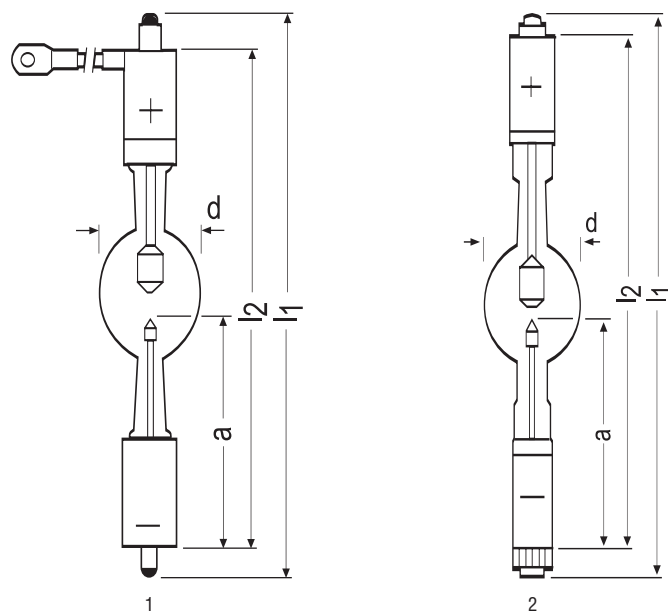
| Ordering Abbreviation                   | XBO 4000 W/HS CL OFR      | XBO 4000 W/HS OFR               | XBO 4000 W/HS XL OFR            | XBO 4000 W/HTP OFR          | XBO 4000 W/DHP OFR            |
|-----------------------------------------|---------------------------|---------------------------------|---------------------------------|-----------------------------|-------------------------------|
| Product Number                          | 69394☼                    | 69254                           | 69474☼                          | 69296                       | 69481☼                        |
| Watts (W)                               | 4000                      | 4000                            | 4000                            | 4000                        | 4200                          |
| Volts (V)                               | 28                        | 28                              | 27                              | 30                          | 34                            |
| Type of Current                         | DC                        | DC                              | DC                              | DC                          | DC                            |
| Current (A)                             | 135                       | 135                             | 135                             | 130                         | 125                           |
| Current Control Range (A)               | 80-150                    | 80-150                          | 80-150                          | 100-140                     | 100-130                       |
| Lumens (lm)                             | 155000                    | 155000                          | 155000                          | 155000                      | 170000                        |
| Luminous Intensity (cd)                 | 17000                     | 17000                           | 17000                           | 16000                       | 17000                         |
| Average Luminance (cd/cm <sup>2</sup> ) | 90000                     | 90000                           | 90000                           | 90000                       | 140000                        |
| Luminous Area -- w x h (mm)             | 1.9 x 6.0                 | 1.9 x 6.0                       | 1.9 x 6.0                       | 1.9 x 6.0                   | 1.6 x 5.0                     |
| Length l1 max (mm)                      | 410                       | 410                             | 408                             | 433                         | 340                           |
| Length l2 max (mm)                      | 370                       | 370                             | 368                             | 382                         | 294                           |
| Distance a (mm)                         | 171                       | 171                             | 171                             | 167.5                       | 123                           |
| Diameter d (mm)                         | 60                        | 70                              | 70                              | 70                          | 55                            |
| Warranty                                | 1000                      | 1000                            | 1500                            | 1000                        | 700                           |
| Operating Position                      | s20 p20                   | s20 p20                         | s20p20                          | s20 p20                     | s15 p15                       |
| Cooling                                 | Required                  | Required                        | Required                        | Required                    | Required                      |
| Magnetic Arc Stabilization              | Required                  | Required                        | Required                        |                             |                               |
| Base Anode                              | SFaX30-9.5                | SFaX30-9.5                      | SFaX30-9.5                      | SFa27-14                    | SFaX27-14/80                  |
| Base Cathode                            | SFa30-7.9                 | SFa30-7.9                       | SFa30-7.9                       | SFc27-14                    | SFc27-16/45                   |
| Fig No                                  | 1                         | 2                               | 3                               | 4                           | 5                             |
| Symbols & Footnotes                     | 56,58,60,129,157,179, 281 | 43,45,56,58,60,109,129, 157,179 | 43,45,56,58,60,129, 157,179,280 | 45,51,56,58,60,129, 157,179 | 56,58,60,129,157,179, 279,282 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



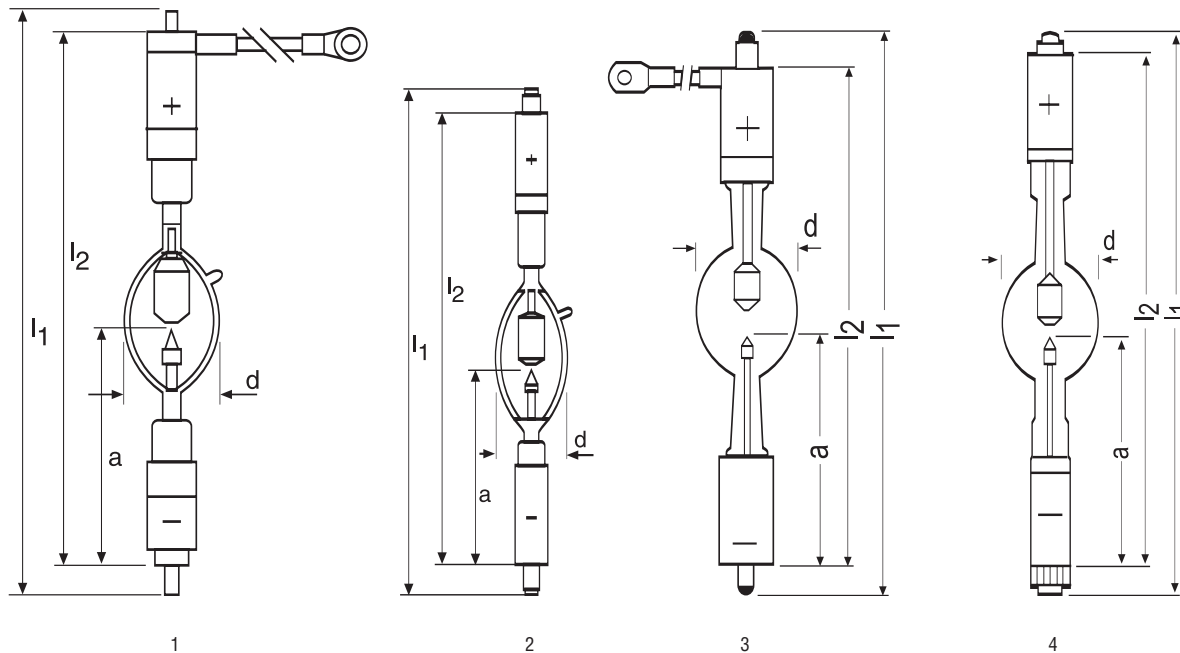
| Ordering Abbreviation                   | XBO 4200 W/CA OFR        | XBO 4200 W/GS OFR        | XBO 4200 W/HPS OFR           | XBO 4500 W/DHP OFR           | XBO 4500 W/DTP OFR          |
|-----------------------------------------|--------------------------|--------------------------|------------------------------|------------------------------|-----------------------------|
| Product Number                          | 69294                    | 69350                    | 69488☼                       | 69463☼                       | 69459☼                      |
| Watts (W)                               | 4200                     | 4200                     | 4200                         | 4500                         | 4500                        |
| Volts (V)                               | 29                       | 29                       | 35                           | 30                           | 32                          |
| Type of Current                         | DC                       | DC                       | DC                           | DC                           | DC                          |
| Current (A)                             | 140                      | 140                      | 120                          | 145                          | 145                         |
| Current Control Range (A)               | 80-160                   | 80-160                   | 80-130                       | 80-150                       | 80-150                      |
| Lumens (lm)                             | 190000                   | 190000                   | 170000                       | 190000                       | 190000                      |
| Luminous Intensity (cd)                 | 20000                    | 20000                    | 17000                        | 22000                        | 25000                       |
| Average Luminance (cd/cm <sup>2</sup> ) | 100000                   | 100000                   | 160000                       | 115000                       | 115000                      |
| Luminous Area -- w x h (mm)             | 2.1 x 5.7                | 2.1 x 5.7                | 1.5 x 4.5                    | 1.9 x 5.0                    | 1.9 x 5.0                   |
| Length l1 max (mm)                      | 428                      | 428                      | 332                          | 408                          | 433                         |
| Length l2 max (mm)                      | 382                      | 382                      | 295                          | 368                          | 384                         |
| Distance a (mm)                         | 167.5                    | 167.5                    | 128                          | 171                          | 165                         |
| Diameter d (mm)                         | 70                       | 60                       | 55                           | 60                           | 60                          |
| Warranty                                | 1000                     | 1000                     | 500                          | 1000                         | 1000                        |
| Operating Position                      | s 15                     | s 15                     | s15 p15                      | s15 p15                      | s15 p15                     |
| Cooling                                 | Required                 | Required                 | Required                     | Required                     | Required                    |
| Magnetic Arc Stabilization              |                          | Required                 |                              | Required                     | Required                    |
| Base Anode                              | SFaX27-13                | SFaX27-13                | SFaX30-14/68                 | SFaX30-9.5                   | SFcX27-14                   |
| Base Cathode                            | SFaX27-14                | SFaX27-14                | SFc30-20/50                  | SFa30-7.9                    | SFa27-14                    |
| Fig No                                  | 1                        | 1                        | 2                            | 3                            | 4                           |
| Symbols & Footnotes                     | 47,56,58,129,157,179,220 | 52,56,58,109,129,157,179 | 56,58,60,129,157,179,282,283 | 56,58,60,129,157,179,279,282 | 51,56,58,60,129,157,179,279 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



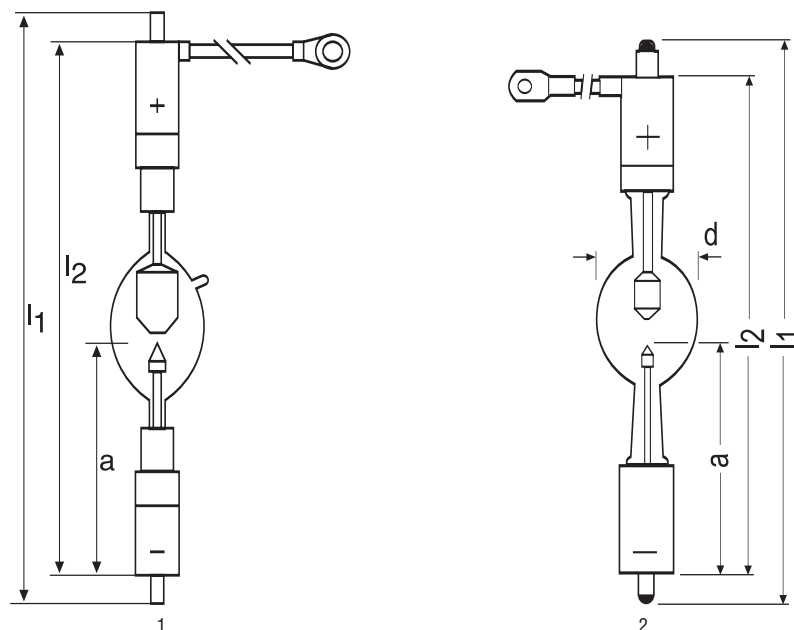
| Ordering Abbreviation                   | XBO 4500 W/HS OFR              | XBO 4500 W/HS LA OFR               | XBO 4500 W/HTP OFR          | XBO 5000 W/H OFR            | XBO 5000 W/HTP OFR             |
|-----------------------------------------|--------------------------------|------------------------------------|-----------------------------|-----------------------------|--------------------------------|
| Product Number                          | 69359                          | 69389                              | 69360                       | 69315                       | 69336                          |
| Watts (W)                               | 4500                           | 4500                               | 4500                        | 5000                        | 5000                           |
| Volts (V)                               | 32                             | 30                                 | 32                          | 35                          | 34                             |
| Type of Current                         | DC                             | DC                                 | DC                          | DC                          | DC                             |
| Current (A)                             | 135                            | 145                                | 135                         | 140                         | 140                            |
| Current Control Range (A)               | 80-150                         | 80-150                             | 80-150                      | 100-150                     | 100-150                        |
| Lumens (lm)                             | 190000                         | 160000                             | 190000                      | 225000                      | 225000                         |
| Luminous Intensity (cd)                 | 22000                          | 22000                              | 22000                       | 27000                       | 27000                          |
| Average Luminance (cd/cm <sup>2</sup> ) | 120000                         | 115001                             | 105000                      | 95000                       | 95000                          |
| Luminous Area -- w x h (mm)             | 1.9 x 6.0                      | 1.9 x 5.0                          | 1.9 x 6.0                   | 2.2 x 6.5                   | 2.2 x 6.5                      |
| Length l1 max (mm)                      | 410                            | 410                                | 433                         | 433                         | 433                            |
| Length l2 max (mm)                      | 370                            | 370                                | 382                         | 382                         | 382                            |
| Distance a (mm)                         | 171                            | 171                                | 171                         | 168                         | 165                            |
| Diameter d (mm)                         | 70                             | 60                                 | 70                          | 70                          | 70                             |
| Warranty                                | 1000                           | 1000                               | 1000                        | 1000                        | 1000                           |
| Operating Position                      | s15 p15                        | s15 p15                            | s15 p15                     | s15 p15                     | s15 p15                        |
| Cooling                                 | Required                       | Required                           | Required                    | Required                    | Required                       |
| Magnetic Arc Stabilization              | Required                       | Required                           | Required                    | Required                    | Required                       |
| Base Anode                              | SFa30-7.9                      | SFaX30-9.5                         | SFa27-14                    | SFaX27-13                   | SFa27-14                       |
| Base Cathode                            | SFaX30-9.5                     | SFa30-7.9                          | SFc27-14                    | SFaX27-14                   | SFc27-14                       |
| Fig No                                  | 1                              | 1                                  | 2                           | 1                           | 2                              |
| Symbols & Footnotes                     | 43,45,56,58,60,109,129,157,179 | 43,45,56,58,60,109,129,157,179,210 | 45,51,56,58,109,129,157,179 | 45,56,58,60,109,129,157,179 | 45,51,56,58,60,109,129,157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



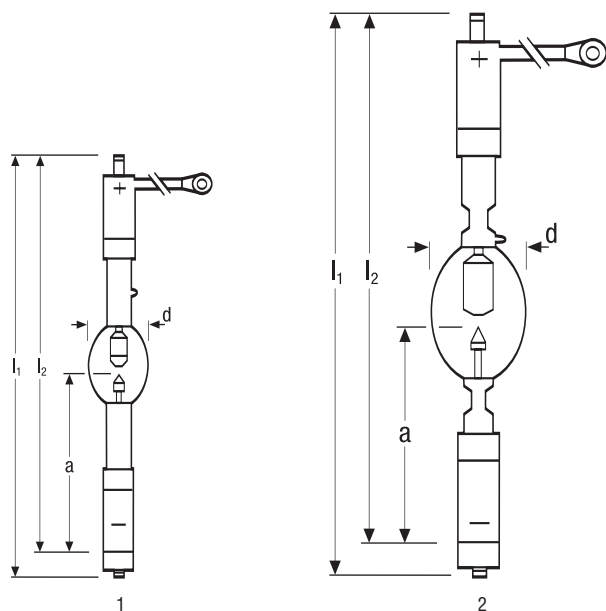
| Ordering Abbreviation       | XBO 6000 W/DHP OFR            | XBO 6000 W/DTP OFR               | XBO 6000 W/HS OFR               | XBO 6000 W/HSLA OFR                 | XBO 6000 W/HTP OFR                 |
|-----------------------------|-------------------------------|----------------------------------|---------------------------------|-------------------------------------|------------------------------------|
| Product Number              | 69476*                        | 69460*                           | 69339                           | 69386*                              | 69340                              |
| Watts (W)                   | 6000                          | 6000                             | 6000                            | 6000                                | 6000                               |
| Volts (V)                   | 35                            | 39                               | 37                              | 35                                  | 37                                 |
| Type of Current             | DC                            | DC                               | DC                              | DC                                  | DC                                 |
| Current (A)                 | 170                           | 155                              | 160                             | 170                                 | 160                                |
| Current Control Range (A)   | 140-175                       | 140-175                          | 110 - 165                       | 140-175                             | 110 - 165                          |
| Lumens (lm)                 | 280000                        | 270000                           | 280000                          | 280000                              | 280000                             |
| Luminous Intensity (cd)     | 30000                         | 33000                            | 40000                           | 30000                               | 40000                              |
| Average Luminance (cd/cm2)  | 160000                        | 130000                           | 105000                          | 160000                              | 105000                             |
| Luminous Area -- w x h (mm) | 1.9 x 6.0                     | 1.9 x 7.0                        | 2.0 x 7.5                       | 1.9 x 6.0                           | 2.0 x 7.5                          |
| Length l1 max (mm)          | 431                           | 433                              | 433                             | 433                                 | 433                                |
| Length l2 max (mm)          | 391                           | 386                              | 393                             | 393                                 | 382                                |
| Distance a (mm)             | 170.5                         | 165                              | 170.5                           | 170.5                               | 165                                |
| Diameter d (mm)             | 70                            | 70                               | 78                              | 70                                  | 78                                 |
| Warranty                    | 600                           | 600                              | 750                             | 600                                 | 750                                |
| Operating Position          | s15 p15                       | s15 p15                          | s15 p15                         | s15 p15                             | s15 p15                            |
| Cooling                     | Required                      | Required                         | Required                        | Required                            | Required                           |
| Magnetic Arc Stabilization  | Required                      | Required                         | Required                        | Required                            | Required                           |
| Base Anode                  | SFaX30-9.5                    | SFc27-14                         | SFaX30-9.5                      | SFaX30-9.5                          | SFaX27-14                          |
| Base Cathode                | SFa30-7.9                     | SFa27-14                         | SFa30-7.9                       | SFa30-7.9                           | SFc27-14                           |
| Fig No                      | 1                             | 2                                | 3                               | 3                                   | 4                                  |
| Symbols & Footnotes         | 56,58,60,129,157,179, 279,282 | 51,56,58,60,109,129,157, 179,279 | 43,45,56,58,60,109,129, 157,179 | 43,45,56,58,60,109,129, 157,179,210 | 43,45,51,56,58,60,109, 129,157,179 |

# XBO®>450W XENON SHORT ARC CINEMA FILM PROJECTION



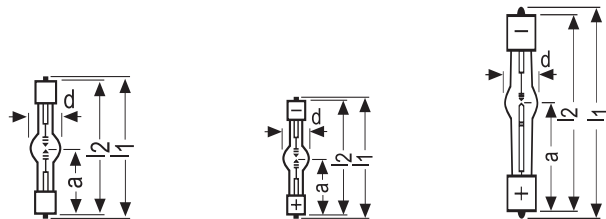
| Ordering Abbreviation                   | XBO 6500 W/DHP OFR           | XBO 6500 W/HSLA OFR                | XBO 7000 W/HS OFR              | XBO 8000 W/HS OFR              |
|-----------------------------------------|------------------------------|------------------------------------|--------------------------------|--------------------------------|
| Product Number                          | 69461*                       | 69489*                             | 69295                          | 69351                          |
| Watts (W)                               | 6500                         | 6500                               | 7000                           | 8000                           |
| Volts (V)                               | 38                           | 38                                 | 42                             | 45                             |
| Type of Current                         | DC                           | DC                                 | DC                             | DC                             |
| Current (A)                             | 170                          | 170                                | 160                            | 175                            |
| Current Control Range (A)               | 140-175                      | 140-175                            | 110-165                        | 150-180                        |
| Lumens (lm)                             | 300000                       | 300000                             | 350000                         | 400000                         |
| Luminous Intensity (cd)                 | 32000                        | 32000                              | 35000                          | 40000                          |
| Average Luminance (cd/cm <sup>2</sup> ) | 160000                       | 160000                             | 100000                         | 110000                         |
| Luminous Area -- w x h (mm)             | 2.0 x 6.3                    | 2.0 x 6.3                          | 2.0 x 7.5                      | 2.5 x 10.5                     |
| Length l1 max (mm)                      | 431                          | 433                                | 433                            | 433                            |
| Length l2 max (mm)                      | 391                          | 393                                | 393                            | 393                            |
| Distance a (mm)                         | 170.5                        | 170.5                              | 170.5                          | 170.5                          |
| Diameter d (mm)                         | 70                           | 70                                 | 78                             | 90                             |
| Warranty                                | 500                          | 500                                | 650                            | 500                            |
| Operating Position                      | s15 p15                      | s15 p15                            | s15 p15                        | s 15, p15                      |
| Cooling                                 | Required                     | Required                           | Required                       | Required                       |
| Magnetic Arc Stabilization              | Required                     | Required                           | Required                       | Required                       |
| Base Anode                              | SFaX30-9.5                   | SFaX30-9.5                         | SFaX30-9.5                     | SFaX 30-9.5                    |
| Base Cathode                            | SFa30-7.9                    | SFa30-7.9                          | SFa30-8.0                      | SFa 30-7.9                     |
| Fig No                                  | 1                            | 2                                  | 2                              | 2                              |
| Symbols & Footnotes                     | 56,58,60,129,157,179,279,282 | 43,45,56,58,60,109,129,157,179,210 | 43,45,56,58,60,109,129,157,179 | 43,45,56,58,60,109,129,157,179 |

# XSTAGE™ XENON SHORT ARC ENTERTAINMENT



| Ordering Abbreviation                   | Xstage 2000W OFR | Xstage 3000W OFR | Xstage 4000W OFR | Xstage 7000W OFR |
|-----------------------------------------|------------------|------------------|------------------|------------------|
| Product Number                          | 69482☼           | 69483☼           | 69484☼           | 69485☼           |
| Watts (W)                               | 2000             | 3000             | 4000             | 7000             |
| Volts (V)                               | 23               | 30               | 30               | 40               |
| Type of Current                         | DC               | DC               | DC               | DC               |
| Current (A)                             | 90               | 100              | 130              | 160              |
| Current Control Range (A)               | 70-110           | 70-110           | 80-135           | 110-165          |
| Lumens (lm)                             | 80000            | 140000           | 150000           | 330000           |
| Luminous Intensity (cd)                 | 9000             | 13500            | 17000            | 33000            |
| Average Luminance (cd/cm <sup>2</sup> ) | 170000           | 200000           | 120000           | 120000           |
| Luminous Area -- w x h (mm)             | 1.2x2.7          | 1.3x3.5          | 1.9x5.0          | 2.0x7.0          |
| Length l1 max (mm)                      | 300              | 300              | 315              | 405              |
| Length l2 max (mm)                      | 262              | 262              | 277              | 354              |
| Distance a (mm)                         | 120              | 120              | 120              | 162.5            |
| Diameter d (mm)                         | 46.5             | 55               | 60               | 70               |
| Warranty                                | 1000             | 1000             | 1000             | 1000             |
| Operating Position                      | any              | any              | any              | any              |
| Cooling                                 | Required         | Required         | Required         | Required         |
| Magnetic Arc Stabilization              |                  |                  |                  |                  |
| Base Anode                              | SFaX27-9.5       | SFaX27-9.6       | SFaX27-9.7       | SFaX27-9.8       |
| Base Cathode                            | SFc28-27         | SFc28-28         | SFc28-29         | SFc28-30         |
| Fig No                                  | 1                | 1                | 1                | 2                |
| Symbols & Footnotes                     | 56,129,157,179   | 56,129,157,179   | 56,129,157,179   | 56,129,157,179   |

## HBO® MERCURY SHORT ARC



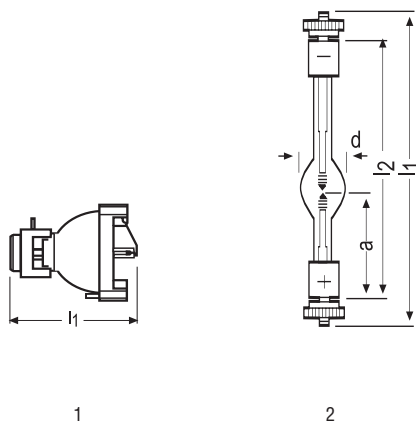
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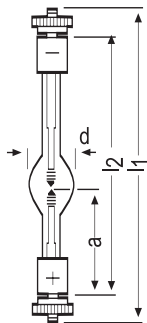
| Ordering Abbreviation                   | HBO 50 W AC L1 | HBO 50 W AC L2 | HBO 50 W/3 | HBO 100 W/2 | HBO 103 W/2 |
|-----------------------------------------|----------------|----------------|------------|-------------|-------------|
| Product Number                          | 69213          | 69214          | 69215      | 69217       | 69182       |
| Watts (W)                               | 50             | 50             | 50         | 100         | 100         |
| Volts (V)                               | 42             | 37             | 23         | 20          | 23          |
| Type of Current                         | AC             | AC             | DC         | DC          | DC          |
| Current (A)                             | 1.3            | 1.45           | 2.3        | 5.0         | 4.44        |
| Lumens (lm)                             | 2000           | 2000           | 1300       | 2200        | 2550        |
| Luminous Intensity (cd)                 | 230            | 230            | 150        | 260         | 270.0       |
| Average Luminance (cd/cm <sup>2</sup> ) | 30000          | 30000          | 90000      | 170000      | 150000      |
| Luminous Area – w x h (mm)              | 0.3 x 1.0      | 0.3 x 1.0      | 0.2 x 0.35 | 0.25 x 0.25 | 0.25 x 0.25 |
| Luminous Efficacy (lm/W)                | 40             | 40             | 26         | 22          | 30          |
| Length l1 max (mm)                      | 53             | 53             | 53         | 90          | 90          |
| Length l2 max (mm)                      | 47             | 47             | 47         | 82          | 82          |
| Distance a (mm)                         | 22             | 22             | 22         | 43          | 43          |
| Diameter d (mm)                         | 8.5            | 8.5            | 9          | 10          | 10          |
| Avg Rated Life (hrs)                    | 100            | 100            | 200        | 200         | 300         |
| Operating Position                      | s 45           | s 45           | s 45       | s 90        | s 90        |
| Cooling                                 | Convection     | Convection     | Convection | Convection  | Convection  |
| Base Anode                              | SFa6-2         | SFa6-2         | SFa6-2     | SFa7.5-2    | SFa7.5-2    |
| Base Cathode                            | SFa6-2         | SFa6-2         | SFa8-2     | SFa9-2      | SFa9-2      |
| Fig No                                  | 1              | 1              | 2          | 3           | 3           |
| Symbols & Footnotes                     | 58             | 58             | 58         | 58          | 58,222      |

# HBO® MERCURY SHORT ARC



| Ordering Abbreviation                   | HBO R 103 W/45 | HBO 200 W/2 L1 | HBO 200 W/2 L2 | HBO 200 W/2 TM L2 | HBO 200 W/4 |
|-----------------------------------------|----------------|----------------|----------------|-------------------|-------------|
| Product Number                          | 69311          | 69198          | 69222          | 69223             | 69224       |
| Watts (W)                               | 100            | 200            | 200            | 200               | 200         |
| Volts (V)                               | 23             | 61             | 53             | 47                | 61          |
| Type of Current                         | DC             | DC or AC       | DC or AC       | DC or AC          | AC          |
| Current (A)                             | 4.3            |                |                |                   | 3.6         |
| Lumens (lm)                             |                | 9500           | 9500           | 9500              | 9500        |
| Luminous Intensity (cd)                 |                | 1000           | 1000           | 1000              | 1000        |
| Average Luminance (cd/cm <sup>2</sup> ) |                | 40000          | 40000          | 40000             | 40000       |
| Luminous Area – w x h (mm)              |                | 0.6 x 2.2      | 0.6 x 2.2      | 0.6 x 2.2         | 0.6 x 2.2   |
| Luminous Efficacy (lm/W)                |                | 47.5           | 47.5           | 47.5              | 47.5        |
| Length l1 max (mm)                      | 81.50          | 128            | 128            | 128               | 128         |
| Length l2 max (mm)                      |                | 102            | 102            | 102               | 102         |
| Distance a (mm)                         |                | 40             | 40             | 40                | 40          |
| Diameter d (mm)                         | 67             | 17             | 17             | 17                | 17          |
| Avg Rated Life (hrs)                    | 300            | 400            | 400            | 200               | 200         |
| Operating Position                      | p 20           | s 45           | s 45           | s 45              | s 45        |
| Cooling                                 | Convection     | Convection     | Convection     | Convection        | Convection  |
| Base Anode                              | Pin            | SFc10-4        | SFc10-4        | 8-32 UNC-3A       | SFc10-4     |
| Base Cathode                            | Pin            | SFc10-4        | SFc10-4        | 8-32 UNC-3A       | SFc10-4     |
| Fig No                                  | 1              | 2              | 2              | 2                 | 2           |
| Symbols & Footnotes                     | 60,190,223     | 58,86,226,227  | 58,86,226,227  | 58,87             | 58,225      |

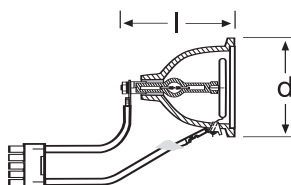
## HBO® MERCURY SHORT ARC



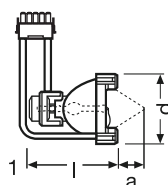
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| Ordering Abbreviation      | HBO 200 W/DC | HBO 200 W/DC TM | HBO 202 W/4 |
|----------------------------|--------------|-----------------|-------------|
| Product Number             | 69225        | 69163☼          | 69316       |
| Watts (W)                  | 200          | 200             | 200         |
| Volts (V)                  | 57           | 56              | 61          |
| Type of Current            | DC           | DC              | AC          |
| Current (A)                | 3.5          |                 | 3.6         |
| Lumens (lm)                | 10000        | 9500            | 0           |
| Luminous Intensity (cd)    | 1100         | 1000            | 1000        |
| Average Luminance (cd/cm2) | 40000        | 40000           | 40000       |
| Luminous Area – w x h (mm) | 0.75 x 2.3   | 0.6 x 2.2       | 0.6 x 2.2   |
| Luminous Efficacy (lm/W)   | 50           | 50              | 47.5        |
| Length l1 max (mm)         | 128          | 128             | 128         |
| Length l2 max (mm)         | 102          | 102             | 102         |
| Distance a (mm)            | 40           | 40              | 40          |
| Diameter d (mm)            | 17           | 17              | 17          |
| Avg Rated Life (hrs)       | 1000         | 400             | 200         |
| Operating Position         | s 15         | s20             | s 45        |
| Cooling                    | Convection   | Convection      | Convection  |
| Base Anode                 | SFc10-4      | 8-32 UNC-3A     | SFc10-4     |
| Base Cathode               | SFc10-4      | 8-32 UNC-3A     | SFc10-4     |
| Fig No                     | 1            | 1               | 1           |
| Symbols & Footnotes        | 58           | 58,200          | 58,69       |
|                            |              |                 |             |

# HXP® MERCURY SHORT ARC



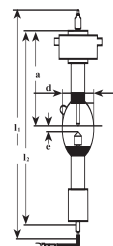
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| Ordering Abbreviation   | HXP R 120 W/17C    | HXP R 120 W/45 C UV     | HXP R 120 W/45 C VIS   |
|-------------------------|--------------------|-------------------------|------------------------|
| Product Number          | 69125              | 69120                   | 69119                  |
| Watts (W)               | 120                | 120                     | 120                    |
| Volts (V)               | 75                 | 75                      | 75                     |
| Type of Current         | AC                 | AC                      | AC                     |
| Current (A)             | 1.4                | 1.4                     | 1.4                    |
| Lumens (lm)             | 4400               |                         | 2800                   |
| Color Temp (K)          |                    |                         | 9500                   |
| Length l max (mm)       | 77                 | 77                      | 77                     |
| Diameter d (mm)         | 56                 | 64                      | 64                     |
| Working Distance A (mm) | 17.3               | 45                      | 45                     |
| Avg Rated Life (hrs)    | 2000               | 2000                    | 2000                   |
| Hot Restart             | p 20               | p 20                    | p 20                   |
| Operating Position      | Special            | Special                 | Special                |
| Base                    | Yes                | Yes                     | Yes                    |
| Fig No                  | 1                  | 2                       | 2                      |
| Symbols & Footnotes     | 60,170,172,173,174 | 60,100,169,170,171,172, | 60,100,169,170,171,172 |

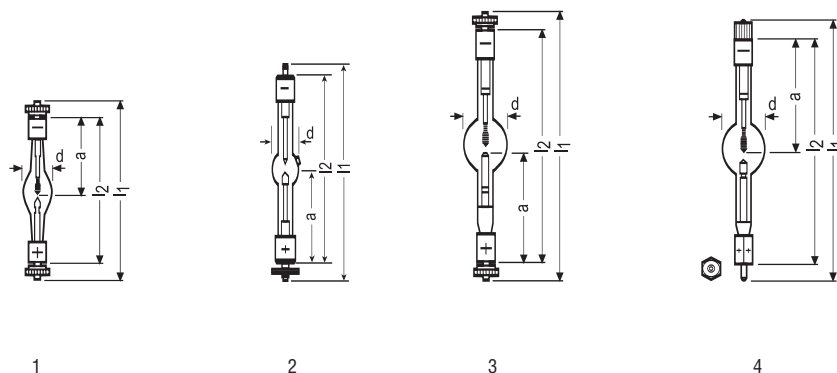
# DISPLAY OPTIC DISCHARGE



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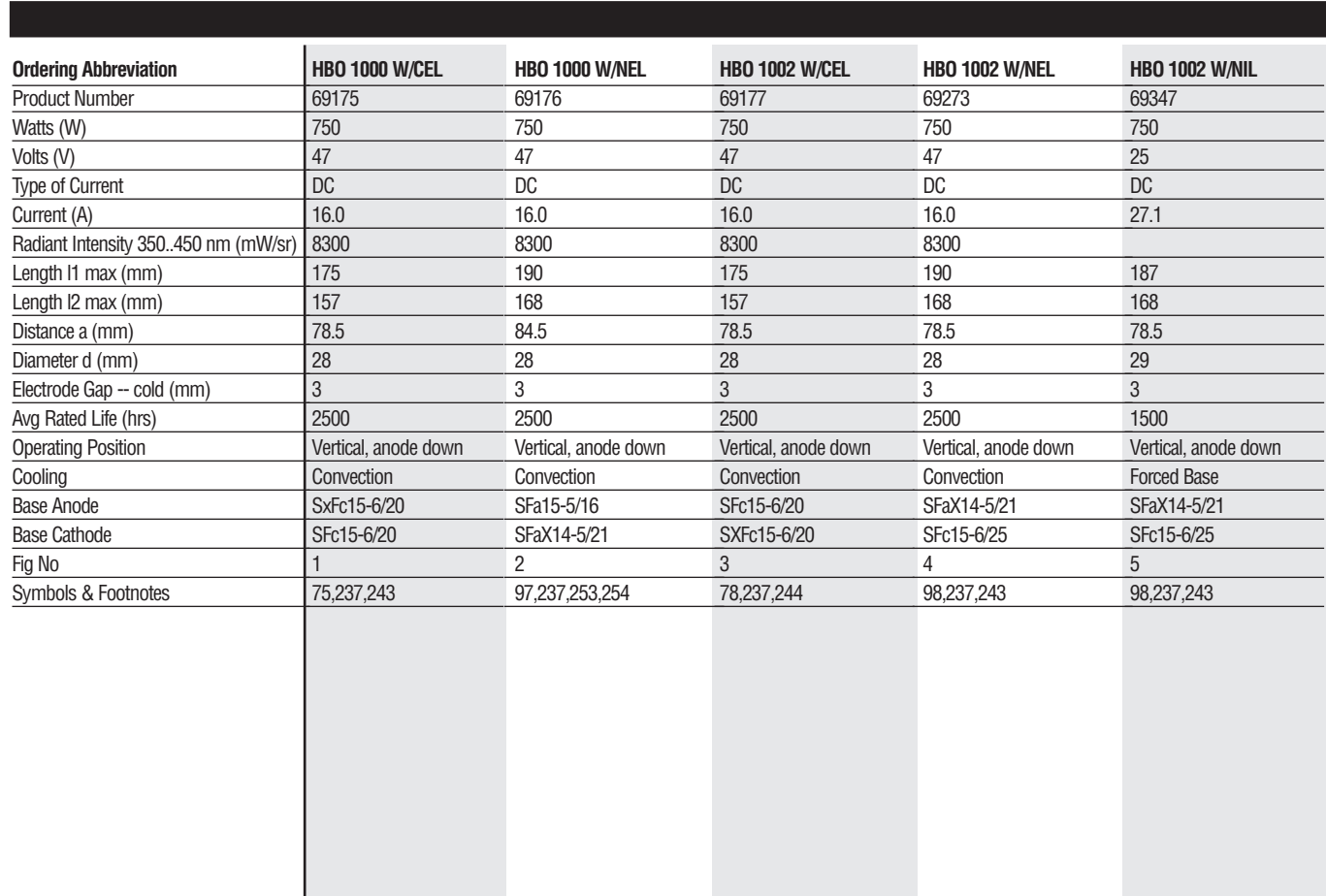
Symbols/Footnotes on page 275-281

# HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY

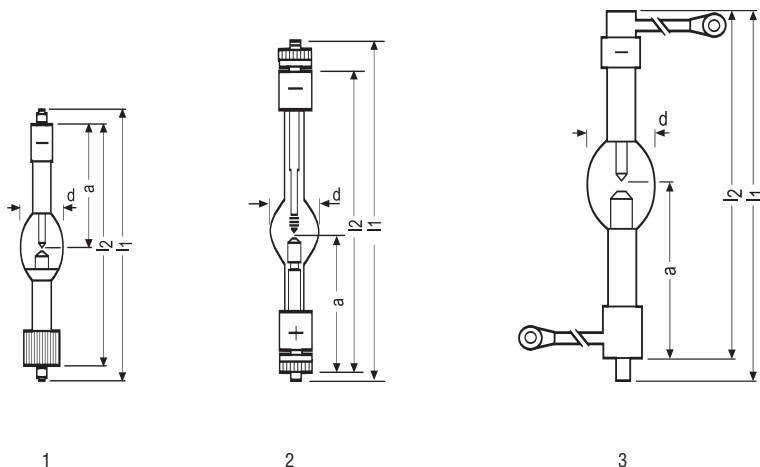


| Ordering Abbreviation                 | HBO 350 W            | HBO 350 W/S          | HBO 450 W/GS         | HBO 500 W/A          | HBO 500 W/B          |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Product Number                        | 69226                | 69228                | 69343                | 69205                | 69206                |
| Watts (W)                             | 350                  | 350                  | 450                  | 500                  | 500                  |
| Volts (V)                             | 68                   | 68                   | 50                   | 60                   | 48                   |
| Type of Current                       | DC                   | DC                   | DC                   | DC                   | DC                   |
| Current (A)                           | 5.3                  | 5.15                 | 9.0                  | 8.3                  | 10.3                 |
| Radiant Intensity 350..450 nm (mW/sr) | 4600                 | 4700                 |                      | 6230                 | 5800                 |
| Length l1 max (mm)                    | 128                  | 127                  | 150                  | 190                  | 180                  |
| Length l2 max (mm)                    | 102                  | 103                  | 105                  | 161.5                | 151.5                |
| Distance a (mm)                       | 45                   | 52.5                 | 53                   | 73                   | 78.5                 |
| Diameter d (mm)                       | 20                   | 20                   | 22                   | 29                   | 29                   |
| Electrode Gap – cold (mm)             | 2.9                  | 3                    | 2.2                  | 4.5                  | 3                    |
| Avg Rated Life (hrs)                  | 600                  | 600                  | 600                  | 800                  | 800                  |
| Operating Position                    | Vertical, anode down | Vertical, anode down | Vertical, anode down | Vertical, anode down | Vertical, anode down |
| Cooling                               | Convection           | Convection           | Convection           | Convection           | Convection           |
| Base Anode                            | SFcY 10-4            | SFcY10-4             | SFc 13-8             | SFcY13-5             | SFcX13-5/20          |
| Base Cathode                          | SFcY 10-4            | SFcY10-4             | SFc 13-4             | SFcY13-5             | SFcY 13-15/20        |
| Fig No                                | 1                    | 1                    | 2                    | 3                    | 4                    |
| Symbols & Footnotes                   | 89,229,230,231       | 89,231               | 291                  | 231,235              | 96,231,236           |

# DISPLAY OPTIC DISCHARGE



# HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



| Ordering Abbreviation                 | HBO 1003 W/PI        | HBO 1003 W/PIL       | HBO 1000 W/D         | HBO 1500 W/CIEL      | HBO 1500 W/CIL       |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Product Number                        | 69195                | 69180                | 69200                | 69171                | 69179                |
| Watts (W)                             | 750                  | 750                  | 1000                 | 1500                 | 1500                 |
| Volts (V)                             | 26                   | 26                   | 38                   | 23                   | 23                   |
| Type of Current                       | DC                   | DC                   | DC                   | DC                   | DC                   |
| Current (A)                           | 27.1                 | 25.8                 | 26.5                 | 65.2                 | 65.2                 |
| Radiant Intensity 350..450 nm (mW/sr) |                      |                      | 10800                |                      |                      |
| Length l1 max (mm)                    | 197                  | 195                  | 240                  | 262                  | 262                  |
| Length l2 max (mm)                    | 169.5                | 169.5                | 208                  | 242                  | 242                  |
| Distance a (mm)                       | 85                   | 85                   | 89.5                 | 122                  | 122                  |
| Diameter d (mm)                       | 29                   | 29                   | 40                   | 52                   | 52                   |
| Electrode Gap – cold (mm)             | 3                    | 3                    | 3                    | 4                    | 4                    |
| Avg Rated Life (hrs)                  | 850                  | 1500                 | 1000                 | 2250                 | 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                            | SFcX14-6/25          | SFcX14-6/25          | SFc15-6/25           | SFa27-20/22          | SFa27-10/35          |
| Base Cathode                          | SFc15-6/25           | SFc15-6/25           | SFc15-6/25           | SFa27-20/23          | SFa27-20/23          |
| Fig No                                | 1                    | 1                    | 2                    | 3                    | 3                    |
| Symbols & Footnotes                   | 237,242,249          | 64,237,242           | 74,243               | 258,260,266          | 260,266              |

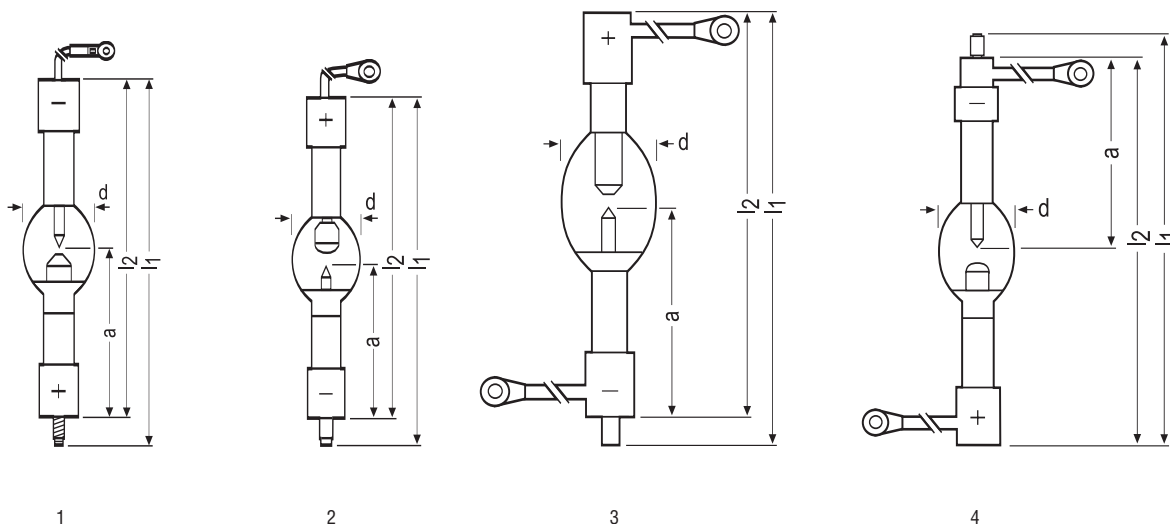
# DISPLAY OPTIC DISCHARGE



For more complete product information visit [www.sylvania.com](http://www.sylvania.com)

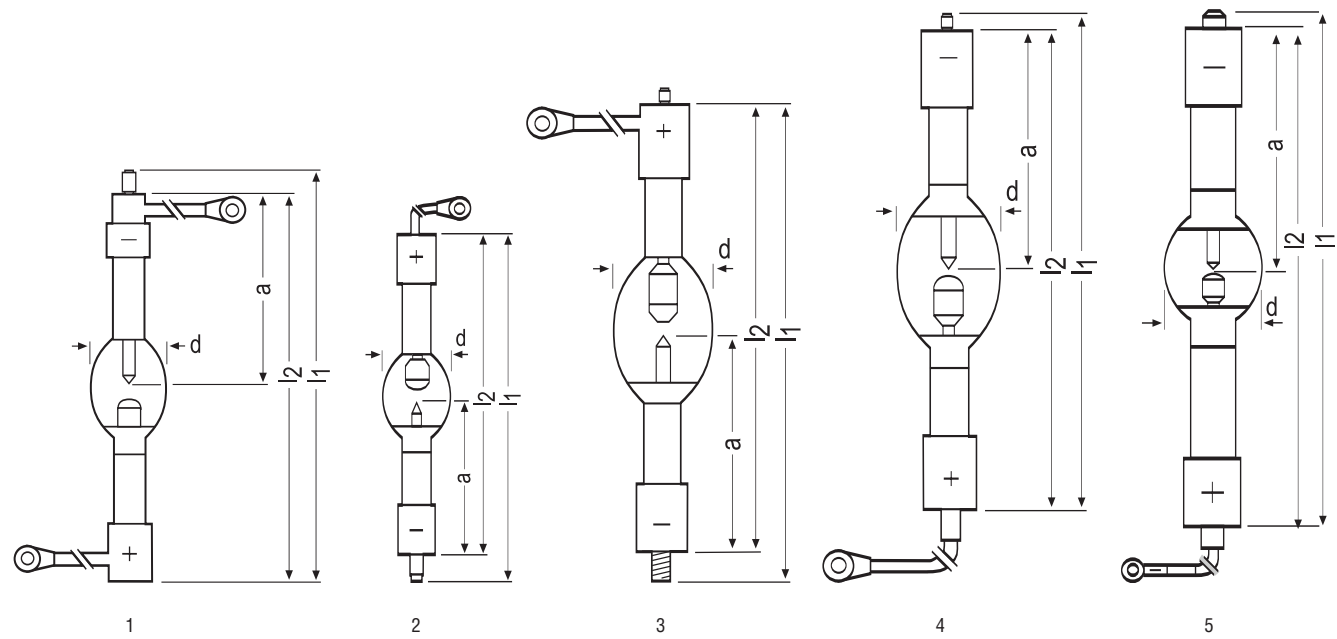
Symbols/Footnotes on page 275-281

# HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



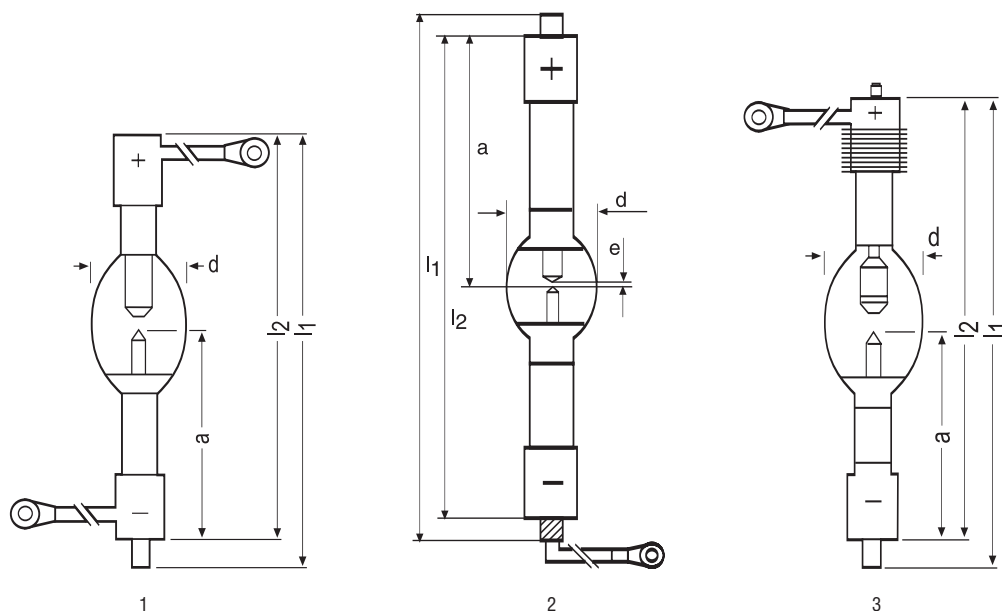
| Ordering Abbreviation                 | HBO 2001 W/NIL       | HBO 2002 W/NIL     | HBO 2001 W/CIEL    | HBO 2001 W/CIL     | HBO 2002 W/MA        |
|---------------------------------------|----------------------|--------------------|--------------------|--------------------|----------------------|
| Product Number                        | 69292                | 69287              | 69166              | 69189              | 69199                |
| Watts (W)                             | 1750                 | 1750               | 2000               | 2000               | 2000                 |
| Volts (V)                             | 26                   | 24                 | 26                 | 26                 | 37                   |
| Type of Current                       | DC                   | DC                 | DC                 | DC                 | DC                   |
| Current (A)                           | 67.0                 | 67.0               | 77.0               | 77.0               | 54.0                 |
| Radiant Intensity 350..450 nm (mW/sr) |                      |                    |                    |                    |                      |
| Length l1 max (mm)                    | 251                  | 254                | 329                | 329                | 292                  |
| Length l2 max (mm)                    | 231                  | 234                | 309                | 307                | 272                  |
| Distance a (mm)                       | 112                  | 107.5              | 148.75             | 149                | 138.5                |
| Diameter d (mm)                       | 50                   | 52                 | 62                 | 62                 | 62                   |
| Electrode Gap – cold (mm)             | 4.5                  | 4.5                | 4                  | 4.5                | 3                    |
| Avg Rated Life (hrs)                  | 1500                 | 1500               | 2250               | 1500               | 1000                 |
| Operating Position                    | Vertical, anode down | Vertical, anode up | Vertical, anode up | Vertical, anode up | Vertical, anode down |
| Cooling                               | Forced Base          | Forced Base        | Forced Base        | Forced Base        | Forced Base          |
| Base Anode                            | SFc27-10/35          | SFc27-7/35         | SF33.5/50          | SF33.5/50          | SF27/35              |
| Base Cathode                          | SFaX27-7/35          | SFc27-10x1.25/35   | SFa33.5-10/50      | SFa33.5-10//50     | SFa27-10/35          |
| Fig No                                | 1                    | 2                  | 3                  | 3                  | 4                    |
| Symbols & Footnotes                   | 241,260              | 79,241             | 79,114,264         | 79,241,264         | 79,241,260           |

HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY



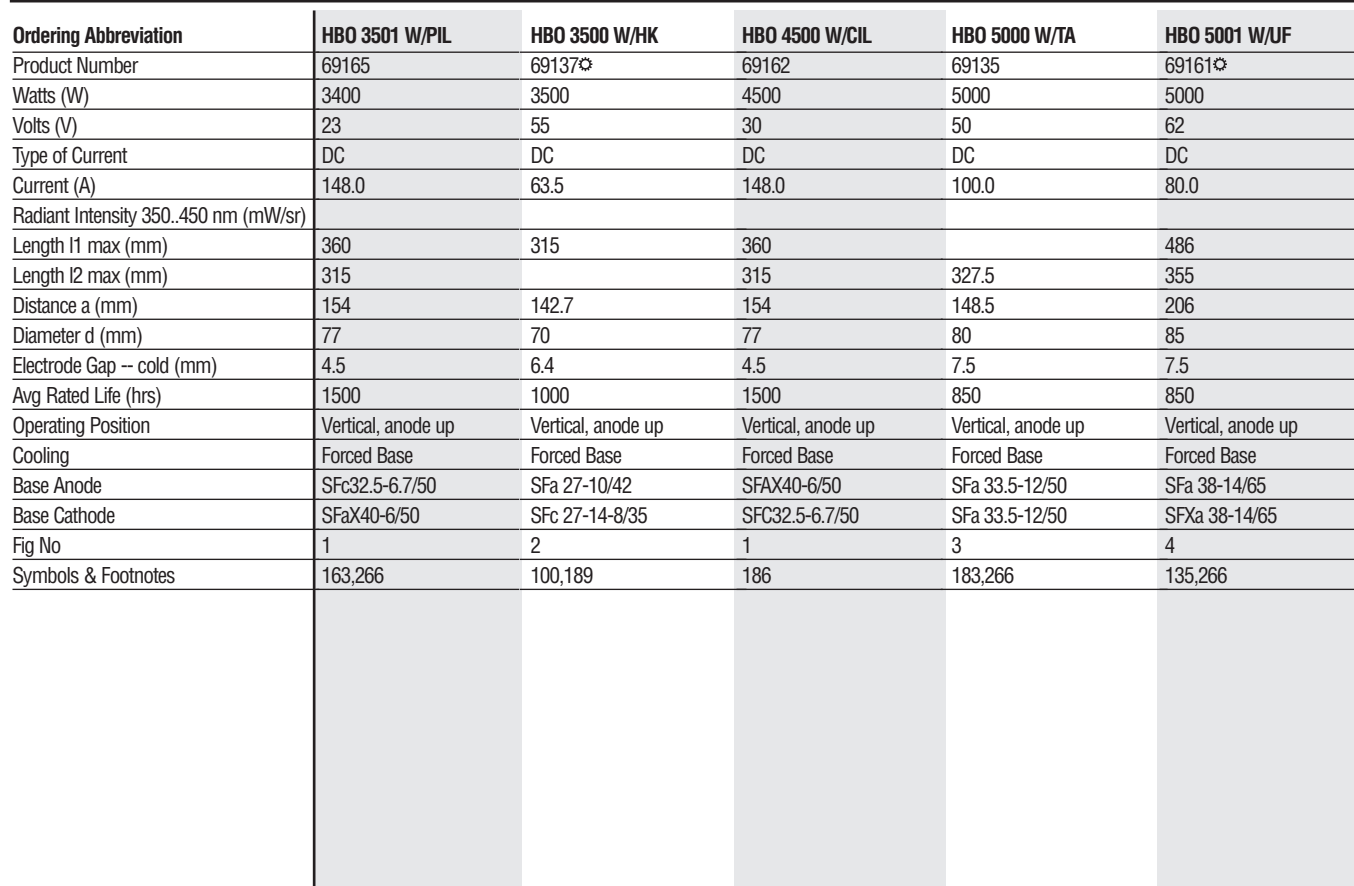
| Ordering Abbreviation                 | HBO 2002 W/MAL       | HBO 2011 W/NIL     | HBO 2500 W/PIL     | HBO 2501 W/NIL       | HBO 2510 W/NIL     |
|---------------------------------------|----------------------|--------------------|--------------------|----------------------|--------------------|
| Product Number                        | 69121                | 69288              | 69172              | 69289                | 69299              |
| Watts (W)                             | 2000                 | 2000               | 2500               | 2500                 | 2500               |
| Volts (V)                             | 40                   | 24                 | 28                 | 23                   | 23                 |
| Type of Current                       | DC                   | DC                 | DC                 | DC                   | DC                 |
| Current (A)                           | 50.0                 | 80.0               | 90.0               | 110.0                | 109.0              |
| Radiant Intensity 350..450 nm (mW/sr) |                      |                    |                    |                      |                    |
| Length l1 max (mm)                    | 292                  | 256                | 350                | 367                  | 367                |
| Length l2 max (mm)                    | 272                  | 236                | 315                | 327                  | 327                |
| Distance a (mm)                       | 138.5                | 107.75             | 149                | 157.75               | 157.5              |
| Diameter d (mm)                       | 62                   | 52                 | 62                 | 70                   | 70                 |
| Electrode Gap – cold (mm)             | 3                    | 4.5                | 6.7                | 4.5                  | 4.5                |
| Avg Rated Life (hrs)                  | 1500                 | 1500               | 1500               | 1500                 | 1500               |
| Operating Position                    | Vertical, anode down | Vertical, anode up | Vertical, anode up | Vertical, anode down | Vertical, anode up |
| Cooling                               | Forced Base          | Forced Base        | Forced Base        | Forced Base          | Forced Base        |
| Base Anode                            | SF27/35              | SFc27-7/35         | SFc30-6/50         | SFc33.5-8/50         | SFc33.5-8/50       |
| Base Cathode                          | SFa27-10/35          | SFc27-12x1.5/35    | SFc30-6.3/50       | SFc33.5-14/5         | SFc33.5-14/50      |
| Fig No                                | 1                    | 2                  | 3                  | 4                    | 5                  |
| Symbols & Footnotes                   | 79,260               | 79,241             | 241,242,266        | 79                   | 72,241             |

# HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY

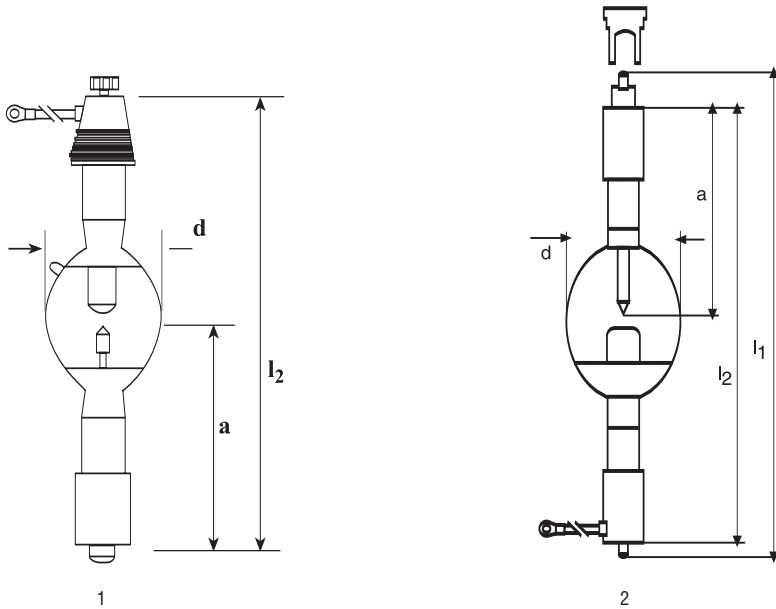


| Ordering Abbreviation                 | HBO 2700 W/CIL     | HBO 3500 W/NIL     | HBO 3500 W/PI      | HBO 3500 W/PIL     | HBO 3501 W/PI      |
|---------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Product Number                        | 69344              | 69456              | 69174              | 69169              | 69127              |
| Watts (W)                             | 2700               | 3500               | 3400               | 3400               | 3400               |
| Volts (V)                             | 24                 | 27                 | 23                 | 23                 | 23                 |
| Type of Current                       | DC                 | DC                 | DC                 | DC                 | DC                 |
| Current (A)                           | 110.0              | 130                | 148.0              | 148.0              | 148.0              |
| Radiant Intensity 350..450 nm (mW/sr) |                    |                    |                    |                    |                    |
| Length l1 max (mm)                    | 334                | 382                | 340                | 360                | 360                |
| Length l2 max (mm)                    | 309                | 337                | 315                | 315                | 315                |
| Distance a (mm)                       | 148.75             | 180                | 154                | 154                | 154                |
| Diameter d (mm)                       | 62                 | 82                 | 77                 | 77                 | 77                 |
| Electrode Gap – cold (mm)             | 4.8                | 5.5                | 4.5                | 4.5                | 4.5                |
| Avg Rated Life (hrs)                  | 1500               | 1500               | 850                | 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                            | SFa33.5/50         | SFc33.5-16-50      | SFaX40-6/50        | SFaX40-6/50        | SFaX40-6/50        |
| Base Cathode                          | SFa33.5-14.59      | SFa33.5-12/50      | SFc32.5-6.7/50     | SFc32.5-6.7/50     | SFc32.5-6.7/50     |
| Fig No                                | 1                  | 2                  | 3                  | 3                  | 3                  |
| Symbols & Footnotes                   | 79,129,264         | 129,260,284        | 99,241,266         | 241,266            | 241,266            |

# DISPLAY OPTIC DISCHARGE



# HBO® MERCURY SHORT ARC FOR MICROLITHOGRAPHY

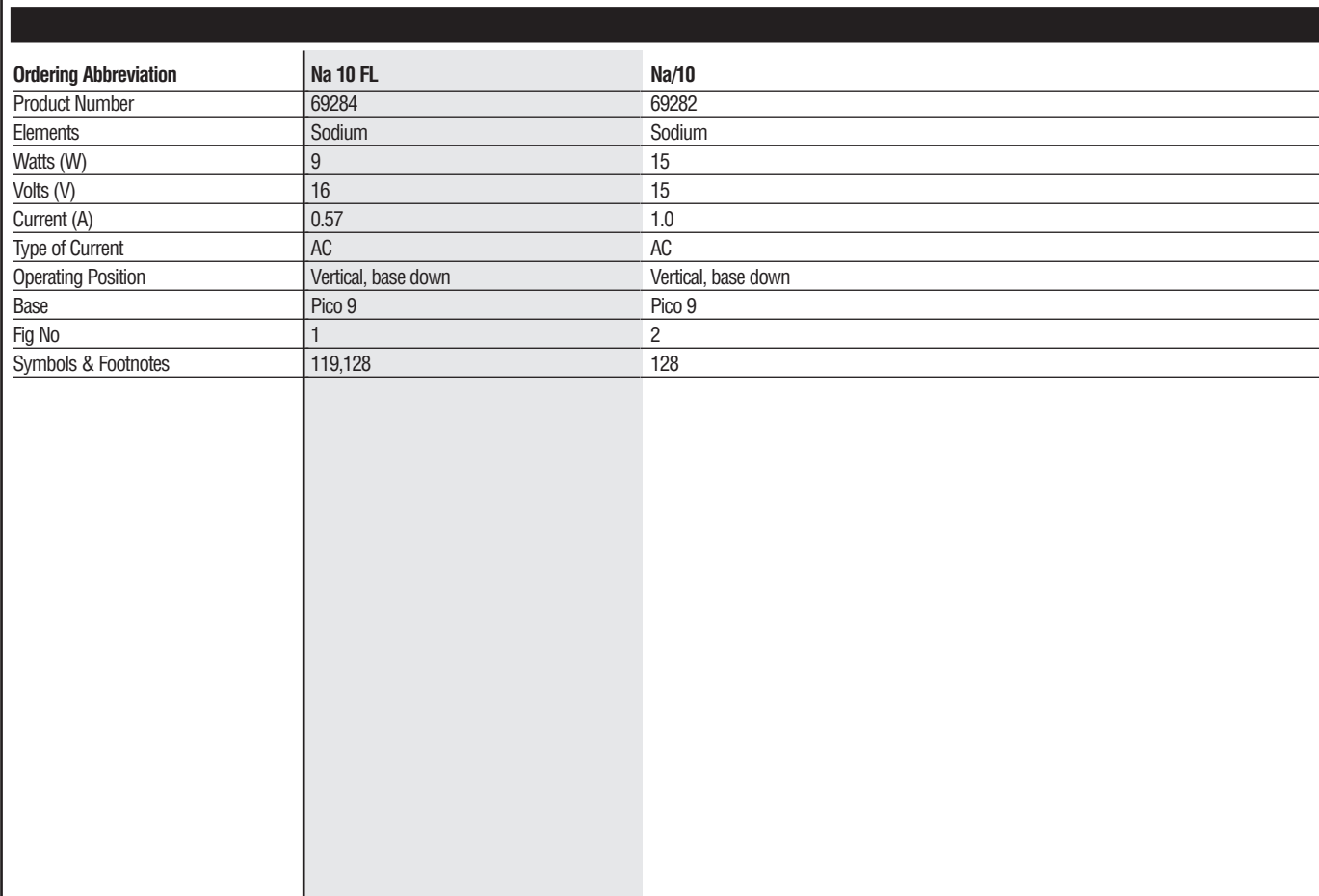


| Ordering Abbreviation                 | HBO 5500 W/PI      | HBO 5000 W/HK        |
|---------------------------------------|--------------------|----------------------|
| Product Number                        | 69164              | 69138*               |
| Watts (W)                             | 5000               | 5100                 |
| Volts (V)                             | 25                 | 70                   |
| Type of Current                       | DC                 | DC                   |
| Current (A)                           | 200.0              | 72.0                 |
| Radiant Intensity 350..450 nm (mW/sr) |                    | 65.8                 |
| Length $l_1$ max (mm)                 |                    | 355                  |
| Length $l_2$ max (mm)                 | 355                | 302                  |
| Distance $a$ (mm)                     | 154                | 152.5                |
| Diameter $d$ (mm)                     | 85                 | 82                   |
| Electrode Gap – cold (mm)             | 5.5                | 7.5                  |
| Avg Rated Life (hrs)                  | 850                | 1000                 |
| Operating Position                    | Vertical, anode up | Vertical, anode down |
| Cooling                               | Forced Base        | Forced Base          |
| Base Anode                            | SFcX 42.5-6/50     | SFYa29-10/42         |
| Base Cathode                          | SFa 37.5-9/50      | SFc29-20-12/42       |
| Fig No                                | 1                  | 2                    |
| Symbols & Footnotes                   | 135,201,266        | 80                   |

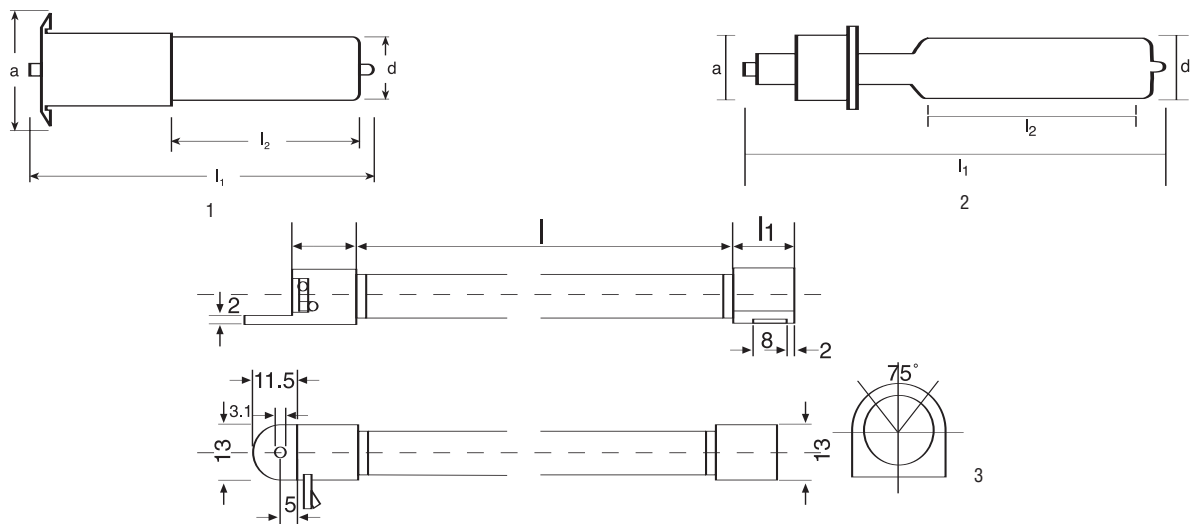


For more complete product information visit [www.sylvania.com](http://www.sylvania.com)

# DISPLAY OPTIC DISCHARGE



# EXCIMER LAMPS



## XERADEX®

| Ordering Abbreviation | XERADEX 20      | XERADEX 20/HV   | XERADEX 20/SY45/45 |
|-----------------------|-----------------|-----------------|--------------------|
| Product Number        | 69338           | 69352           | 69349              |
| Watts (W)             | 20              | 20              | 20                 |
| Length l1 max (mm)    | 245             | 245             | 300                |
| Length l2 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   | 115,118,145,147 | 115,118,145,158 | 115,118,145,148    |

## LINEX®

| Ordering Abbreviation  | LX40T3/956/A3 | LX24T3/956/A4 |  |
|------------------------|---------------|---------------|--|
| Product Number         | 52079         | 52155         |  |
| Watts (W)              | 40            | 24            |  |
| Avg Rated Life (hrs)   | 2000          | 2000          |  |
| Base                   | Special       | Special       |  |
| Illuminance @ 8mm (Lx) | 80000         | 48000         |  |
| Bulb                   | T3            | T3            |  |
| Lamp Finish            | Coated        | Coated        |  |
| Hot Restart            | Yes           | Yes           |  |
| Length L (mm)          | 350           | 235           |  |
| Length L1 (mm)         | 15            | 15            |  |
| MOL (mm)               | 391.5         | 267.5         |  |
| Fig No                 | 3             | 3             |  |
| Symbols & Footnotes    | 176,204       | 176,204       |  |

## LAMP BASES



BA15d  
IEC 7004-11  
DIN 49721  
DL  
Bayonet



BA15s  
IEC 7004-11A  
DIN 49720  
SC  
Bayonet



BA20d  
IEC 7004-12  
DIN 49730



E10  
IEC 7004-22  
DIN 49610  
miniature  
Edison



E14  
IEC 7004-23  
DIN 49615  
small  
Edison



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



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



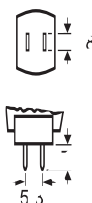
FaX1.5-3x1



G4  
IEC 7004-72  
DIN 49757  
2-pin



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



G5.3-4.8  
2-pin



GY5.3  
2-pin



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



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



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



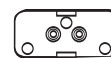
GZ6.35  
IEC 7004-59 A  
DIN 49754  
2-pin



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



G9.5  
IEC 7004-70  
medium  
2-pin



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

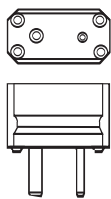


GY9.5  
GZ9.5  
DIN 49756  
IEC 7004-70 B  
2-pin  
pre-focus

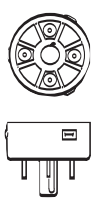
## LAMP BASES



GX16d  
2-pin



GY16  
DIN 49758  
IEC 7004-45  
2-pin



GY17q  
DIN 49758  
IEC 7004-74  
4-pin



GY17t  
DIN 49665  
IEC 7004-45  
4-pin



G22  
IEC 7004-75  
medium  
Bipost



GY22  
2-pin



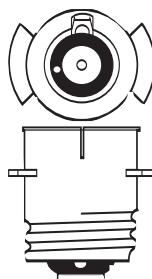
G38  
IEC 7004-76  
MOGUL  
Bipost



GX38q



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



P40s  
DIN 49728  
IEC 7004-43  
medium  
pre-focus



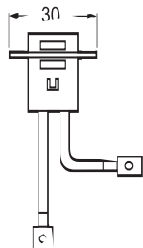
Pico9  
DIN 41539



PG22-6.35  
DIN 49751  
IEC 7004-48



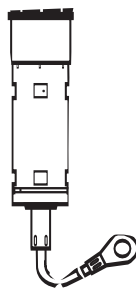
P28s  
DIN 49728  
IEC 7004-42  
MOGUL  
pre-focus



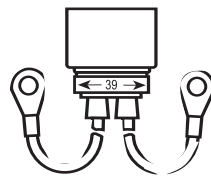
PK30d



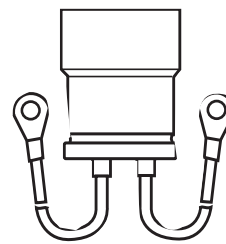
R7s  
RX7s  
DIN 49750  
IEC 7004-92



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

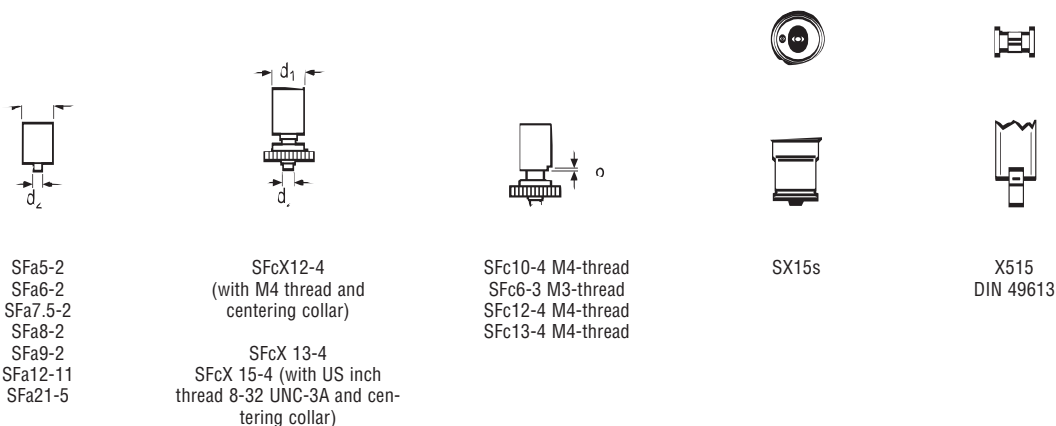
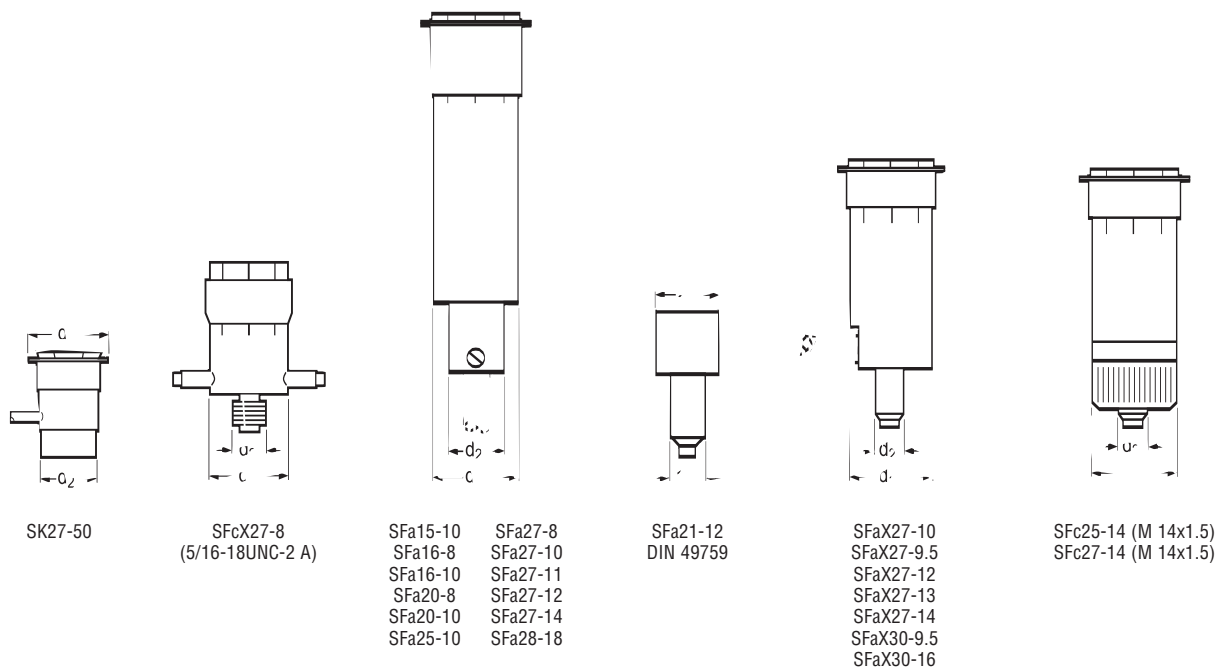


K39 d  
with flexible Sial cable  
Length of cable 300 mm.  
Hole of cable lug dia. 8.4 mm



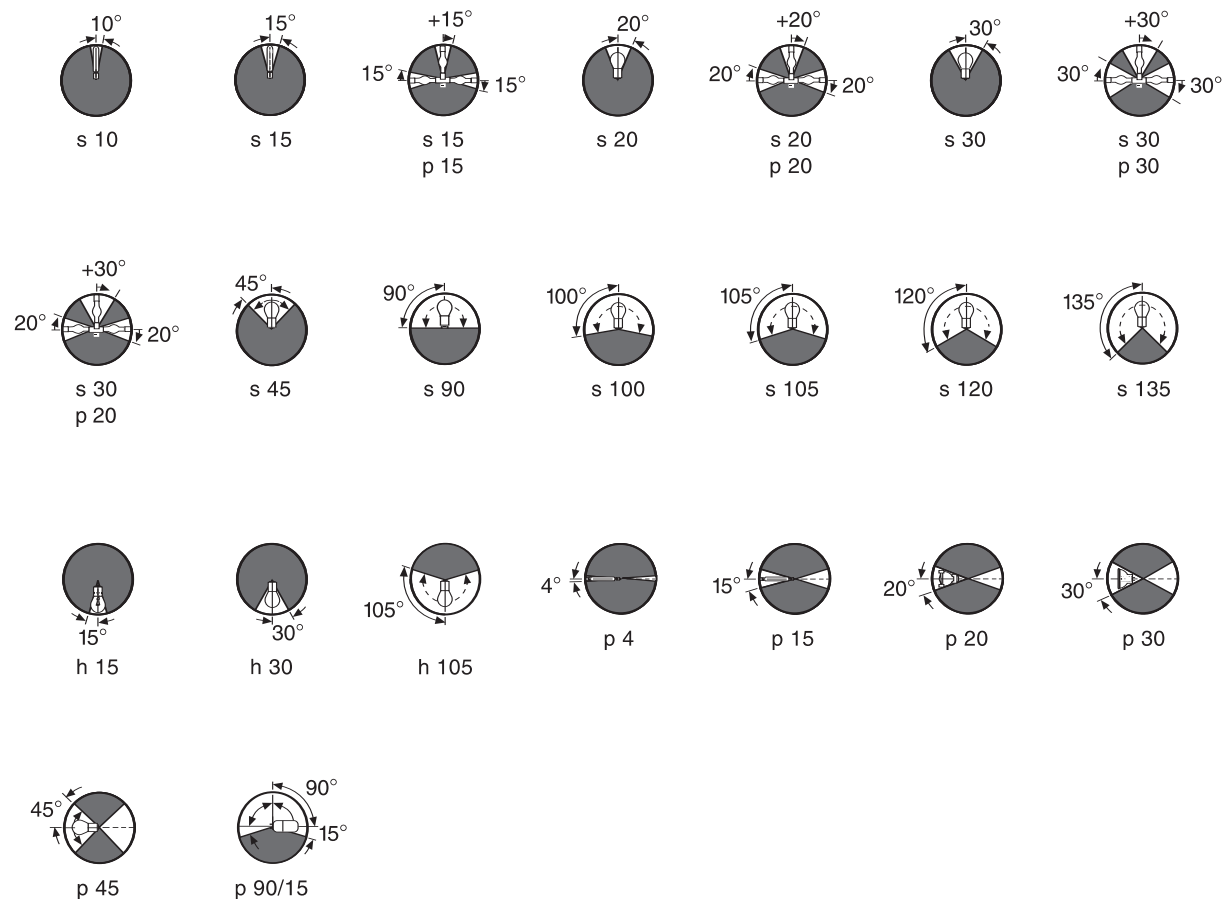
K59 d  
with flexible Sial cable  
Length of cable 350 mm.  
Hole of cable lug dia. 8.4 mm  
DIN 49732

## LAMP BASES



## OPERATING POSITIONS

### Schematic diagrams



## GENERAL INFORMATION

In North America, OSRAM brand Display/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 Display/Optic lamps and could void the lamp warranty. A list of power supply manufacturers is available upon request.

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

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC 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                                                                                 | Lamp arc needs to be in horizontal operating position.                                                                                                                                                           |
| 3                                                                                 | Any operating position allowed with appropriate cooling.                                                                                                                                                         |
| 4                                                                                 | In certain countries there are third party property rights relating to equipment which must be observed if these lamps are used in dentistry.                                                                    |
| 5                                                                                 | Lamp suited for video camera heads; 500hr life @ 1.8V/ 45 min. ON / 15 min. OFF.                                                                                                                                 |
| 6                                                                                 | WARNING: This lamp is designed for heating purposes. It emits a strong Infrared radiation with a temperature at focal point approx. 1300 degrees C. Read Safety and Warning instructions before using this lamp. |
| 7                                                                                 | Lamp also available in BELLAPHOTO (Product Number 54163).                                                                                                                                                        |
| 8                                                                                 | Lamp also available in BELLAPHOTO (Product Number 54840).                                                                                                                                                        |
| 9                                                                                 | Lamp service life 75hr life is defined at 76V with a duty cycle of 45 min. ON / 15 min. OFF.                                                                                                                     |
| 10                                                                                | Current bar needs to be positioned underneath the discharge arc during operation.                                                                                                                                |
| 11                                                                                | Lamp also available in 240 V model.                                                                                                                                                                              |
| 12                                                                                | Preferred operating position is horizontal; vertical possible for short periods.                                                                                                                                 |
| 13                                                                                | Lamp has internal proximity reflector.                                                                                                                                                                           |
| 14                                                                                | Base - filament connections: Pins 1 and 4.                                                                                                                                                                       |
| 15                                                                                | Lamp has monoplane filament 10 X 10 mm.                                                                                                                                                                          |
| 16                                                                                | Lamp has monoplane filament.                                                                                                                                                                                     |
| 17                                                                                | Lamp also available as a 240V model (Product Number 54977).                                                                                                                                                      |
| 18                                                                                | Lamp has a biplane filament.                                                                                                                                                                                     |
| 19                                                                                | WARNING: Lamp has a special GY22 base. Ignition voltage must be applied only to the thin pin.                                                                                                                    |
| 20                                                                                | Lamp interchangeable with HX 602                                                                                                                                                                                 |
| 21                                                                                | Lamp interchangeable with HX 600                                                                                                                                                                                 |
| 22                                                                                | Lamp also available as 115V model (Product Number 54636).                                                                                                                                                        |
| 23                                                                                | Lamp has two separately switchable filaments.                                                                                                                                                                    |
| 24                                                                                | Length l = Contact to contact.                                                                                                                                                                                   |
| 25                                                                                | Lamp also available in 240 V version : Product Number 54619.                                                                                                                                                     |
| 26                                                                                | High-performance HPL halogen lamps are manufactured under license from ETC, Inc.                                                                                                                                 |
| 27                                                                                | Do not tilt perpendicular to the filament.                                                                                                                                                                       |
| 28                                                                                | WARNING: The contact pins on the base are connected internally. The electrode farthest from the base must be connected via cable.                                                                                |
| 29                                                                                | MFL=Medium Flood                                                                                                                                                                                                 |
| 30                                                                                | NSP=Narrow Spot                                                                                                                                                                                                  |
| 31                                                                                | WFL=Wide Flood                                                                                                                                                                                                   |
| 32                                                                                | VNSP=Very Narrow Spot.                                                                                                                                                                                           |
| 33                                                                                | With biplane filament , higher luminous intensity can be achieved.                                                                                                                                               |
| 34                                                                                | Lamp has a flat core filament with filament area perpendicular to the lamp axis.                                                                                                                                 |
| 35                                                                                | Hg 100 also suitable for DC operation (no igniter needed when connected to 230V)                                                                                                                                 |
| 36                                                                                | Lamp also available with connecting cable and plug-in contact.XBO R 180W/45 C OFR (Product Number 69183).                                                                                                        |
| 37                                                                                | Lampholder for FaX 1.5 base = HMI Socket 46721 (Product Number 69302).                                                                                                                                           |
| 38                                                                                | Lamp also available in ozone-free version XBO 75 W/2 OFR (Product Number 69232)                                                                                                                                  |
| 39                                                                                | Lamp also available in ozone-free version XBO 150 W/1 OFR (Product Number 69235)                                                                                                                                 |
| 40                                                                                | Lamp uses Suprasil quartz glass.                                                                                                                                                                                 |
| 41                                                                                | Lamp also available in ozone-free version XBO 450 W OFR (Product Number 69245)                                                                                                                                   |
| 42                                                                                | Lamp also available in Suprasil quartz glass version XBO 450 W/4 (Product Number 69244)                                                                                                                          |
| 43                                                                                | S=Short                                                                                                                                                                                                          |
| 44                                                                                | C=Base with Cable                                                                                                                                                                                                |

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                                                                                                                                      |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 45       | H=Suitable for horizontal operation                                                                                                                                                                                                              |
| 46       | TC=Thread and Cable                                                                                                                                                                                                                              |
| 47       | CA=Cable on anode base                                                                                                                                                                                                                           |
| 48       | All HTI« lamps are hot restrikeable with the exception of HTI 150, HTI 152, HTI 405 W/SE, and 705 W/SE.                                                                                                                                          |
| 49       | SHSC=Extra short version for horizontal burning position, anode connection via cable (super short)                                                                                                                                               |
| 50       | TM=Threaded Modified                                                                                                                                                                                                                             |
| 51       | TP=Threaded Pin                                                                                                                                                                                                                                  |
| 52       | GS=Gap Shortened                                                                                                                                                                                                                                 |
| 53       | SE=Single Ended                                                                                                                                                                                                                                  |
| 54       | DE=Double Ended                                                                                                                                                                                                                                  |
| 55       | DX= Double Ended eXtreme Seal technology                                                                                                                                                                                                         |
| 56       | OFR=Ozone Free                                                                                                                                                                                                                                   |
| 57       | Molybdenum pins have 1mm diameter.                                                                                                                                                                                                               |
| 58       | s (Operating Position) = Vertical, base down                                                                                                                                                                                                     |
| 59       | h (Operating Position) = Vertical, base up                                                                                                                                                                                                       |
| 60       | p (Operating Position) = Horizontal                                                                                                                                                                                                              |
| 61       | Lamp also available with 850 hr HBO 1500 W/PI (Product Number 69319)                                                                                                                                                                             |
| 62       | Lamp also available as version HBO 2001 W/CI with 850hr life (Product number 69219)                                                                                                                                                              |
| 63       | Lamp is also available with connecting cable and plug-in contact. HTI 250W/32 C (Product Number 54089).                                                                                                                                          |
| 64       | Lamp also available as version HBO 1003 W/PI with 850hr life (Product Number 69195)                                                                                                                                                              |
| 65       | Lamp also available as version HBO 2500 W/PI with 850hr life (Product Number 69178)                                                                                                                                                              |
| 66       | Technical data if operated on AC: Current = 7.1 A, Volts = 67 V.                                                                                                                                                                                 |
| 67       | Average service life of lamp if operated with 400W is 100 hrs.                                                                                                                                                                                   |
| 68       | Magnetic arc stabilization required.                                                                                                                                                                                                             |
| 69       | Lamp same as HBO 200 W/4 (Product Number 69224 but with increased radiation in the wavelength range below 450nm for UV-curing.                                                                                                                   |
| 70       | Technical lamp data if operated on AC: Current=4.2 A, Volts=65 V, Lumens=10,000 lm, Luminous Efficacy=50 lm/W.                                                                                                                                   |
| 71       | Electrical data if lamp is operated on AC: Current=7.8 A, Volts=67 V.                                                                                                                                                                            |
| 72       | Lamp has been specially adjustment for uniform illumination in the far field(200-250) mm focal length.                                                                                                                                           |
| 73       | Cathode Base with 8-32 UNC-3A thread.                                                                                                                                                                                                            |
| 74       | Anode Base=Sleeve base with M 6 thread.                                                                                                                                                                                                          |
| 75       | Anode Base=Hexagon base with M 6 thread.                                                                                                                                                                                                         |
| 76       | Anode Base with 8-32 UNC-3A thread.                                                                                                                                                                                                              |
| 77       | Anode Base=Sleeve base with cooling fins and cable connection (M 6).                                                                                                                                                                             |
| 78       | Anode Base with M 6 thread.                                                                                                                                                                                                                      |
| 79       | Anode Base with cable connection (M 8).                                                                                                                                                                                                          |
| 80       | Anode Base with cable connection (M 6).                                                                                                                                                                                                          |
| 81       | Anode Base with 8-32 UNC-3 thread.                                                                                                                                                                                                               |
| 82       | Pin dimensions at front ceramic ring 2mm diameter, 10 mm length. Pin dimensions at rear ceramic base cap 2.5mm diameter, 11mm length.                                                                                                            |
| 83       | Anode base with M 5x 0.9 thread                                                                                                                                                                                                                  |
| 84       | Cathode Hexagon base with M 5x 0.9 thread                                                                                                                                                                                                        |
| 85       | Anode base with cable: length 340mm; connector 8/25.                                                                                                                                                                                             |
| 86       | 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. |
| 87       | Product Number 69223 can be used for DC operation (47...65 Volts / 3.1...4.2Amps) and for AC operation (L2 version 49 57 Volt / 4.2 Amps).                                                                                                       |
| 88       | For DC operation Product Number 69204 can be used (67-85 Volts / 5.9 - 7.4 Amps). For AC operation Product Number 69204 can be used (L2 version 69-77 Volt / 7.8 Amps).                                                                          |
| 89       | Anode and Cathode Base with UNC-3B thread.                                                                                                                                                                                                       |
| 90       | Type of current: sine-wave (sinusoidal) AC.                                                                                                                                                                                                      |

# SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 91       | Photometric data refer to discharge tube (lamp burner).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 92       | Lamp also available with 850 hrs (HBO 3500 W/PI, Product Number 69174)                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 93       | Lamp also available with 850 hrs (HBO 3501 W/PI, Product Number 69127)                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 94       | Lamp also available as Longlife version HBO 2500 W/PIL with 1500hr life (Product Number 69172).                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 95       | Lamp also available as Longlife version HBO 3500 W/PIL with 1500hr life (Product Number 69169).                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 96       | Cathode base with M 5x 0.9 thread                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 97       | Cathode base with cable connection (M5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 98       | Anode Base=Sleeve base with cable connection (M5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 99       | Lamp also available as Longlife version HBO 3500 W/PIL with 1500hr life (Product Number 69169).                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 100      | Anode base with cable connection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 101      | Length l1 = Contact to contact.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 102      | Lamp has a parabolic reflector.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 103      | Lamp wattage - After seasoning for 1/2 hour 1000 watts based on 2 filaments together, 400 watts based on 1 filament.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 104      | Average service life = 25 hrs. based on 2 filaments together, 100 hrs. with 1 filament.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 105      | Average service life = 50 hrs. based on 2 filaments together, 100 hrs. with 1 filament.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 106      | Ignition voltage = 36 kVs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 107      | Ignition: Min. open circuit voltage for cold / hot ignition = 85 / 110 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 108      | Cooling: Min. air flow velocity around discharge vessel = 6 m/s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 109      | Magnetic arc stabilization: necessary for horizontal operation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 110      | Product number 54100 is the replacement for product number 54048.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 111      | HMI PAR lens set for OSRAM HMI 1200 PAR 64 comprising of NSP, VNSP, MFL, and VWFL lenses.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 112      | OSRAM socket #46721, cable length 22" for use with the following OSRAM lamps: HTI 400W/SE (product number 54084), HTI 600W/SE (product number 54087), and HMI 250W/SE (product number 54062).                                                                                                                                                                                                                                                                                                                                                        |
| 113      | Lamp has a elliptical reflector.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 114      | Lamp also available as version HBO 2001 W/CIL with 1500hr life (product number 69189)                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 115      | The XERADEX 20 lamp must be operated with DBD 20/110-240/ECG-XERADEX power supply (Product Number 69128 or 69129).                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 116      | This power supply is designed to operate the XERADEX 20 lamp (Product Number 69338).                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 117      | Lumens refers to screen lumens.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 118      | 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 (O2) surrounding the lamp into ozone (O3). 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). |
| 119      | For Na 10 FL (product number 69284) use adapter no. 454/s using Pico 9 bases with P28 sockets.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 120      | Lamp also available with male connectors (Product Number 58722)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 121      | Lamp also available with female connectors (Product Number 58697)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 122      | Lamp also available with male connectors (Product Number 58726)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 123      | Lamp also available with female connectors (Product Number 58721)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 124      | All VIP« lamps are for AC operation on electronic power supplies and are hot restrikeable. All VIP« lamps need forced cooling.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 125      | Lamp also available with female connectors (Product Number 58709)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 126      | Lamp also available with female connectors (Product Number 58717)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 127      | Clean room ready packaging.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 128      | 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.                                                                                                                                                                                                                                                                      |
| 129      | This lamp has positive pressure even when cold. Please read safety/warning instructions before using this lamp.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 130      | Line drawing represented does not show cable connection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 131      | Lamp HSD 250/78 also available with 7800K color temperature and average rated life at 3000 hr. Product Number 54118.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 132      | Lamp XBO 10000 W/HS OFR also available with current control range 160-299 amps. Product Number 69342.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 133      | Lamp HSD 250 also available with 6000K color temperature and average rated life at 2000 hr. Product Number 54170.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 134      | Connector = Female, round, with 4mm pin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                                                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 135      | Lamp life may vary depending on duty cycle and application.                                                                                                                                                                     |
| 136      | Connector = Female.                                                                                                                                                                                                             |
| 137      | Connector = Male.                                                                                                                                                                                                               |
| 138      | Snap-on connector, female / male contact.                                                                                                                                                                                       |
| 139      | In horizontal operation position it is recommended that the "lead connection" wire be in the top position with filler tip facing down.                                                                                          |
| 140      | This lamp type is twice the life of the ANSI standard version.                                                                                                                                                                  |
| 141      | This lamp type is twice the life of the standard version.                                                                                                                                                                       |
| 142      | Please see Product Number 58795 for double life version.                                                                                                                                                                        |
| 143      | Please see Product Number 58789 for double life version.                                                                                                                                                                        |
| 144      | Please see Product Number 58794 for double life version.                                                                                                                                                                        |
| 145      | XERADEX lamp life is rated in terms of 70% of initial UVC output on a continuous burn cycle.                                                                                                                                    |
| 146      | Lamp also available with connecting cable and plug-in contact. XBO R 100W/45 C OFR (Product Number 69191).                                                                                                                      |
| 147      | Base is KF50 flange fitting; lamp is designed for use in vacuum environments at pressures above 300 mbar.                                                                                                                       |
| 148      | Base is KF40 flange fitting; lamp is designed for use in high vacuum environments at pressures above 30 mbar and below 10 <sup>-3</sup> mbar.                                                                                   |
| 149      | Please see Product Number 58779 for double life version.                                                                                                                                                                        |
| 150      | Please see Product Number 58819 for double life version.                                                                                                                                                                        |
| 151      | Please see Product Number 58821 for double life version.                                                                                                                                                                        |
| 152      | Maximum permitted base temperature is 350 degrees C at molybdenum foil / pinch seal region.                                                                                                                                     |
| 153      | Distance b = Ignition Electrode. Base for ignition electrode is SFC 6-3.                                                                                                                                                        |
| 154      | HBO 200W L1 and HBO 200W L2 can be operated on AC or DC.                                                                                                                                                                        |
| 155      | HBO 200W L1 (Product Number 69218) technical data if operated on AC current: Volts = 61 +/- 4, Current (A) = 3.6.                                                                                                               |
| 156      | HBO 200W L2 (Product Number 69220) technical data if operated on AC current: Volts = 53 +/- 4, Current (A) = 4.2.                                                                                                               |
| 157      | Distance a is from end of base to the respective electrode tip (cold) - see lamp drawing.                                                                                                                                       |
| 158      | Base is KF50 flange fitting; lamp is designed for use in high vacuum environments at pressures above 200 mbar and below 10 <sup>-3</sup> mbar.                                                                                  |
| 159      | For use indoors or outdoors. When used outdoors, protect the lens of the bulb from direct contact with moisture (rain, snow, etc.) to avoid cracking or breaking.                                                               |
| 160      | 2000hr warranty against non-passive lamp failure.                                                                                                                                                                               |
| 161      | Optimized lamp eXtreme Seal (XS) technology to withstand interior base temperatures of up to 450 degrees celsius.                                                                                                               |
| 162      | When operated on electronic control gear (ECG) service life extended to 3000h.                                                                                                                                                  |
| 163      | Also available with 850h, HBO 3501 W/PI: NAED 69127.                                                                                                                                                                            |
| 164      | SHP - series (Super High Performance Technology).                                                                                                                                                                               |
| 165      | Lamp focus is 60mm in front of reflector rim.                                                                                                                                                                                   |
| 166      | Lamp is part of the SharXS HTI lamp series. All SharXS HTI lamps are identical in terms of their shape, size, and bases.                                                                                                        |
| 167      | Base has notch for pre-alignment.                                                                                                                                                                                               |
| 168      | Lamp current not to exceed 7.2A.                                                                                                                                                                                                |
| 169      | 125 mm (front ring to plug) and 95 mm (rear cap to plug) silicon cables terminated with MATE-N-LOK plug no. 350809-1 with pins no. 926868-3 by AMP Inc.                                                                         |
| 170      | It takes time for the mercury in the lamp to evaporate. Typically 95% of luminous output are generated after approximately 120 seconds. For quality inspection purposes allow for five minutes burning time.                    |
| 171      | Excessive airflow may lead to mercury condensation in the discharge lamp bulb and consequently to a performance drop.                                                                                                           |
| 172      | Operation time after which either aperture lumens decrease to 50% of initial value or the lamp voltage reaches 115 V and the lamp cannot be ignited. Switching cycle: 210 minutes on / 30 minutes off.                          |
| 173      | Operational bulb wall temperatures lower than 850°C may lead to mercury condensation and prevent the lamp from reaching stable operation conditions; temperatures higher than 950°C may lead to premature failures of the lamp. |
| 174      | For rectangular aperture of 5.0 x 3.8 mm (hor. x vert.) at working distance 17.3 mm.                                                                                                                                            |
| 175      | Output is understood as total energy in the range 320 ... 500 nm focused on an aperture with diameter d at working distance a in front of the reflector.                                                                        |

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                                           |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 176      | Beam Angle data refers to aperture.                                                                                                                   |
| 177      | Lamp is suited for use in ASML equipment (PAS 5500/22, /100, /100B, /TFH100).                                                                         |
| 178      | The QXL lamp allows easy one-hand replacement without opening the light fixture. 1/4 turn twist in/out, no tool required.                             |
| 179      | With vertical operating position: anode(+) on top.                                                                                                    |
| 180      | QXL is a trademark of Electronics Theatre Controls Inc., and used under license                                                                       |
| 181      | The QXL 750/77 lamp has been designed and approved by ETC in the Source Four® Revolution™                                                             |
| 182      | Anode: Cable connection length 110mm                                                                                                                  |
| 183      | Cathode Base with cable connection (M 12).                                                                                                            |
| 184      | Lamp uses eXtreme Seal (XS) Technology, which effectively protects the seal up to 500°C.                                                              |
| 185      | Cable Connector TP120.                                                                                                                                |
| 186      | This lamp is used for OEB/WEE applications.                                                                                                           |
| 187      | Lamp is interchangeable with FLK naed 54589                                                                                                           |
| 188      | Lamp is interchangeable with FLK PLUS HPR 575/115 naed 54549                                                                                          |
| 189      | Lamp designed for the manufacture of printed Board Circuits in Hakuto exposure equipment HAP 3500 and 3510 series                                     |
| 190      | The focus lies 45mm in front of the mounting rim (working distance).                                                                                  |
| 191      | Lamp description changed from HSD 200 to HSD 200W/60 4ARXS                                                                                            |
| 192      | Lamp description changed from HTI 575 W/DE to HTI 575/D5/56 Baby-Sharxs                                                                               |
| 193      | Includes screw hole in anode lamp base with installed cable. No screw hole in cathode lamp base.                                                      |
| 194      | Includes screw hole in anode & cathode lamp base. Includes 1 installed cable for anode lamp base. Cathode cable provided on request when ordering.    |
| 195      | Includes screw hole in anode & cathode lamp base. Includes 1 anode cable & 1 cathode cable in box, not installed.                                     |
| 196      | HTI 1200W/D7/60 SharXS lamp (Product No. 54268-10 case & 54202-30 case) is a direct and equal replacement for the HMI 1200W/S lamp (Product No.54088) |
| 197      | Cathode Base with Cable connection (M 10)                                                                                                             |
| 198      | Easy disassembly into components allow for environmentally preferred waste disposal                                                                   |
| 199      | Aluminum reflector reduces weight by up to 50% compared to standard glass PAR lamps                                                                   |
| 200      | The HBO 200 W/DC TM is a direct and equal replacement for the HBO 200 W/2 TM (product No. 69221)                                                      |
| 201      | Lamp bases need to be forced cooled.                                                                                                                  |
| 202      | The connecting cables do not have a plug-in connector.                                                                                                |
| 203      | XIR=Xenon Infrared                                                                                                                                    |
| 204      | Average service life can vary by application. Call National Customer Sales and Support (888) 677-2627 for more information.                           |
| 205      | Connector = female, flat                                                                                                                              |
| 206      | Lamp is part of the Baby SharXS HTI lamp series. All Baby SharXS HTI lamps are identical in terms of their shape, size, and bases.                    |
| 207      | Reinforced pinch-seal neck design for moving head applications                                                                                        |
| 208      | Connector = female, round                                                                                                                             |
| 209      | Connector = male, flat                                                                                                                                |
| 210      | LA= Lumen Advanced (High Efficiency Lamp)                                                                                                             |
| 211      | Photometric values are measured at rated current.                                                                                                     |
| 212      | Lamp also available in Suprasil quartz glass version: XBO 150 W/4 (Product Number 69238).                                                             |
| 213      | Lamp is suitable for Crosfield color scanner (CR = Crosfield).                                                                                        |
| 214      | Photometric data is measured in vertical operating position at rated wattage.                                                                         |
| 215      | Lamp also available in Suprasil quartz version: XBO 450 W/4 (Product Number 69244).                                                                   |
| 216      | For vertical operating position; anode(+) on top.                                                                                                     |
| 217      | Lamp has same dimensions as XBO 1600 W/HSC OFR (Product Number 69268).                                                                                |
| 218      | Lamp also available as XBO 2001 W/HTP OFR (Product Number 69310).                                                                                     |
| 219      | Necessary input voltage: 380 volt.                                                                                                                    |
| 220      | Lamp also available as XBO 4200 W/GS with 60mm bulb diameter and 500 hrs life.                                                                        |
| 221      | Lamp also available as XBO 5000W/HBM OFR with anode base SFaX30-9,5 and cathode base SFa30-8.                                                         |
| 222      | Lamp optimized for fluorescence microscopy.                                                                                                           |
| 223      | Lamp also available with AMP plug contact. HBO R 103/45 C (Product Number 69311).                                                                     |

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                               |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 224      | HBO 200W/2 and HBO 500W/2 can be operated on AC or DC.                                                                                    |
| 225      | Lamp also available with increased radiation in the wavelength range below 450nm for UV-curing. HBO 202W/4 (Product Number 69316).        |
| 226      | Lamp also available with threaded pin 8-32 UNC-3A: HBO 200 W/2TM (Product Number 69223).                                                  |
| 227      | Technical data if operated on AC current: Volts=65, Lumens=10,000 lm, Luminous Efficacy=50 lm/W.                                          |
| 228      | Lens set available (NSP,MFL,WFL,SWFL) Ref. No. 46771.                                                                                     |
| 229      | Lamps suitable for pulse operation between 250W and 500W. Maximum permissible average power is 350W (also for constant power operation).  |
| 230      | HBO 350W (Product Number 69226) replaces HBO 350 W/G (Product Number 69227).                                                              |
| 231      | Lamp service life is defined with a switch-on/switch off duty cycle of 12hours ON / 30 minutes OFF.                                       |
| 232      | Distance a = Distance (cold) of either anode base to anode tip or cathode base to cathode tip depending on lamp type.                     |
| 233      | NOTE: Maximum permitted base temperature: 230 degrees C (446 degrees F).                                                                  |
| 234      | lamp base is with 8-32 UNC-3A thread.                                                                                                     |
| 235      | Lamp base(s) with M 5x0.9 thread.                                                                                                         |
| 236      | Lamp anode base (hexagon) with thread M5x0.9                                                                                              |
| 237      | Lamps suitable for pulse operation between 700W and 1000W. Maximum permissible average power is 750W (also for constant power operation). |
| 238      | Available in 2500 hrs. life: HBO 1000 W/CEL (Product Number 69175).                                                                       |
| 239      | Discharge tube needs to be in horizontal operating position.                                                                              |
| 240      | Available in 2500 hrs. life: HBO 1002 W/CEL (Product Number 69177).                                                                       |
| 241      | Lamp should not be ignited more than ten times over lifetime.                                                                             |
| 242      | Lamp has cooling fins on anode base.                                                                                                      |
| 243      | Cathode Base=Sleeve base with M 6 thread.                                                                                                 |
| 244      | Cathode Base=Hexagon base with M 6 thread.                                                                                                |
| 245      | Lamp has anode base with cooling fins and cable connection (M 6).                                                                         |
| 246      | Lamp is available in 2500 hrs life: HBO 1000 W/NEL (Product Number 69176).                                                                |
| 247      | Lamp is available in 2500 hrs. life: HBO 1002 W/NEL (Product Number 69273).                                                               |
| 248      | The radiant Power of the I-line is measured in the wavelength range: 365 + 2.5 nm.                                                        |
| 249      | Lamp also available as Longlife version HBO 1003 W/PIL (Product Number 69180) with 1500hr life.                                           |
| 250      | Lamp filler tip needs to point upwards during operation.                                                                                  |
| 251      | Cathode Base=Sleeve base with cooling fins and cable connection (M 6).                                                                    |
| 252      | Cathode Base with M 6 thread.                                                                                                             |
| 253      | Cathode Base with cooling fins.                                                                                                           |
| 254      | Anode sleeve base without thread.                                                                                                         |
| 255      | Anode Base=Sleeve base with cable connection (M 6).                                                                                       |
| 256      | Maximum permitted base temperature: 200 degrees C (392 degrees F).                                                                        |
| 257      | Lamp also available as Longlife version HBO 1500 W/PIL (Product Number 69181) with 1500hr life.                                           |
| 258      | Lamp also available as Longlife version HBO 1500 W/CIL (Product Number 69179) with 1500hr life.                                           |
| 259      | Lamp also available as Longlife version HBO 2001 W/NIL with 1500hr life (Product Number 69292).                                           |
| 260      | Cathode Base with cable connection (M 8).                                                                                                 |
| 261      | Permitted wattage range: 300W to 600W.                                                                                                    |
| 262      | Anode Base=Cooling fins with cable connection (M 8).                                                                                      |
| 263      | The average rated life of this lamp depends on the operating mode (initial power setting).                                                |
| 264      | Cathode Base with cable connection (M 6).                                                                                                 |
| 265      | Lamp also available as Longlife version HBO 2501 W/NIL (Product Number 69289) with 1500hr.                                                |
| 266      | Anode Base with cable connection (M 10).                                                                                                  |
| 267      | Lamp has round-core double filament.                                                                                                      |
| 268      | Male contacts according to DIN 46248.                                                                                                     |
| 269      | Lamp is also available with male contact(Product Number 58724).                                                                           |
| 270      | Permitted wattage range: 400W to 700W.                                                                                                    |
| 271      | Female contact is according to DIN 46247.                                                                                                 |

## SYMBOLS & FOOTNOTES FOR DISPLAY/OPTIC LAMPS

| Footnote | Description                                                                                                                                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 272      | Despite transverse filament, lamp can be inclined at any angle in s 90 position.                                                                                                              |
| 273      | Lamp has snap-on male contact to DIN 46248.                                                                                                                                                   |
| 274      | Lamp also available with male contact according to DIN 46248. 64361/HLX Z (Product Number 58717)                                                                                              |
| 275      | Lamp has D.C. Bay Ring.                                                                                                                                                                       |
| 276      | 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).                                 |
| 277      | Lamp has 1.75 inch (44.45mm) stranded Nickel leads.                                                                                                                                           |
| 278      | Max. Beam Candlepower (MBCP) : 175 kcd.                                                                                                                                                       |
| 279      | D=Digital                                                                                                                                                                                     |
| 280      | XL=Xtreme Life                                                                                                                                                                                |
| 281      | CL=Classic Line                                                                                                                                                                               |
| 282      | HP=High Performance                                                                                                                                                                           |
| 283      | S=Sony (Sony projector)                                                                                                                                                                       |
| 284      | Anode base with thread (M16)                                                                                                                                                                  |
| 285      | High temperature base. Retards seal deterioration where seal temperature exceeds 650°F.                                                                                                       |
| 286      | For use where seal temperature does not exceed 650°F.                                                                                                                                         |
| 287      | Life at rated voltage and at 650°F maximum seal temperature.                                                                                                                                  |
| 288      | Usually limited to intermittent burning.                                                                                                                                                      |
| 289      | 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. |
| 290      | Bulk pack= 30/case                                                                                                                                                                            |
| 291      | Anode: Hexagon base with thread 8-32 UNC                                                                                                                                                      |

# Index by Ordering Abbreviation

| Type                   | Page | Type                          | Page | Type                 | Page | Type                 | Page |
|------------------------|------|-------------------------------|------|----------------------|------|----------------------|------|
| 111A                   | 217  | 2500T30Q/IR/7 480V            | 219  | BTR                  | 215  | EPT                  | 212  |
| 140                    | 217  | 2500T80Q/120V                 | 219  | BVE                  | 211  | EPX                  | 212  |
| 211 118V               | 217  | 3650T30Q/IR/CL 480V           | 219  | BVM 64540            | 215  | EPZ                  | 212  |
| 212 118V               | 217  | 3800T30Q/IR 570V              | 219  | BVT                  | 215  | ESA/FHD 64225        | 212  |
| 4551                   | 220  | 4515 PAR36 30W                | 217  | BVV                  | 215  | ESB 64250 HLX        | 212  |
| 4557                   | 220  | 6.6A/30T3.5/54322/EXL/DL      | 220  | BVW                  | 215  | ETJ                  | 212  |
| 4559                   | 220  | 6.6A/30T3.5/EXL               | 220  | CAX                  | 211  | EVA 64623 HLX        | 212  |
| 5557                   | 220  | 6.6A/30T10/1P                 | 220  | CXZ                  | 215  | EVC 64657 HLX        | 212  |
| 8013                   | 213  | 6.6A/45T3/CL/64315            | 220  | CYV                  | 215  | EVD 64663 HLX        | 212  |
| 8013                   | 219  | 6.6A/45T3.5/64320/EXM         | 220  | CYX                  | 215  | EVW                  | 212  |
| 8017                   | 213  | 6.6A/45T3.5/EXM               | 220  | DDL                  | 211  | EXC/230              | 218  |
| 8017                   | 219  | 6.6A/45T3.5Q/64321            | 220  | DDM                  | 211  | EXC/240              | 218  |
| 8018                   | 213  | 6.6A/45T4/64319 FEMALE        | 220  | DDS                  | 211  | EXD/230              | 218  |
| 8018                   | 219  | 6.6A/45T4/64319Z              | 220  | DED                  | 211  | EXD/240              | 218  |
| 8100                   | 213  | 6.6A/45T4/CL/64317            | 220  | DNE                  | 211  | EXE/230              | 218  |
| 8100                   | 219  | 6.6A/45T4CL/64318             | 220  | DNF                  | 211  | EXE/240              | 218  |
| 62138 HLX              | 213  | 6.6A/45T10/P                  | 220  | DNS/FMC              | 215  | EXR                  | 212  |
| 64223                  | 214  | 6.6A/100T4/64341Z/HLX         | 221  | DPY                  | 215  | EXW                  | 212  |
| 64251 HLX              | 214  | 6.6A/100T4/64342/HLX          | 221  | DTA                  | 215  | EYB                  | 213  |
| 64255                  | 214  | 6.6A/115T4Q/58798/2PPF/EVW    | 221  | DTY                  | 215  | EYB-5                | 213  |
| 64258 AHLX             | 214  | 6.6A/150T4/64361/HLX          | 221  | DWE                  | 215  | EYB-7                | 213  |
| 64258 HLX              | 214  | 6.6A/150T4Q/64354/EWR/DL      | 221  | DWT                  | 215  | EZE                  | 213  |
| 64260                  | 214  | 6.6A/150T4Q/64361Z/HLX        | 221  | DXW                  | 215  | EZE                  | 213  |
| 64261                  | 214  | 6.6A/30MR16/64331A/FL         | 220  | DYH                  | 211  | FAD                  | 216  |
| 64265 HLX              | 214  | 6.6A/30MR16/64331A/SP         | 220  | DYS/300              | 215  | FAL                  | 216  |
| 64275                  | 214  | 6.6A/30MR16/64331AC/FL        | 220  | DYS/300              | 217  | FCB                  | 216  |
| 64291 XIR 40W          | 214  | 6.6A/40MR11/64333A            | 220  | DZE/FDS              | 211  | FCM                  | 216  |
| 64292 XIR 150W         | 214  | 6.6A/40MR11/64333B            | 220  | EBV 118V             | 211  | FCR 64625 HLX        | 213  |
| 64501                  | 217  | 6.6A/45MR16/64337A 45-15      | 220  | ECA 120V             | 211  | FCS 64640 HLX        | 213  |
| 64513                  | 214  | 6.6A/45MR16/64337B 45-15      | 220  | ECR 64815 CP/83 230V | 215  | FDA                  | 216  |
| 64514                  | 214  | 6.6A/48MR16/64337A 48-15      | 220  | ECT 120V             | 211  | FDB                  | 216  |
| 64515                  | 214  | 6.6A/48MR16/64337A LL IRC     | 220  | EFM 64607            | 211  | FDN                  | 216  |
| 64516                  | 214  | 6.6A/48MR16/64337B LL IRC     | 221  | EFN 64615 HLX        | 211  | FDS/DZE 64643        | 213  |
| 64573                  | 217  | 6.6A/48MR16/64337C LL IRC     | 221  | EFF 64627 HLX        | 211  | FDT 64628            | 213  |
| 64575                  | 217  | 6.6A/48W/MR16/64338AC         | 220  | FFP/X 64629 HLX      | 211  | FDV 64642 HLX        | 213  |
| 64579 115-120V         | 216  | 6.6A/48W/MR16/64338AC         | 220  | EFF 64634 HLX        | 211  | FEL                  | 216  |
| 64602                  | 214  | 6.6A/62W/MR16/64336A          | 221  | EFR-5X 64620 HLX     | 211  | FEP/240              | 216  |
| 64611 HLX              | 214  | 6.6A/105MR16/64339A           | 221  | EFX                  | 215  | FER                  | 216  |
| 64614                  | 217  | 6.6A/105MR16/64339AC          | 221  | EGE                  | 215  | FEV                  | 216  |
| 64617                  | 214  | 6.6A/105MR16/64339B           | 221  | EGG                  | 215  | FEX/230              | 216  |
| 64621 HLX              | 219  | 6.6A/105MR16/64339C           | 221  | EGJ                  | 215  | FEX/240              | 216  |
| 64624                  | 214  | 6.6A/200PAR64Q/2P             | 221  | EGK                  | 215  | FEY                  | 216  |
| 64635 HLX              | 214  | 6.6A/200T4/64382A/HLX         | 221  | EGN                  | 215  | FFJ                  | 216  |
| 64637                  | 214  | 6.6A/200T4/64382C/HLX         | 221  | EGR                  | 215  | FFM                  | 216  |
| 64638 HLX              | 214  | 6.6A/200T4Q/2PPF/58750/EZL/DL | 221  | EGT                  | 215  | FFN                  | 218  |
| 64650                  | 214  | 6.6A/200T4Q/64386             | 221  | EGW 64535            | 215  | FFP                  | 218  |
| 64654 HLX              | 214  | 6.6A/200T4Q/CL/DCR/58746/DL   | 221  | EHA                  | 211  | FFR                  | 218  |
| 64665 HLX              | 214  | 6.6A/200T5/CL/64380           | 221  | EHG/EHB              | 215  | FFS                  | 219  |
| 64668 XIR 80W          | 214  | 6.6A/65T4/64328Z/HLX          | 221  | EHD                  | 216  | FFT                  | 216  |
| 64805 CP/85 (CP/29)    | 217  | aluPAR 56/NSP/300W/120V       | 218  | EHE 64626 HLX        | 211  | FHM                  | 216  |
| 70313 (390158)         | 214  | aluPAR 56/MFL/300W/120V       | 218  | EHF                  | 216  | FHS                  | 213  |
| 70314 (390153)         | 24   | aluPAR 56/WFL/300W/120V       | 218  | EHG                  | 216  | FKJ CP/71            | 216  |
| 70314 (390153)         | 219  | aluPAR 56/NSP/300W/230V       | 218  | EHJ 64655 HLX        | 211  | FKK CP/73            | 216  |
| 70335 BULK             | 215  | aluPAR 56/MFL/300W/230V       | 218  | EHJ 64655 HLX BULK   | 211  | FKT/EYH              | 213  |
| 70335 BULK             | 219  | aluPAR 56/WFL/500W/120V       | 218  | EHJ 64655 HLX/7X     | 211  | FKW                  | 216  |
| 14V/35W/M/GZ4          | 213  | aluPAR 56/NSP/500W/120V       | 218  | EHP                  | 216  | FLE                  | 213  |
| 20PAR/36/CAP/WFL       | 217  | aluPAR 56/MFL/500W/120V       | 218  | EHR                  | 216  | FLK                  | 216  |
| 60T4QCL                | 213  | aluPAR 56/WFL/500W/120V       | 218  | EJA                  | 211  | FLK PLUS HPR 575/115 | 216  |
| 85T3/RM                | 213  | aluPAR 64/NSP/500W/120V       | 218  | EJG                  | 216  | FLK/X 115V           | 216  |
| 120/T4/SPECIAL         | 213  | aluPAR 64/MFL/500W/120V       | 218  | EJL                  | 211  | FMR                  | 216  |
| 150/25T4               | 217  | aluPAR 64/WFL/500W/120V       | 218  | EJM                  | 211  | FNS 64512            | 213  |
| 220T4Q/2PPF            | 213  | aluPAR 64/NSP/1000W/120V      | 218  | EJV                  | 211  | FNT 64656 HLX        | 213  |
| 235T4Q/2PPF            | 213  | aluPAR 64/MFL/1000W/120V      | 218  | EKB                  | 216  | FRG                  | 216  |
| 350PAR56/SP            | 219  | aluPAR 64/VNSP/1000W/120V     | 218  | EKE                  | 212  | FRK                  | 216  |
| 500T30Q/IR 120V        | 219  | aluPAR 64/NSP/1000W/120V      | 218  | EKE/X                | 212  | FRN CP/89            | 216  |
| 500T30Q/IR/7 120V      | 219  | aluPAR 64/MFL/1000W/120V      | 218  | EKP/ENA              | 212  | FRN 2000T7Q          | 219  |
| 1000/240V/G9.5         | 219  | aluPAR 64/WFL/1000W/120V      | 218  | ELC                  | 212  | FSH                  | 216  |
| 1000Q/T6/RTP/C         | 219  | aluPAR 64/NSP/1000W/230V      | 218  | ELC 64653 HLX        | 212  | FSX/230              | 213  |
| 1000Q/T6/RTPFS         | 219  | aluPAR 64/MFL/1000W/230V      | 218  | ELC-10 64659 HLX     | 212  | FSY                  | 213  |
| 1000T30Q/IR 230-250V   | 219  | aluPAR 64/WFL/1000W/230V      | 218  | ELC-3/X              | 212  | FTK                  | 216  |
| 1000T6QRT/PX           | 219  | BAA                           | 211  | ELC-7/X              | 212  | FVL                  | 216  |
| 1000TQ/RTP/CR/BULK     | 219  | BBA 118V                      | 211  | ELC-7/X BULK         | 212  | FVM                  | 216  |
| 1200T30Q/IR/CL/HT 144V | 219  | BCA 118V                      | 215  | ELC-HL               | 212  | FXL                  | 213  |
| 1500T6Q/RTP/GS         | 219  | BCM                           | 215  | ELD                  | 213  | FXL-HL               | 213  |
| 1600T30Q/IR 240V       | 219  | BHC/DYS/DYV                   | 215  | ELH                  | 212  | GCA                  | 216  |
| 1600T30Q/IR 277V       | 219  | BHC/DYS/DYV-5                 | 215  | ENG                  | 212  | GCB                  | 213  |
| 1600T30Q/IR/7 240V     | 219  | BRJ/EBV 64633 HLX             | 211  | ENH                  | 212  | GLC 575/115/300      | 217  |
| 2000T80Q/120V/G22      | 219  | BRL 64610 HLX                 | 211  | ENH SPOT             | 212  | GLA 575/115/2000     | 216  |
| 2500T30Q/IR 480V       | 219  | BRN                           | 211  | ENH-5                | 212  | GLD 750/115/300      | 217  |
|                        |      | BTL                           | 215  | ENL                  | 212  | GLE 750/115/1500     | 217  |
|                        |      | BTM                           | 215  | ENX                  | 212  | GLF                  | 217  |
|                        |      | BTN                           | 215  | ENX-5                | 212  | HBO 50 W AC L1       | 254  |
|                        |      | BTP                           | 215  | ENX-7                | 212  | HBO 50 W AC L2       | 254  |
|                        |      |                               |      |                      |      | HBO 50 W/3           | 254  |
|                        |      |                               |      |                      |      | HBO 100 W/2          | 254  |
|                        |      |                               |      |                      |      | HBO 103 W/2          | 254  |
|                        |      |                               |      |                      |      | HBO R 103 W/45       | 255  |
|                        |      |                               |      |                      |      | HBO 200 W/2 L1       | 255  |
|                        |      |                               |      |                      |      | HBO 200 W/2 L2       | 255  |
|                        |      |                               |      |                      |      | HBO 200 W/2 TM L2    | 255  |
|                        |      |                               |      |                      |      | HBO 200 W/4          | 255  |
|                        |      |                               |      |                      |      | HBO 200 W/DC         | 256  |
|                        |      |                               |      |                      |      | HBO 200 W/DC TM      | 256  |
|                        |      |                               |      |                      |      | HBO 200 W/DN-I       | 258  |
|                        |      |                               |      |                      |      | HBO 201 W/HS-D2      | 258  |
|                        |      |                               |      |                      |      | HBO 202 W/4          | 256  |
|                        |      |                               |      |                      |      | HBO 250 W/BY         | 258  |
|                        |      |                               |      |                      |      | HBO 250 W/HS         | 258  |
|                        |      |                               |      |                      |      | HBO 350 W            | 259  |
|                        |      |                               |      |                      |      | HBO 350 W/S          | 259  |
|                        |      |                               |      |                      |      | HBO 450 W/GS         | 259  |
|                        |      |                               |      |                      |      | HBO 500 W/A          | 259  |
|                        |      |                               |      |                      |      | HBO 500 W/B          | 259  |
|                        |      |                               |      |                      |      | HBO 510 W/FU         | 258  |
|                        |      |                               |      |                      |      | HBO 1000 W/CEL       | 260  |
|                        |      |                               |      |                      |      | HBO 1000 W/D         | 261  |
|                        |      |                               |      |                      |      | HBO 1000 W/NEL       | 260  |
|                        |      |                               |      |                      |      | HBO 1002 W/CEL       | 260  |
|                        |      |                               |      |                      |      | HBO 1002 W/NEL       | 260  |
|                        |      |                               |      |                      |      | HBO 1002 W/NIL       | 260  |
|                        |      |                               |      |                      |      | HBO 1003 W/PI        | 261  |
|                        |      |                               |      |                      |      | HBO 1003 W/PIL       | 261  |
|                        |      |                               |      |                      |      | HBO 1500 W/CIEL      | 261  |
|                        |      |                               |      |                      |      | HBO 1500 W/CIL       | 261  |
|                        |      |                               |      |                      |      | HBO 1500 W/PI        | 262  |
|                        |      |                               |      |                      |      | HBO 1500 W/PIL       | 262  |
|                        |      |                               |      |                      |      | HBO 1500 W/PIL HP    | 262  |
|                        |      |                               |      |                      |      | HBO 2000 W/NIL       | 262  |
|                        |      |                               |      |                      |      | HBO 2001 W/CIEL      | 263  |
|                        |      |                               |      |                      |      | HBO 2001 W/CIL       | 263  |
|                        |      |                               |      |                      |      | HBO 2001 W/NIEL      | 262  |
|                        |      |                               |      |                      |      | HBO 2001 W/NIL       | 263  |
|                        |      |                               |      |                      |      | HBO 2002 W/MA        | 263  |
|                        |      |                               |      |                      |      | HBO 2002 W/MAL       | 264  |
|                        |      |                               |      |                      |      | HBO 2002 W/NIL       | 263  |
|                        |      |                               |      |                      |      | HBO 2011 W/NIL       | 264  |
|                        |      |                               |      |                      |      | HBO 2500 W/PIL       | 264  |
|                        |      |                               |      |                      |      | HBO 2501 W/NIL       | 264  |
|                        |      |                               |      |                      |      | HBO 2510 W/NIL       | 264  |
|                        |      |                               |      |                      |      | HBO 2700 W/CIL       | 265  |
|                        |      |                               |      |                      |      | HBO 3500 W/HK        | 266  |
|                        |      |                               |      |                      |      | HBO 3500 W/NIL       | 265  |
|                        |      |                               |      |                      |      | HBO 3500 W/PI        | 265  |
|                        |      |                               |      |                      |      | HBO 3500 W/PIL       | 265  |
|                        |      |                               |      |                      |      | HBO 3501 W/PI        | 265  |
|                        |      |                               |      |                      |      | HBO 3501 W/PIL       | 266  |
|                        |      |                               |      |                      |      | HBO 4500 W/CIL       | 266  |
|                        |      |                               |      |                      |      | HBO 5000 W/HK        | 267  |
|                        |      |                               |      |                      |      | HBO 5000 W/TA        | 266  |
|                        |      |                               |      |                      |      | HBO 5001 W/UF        | 266  |
|                        |      |                               |      |                      |      | HBO 5500 W/PI        | 267  |
|                        |      |                               |      |                      |      | HMI 200 W/SE         | 225  |
|                        |      |                               |      |                      |      | HMI 250 W/SE         | 225  |
|                        |      |                               |      |                      |      | HMI 400 W/SE         | 225  |
|                        |      |                               |      |                      |      | HMI 575 W/DXS        | 227  |
|                        |      |                               |      |                      |      | HMI 575 W/GS         | 227  |
|                        |      |                               |      |                      |      | HMI 575 W/SEL XS     | 225  |
|                        |      |                               |      |                      |      | HMI 700 W/SE XS      | 225  |
|                        |      |                               |      |                      |      | HMI 1200 W/DXS       | 227  |
|                        |      |                               |      |                      |      | HMI 1200 W/GS        | 227  |
|                        |      |                               |      |                      |      | HMI 1200 W/S XS      | 227  |
|                        |      |                               |      |                      |      | HMI 1200 W/SEL XS    | 225  |
|                        |      |                               |      |                      |      | HMI 2500 W/DXS       | 227  |
|                        |      |                               |      |                      |      | HMI 2500 W/S XS      | 227  |
|                        |      |                               |      |                      |      | HMI 2500 W/SE XS     | 226  |
|                        |      |                               |      |                      |      | HMI 4000 W           | 227  |
|                        |      |                               |      |                      |      | HMI 4000 W/DXS       | 227  |
|                        |      |                               |      |                      |      | HMI 4000 W/SE XS     | 226  |
|                        |      |                               |      |                      |      | HMI 6000 W           | 228  |
|                        |      |                               |      |                      |      | HMI 6000 W/DXS       | 228  |
|                        |      |                               |      |                      |      | HMI 6000 W/SE XS     | 226  |
|                        |      |                               |      |                      |      | HMI 12000 W/DXS      | 228  |
|                        |      |                               |      |                      |      | HMI 12000 W/SE XS    | 228  |
|                        |      |                               |      |                      |      | HMI 12000 W/XS       | 228  |
|                        |      |                               |      |                      |      | HMI 12000 W/SE/GX51  | 226  |
|                        |      |                               |      |                      |      | HMI 18000 W/DXS      | 228  |

# Index by Ordering Abbreviation (cont.)

| Type                        | Page |
|-----------------------------|------|
| HMI 18000 W/SE/GX51         | 226  |
| HPL 375/115 (UCF)           | 217  |
| HPL 375/115/X (UCF)         | 217  |
| HPL 550/77 (UCF)            | 217  |
| HPL 550/77/X (UCF)          | 217  |
| HPL 575/115 (UCF)           | 217  |
| HPL 575/115/X (UCF)         | 217  |
| HPL 575/120 (UCF)           | 217  |
| HPL 575/120/X (UCF)         | 217  |
| HPL 575/230 (UCF)           | 217  |
| HPL 575/230/X (UCF)         | 217  |
| HPL 575/240 (UCF)           | 217  |
| HPL 575/240/X (UCF)         | 217  |
| HPL 750/77 (UCF)            | 217  |
| HPL 750/115 (UCF)           | 217  |
| HPL 750/115/X (UCF)         | 217  |
| HPL 750/120 (UCF)           | 217  |
| HPL 750/120/X (UCF)         | 217  |
| HPL 750/230 (UCF)           | 217  |
| HPL 750/230/X (UCF)         | 217  |
| HPL 750/240 (UCF)           | 217  |
| HPL 750/240/X (UCF)         | 217  |
| HSD 150W/70 4ARXS           | 236  |
| HSD 150W/UL/75 4ARXS        | 236  |
| HSD 200W/60 4ARXS           | 236  |
| HSD 250W/60 4ARXS           | 236  |
| HSD 250W/80 4ARXS           | 236  |
| HSD 250W/UL/75 4ARXS        | 236  |
| HSD 575W/60 4ARXS           | 236  |
| HSD 575W/72 4ARXS           | 236  |
| HSD 575W/UL/75 4ARXS        | 236  |
| HSR 400/60                  | 235  |
| HSR 575/60                  | 235  |
| HSR 575/72                  | 235  |
| HSR 700/60                  | 235  |
| HSR 1200/60                 | 235  |
| HTI S 35/12                 | 229  |
| HTI 150 W                   | 229  |
| HTI 152 W                   | 229  |
| HTI 250 W/22                | 234  |
| HTI 250 W/32                | 234  |
| HTI 250 W/32C               | 234  |
| HTI 250W/D5/80 BABY SHARXS  | 232  |
| HTI 300 W/DX                | 233  |
| HTI 300W/D5/57 BABY SHARXS  | 232  |
| HTI 300W/D5/65 BABY SHARXS  | 232  |
| HTI 400 W/24                | 234  |
| HTI 400W/D3/75 SHARXS       | 230  |
| HTI 400W/D3/75 SHARXS BULK  | 230  |
| HTI 400W/D5/60 BABY SHARXS  | 232  |
| HTI 403 W/24                | 234  |
| HTI 405 W/SE XS             | 229  |
| HTI 575W/D4/60 SHARXS       | 230  |
| HTI 575W/D4/75 SHARXS       | 230  |
| HTI 575W/D5/56 BABY SHARXS  | 232  |
| HTI 600 W/SE                | 229  |
| HTI 700 W/SE/75             | 229  |
| HTI 700W/D4/60 SHARXS       | 230  |
| HTI 700W/D4/60 SHARXS BULK  | 230  |
| HTI 700W/D4/75 SHARXS       | 231  |
| HTI 700W/D4/75 SHARXS BULK  | 231  |
| HTI 705 W/SE XS             | 229  |
| HTI 1200 W/SE XS            | 229  |
| HTI 1200W/D7/60 SHARXS      | 231  |
| HTI 1200W/D7/60 SHARXS BULK | 231  |
| HTI 1500W/D7/60 SHARXS      | 231  |
| HTI 1800W/SE XS             | 229  |
| HTI 2500 W/DEL              | 233  |
| HTI 2500 W/SE XS            | 229  |
| HTI 4000 W/DE               | 233  |
| HWLV 1200W/80V              | 217  |
| HWMV 1200W/115V             | 217  |
| HWHV 1200W/220V             | 217  |
| HXP R 120 W/17C             | 257  |
| HXP R 120 W/45 C UV         | 257  |
| HXP R 120 W/45 C VIS        | 257  |
| JCP 650W/100V               | 215  |
| LX24T3/956/A4               | 270  |
| LX40T3/956/A3               | 270  |

| Type                 | Page |
|----------------------|------|
| Na 10 FL             | 269  |
| Na/10                | 269  |
| Q4559                | 220  |
| Q4559X               | 220  |
| Q4681                | 220  |
| QXL 750/77           | 218  |
| QXL 750/77/X         | 218  |
| STUDIOLINE 55W/3200  | 218  |
| STUDIOLINE 55W/5600  | 218  |
| VIP R 273/45         | 268  |
| XBO 75 W/2           | 237  |
| XBO 75 W/2 OFR       | 237  |
| XBO 100 W OFR        | 237  |
| XBO R 100 W/45 OFR   | 237  |
| XBO R 100 W/45C OFR  | 237  |
| XBO R 101 W/45C OFR  | 238  |
| XBO 150 W/1          | 238  |
| XBO 150 W/1 OFR      | 238  |
| XBO 150 W/4          | 238  |
| XBO 150 W/CR OFR     | 238  |
| XBO 150 W/S          | 239  |
| XBO R 180 W/45/OFR   | 239  |
| XBO R 180 W/45C OFR  | 239  |
| XBO R 181 W/45C OFR  | 239  |
| XBO R 300 W/60C OFR  | 239  |
| XBO 450 W            | 240  |
| XBO 450 W OFR        | 240  |
| XBO 450 W/1          | 240  |
| XBO 450 W/2 OFR      | 240  |
| XBO 450 W/4          | 240  |
| XBO 500 W/H OFR      | 241  |
| XBO 700 W/HS OFR     | 241  |
| XBO 900 W OFR        | 241  |
| XBO 1000 W/HS OFR    | 241  |
| XBO 1000 W/HSC OFR   | 241  |
| XBO 1000 W/HTP OFR   | 242  |
| XBO 1600 W OFR       | 242  |
| XBO 1600 W/CA OFR    | 242  |
| XBO 1600 W/HS OFR    | 242  |
| XBO 1600 W/HSC OFR   | 242  |
| XBO 2000 W/DTP OFR   | 243  |
| XBO 2000 W/H CL OFR  | 243  |
| XBO 2000 W/H OFR     | 243  |
| XBO 2000 W/H XL OFR  | 243  |
| XBO 2000 W/HCC OFR   | 243  |
| XBO 2000 W/HPS OFR   | 244  |
| XBO 2000 W/HS OFR    | 244  |
| XBO 2000 W/HTP OFR   | 244  |
| XBO 2000 W/SHSC OFR  | 244  |
| XBO 2001 W/HTP OFR   | 244  |
| XBO 2500 W OFR       | 245  |
| XBO 2500 W/HS OFR    | 245  |
| XBO 2500 W/HTP OFR   | 245  |
| XBO 3000 W/DHP OFR   | 245  |
| XBO 3000 W/DHS OFR   | 245  |
| XBO 3000 W/DTP OFR   | 246  |
| XBO 3000 W/H CL OFR  | 246  |
| XBO 3000 W/H OFR     | 246  |
| XBO 3000 W/H XL OFR  | 246  |
| XBO 3000 W/HPS OFR   | 246  |
| XBO 3000 W/HS CL OFR | 247  |
| XBO 3000 W/HS OFR    | 247  |
| XBO 3000 W/HS XL OFR | 247  |
| XBO 3000 W/HSLA OFR  | 247  |
| XBO 3000 W/HTP OFR   | 247  |
| XBO 4000 W/DHP OFR   | 248  |
| XBO 4000 W/HS CL OFR | 248  |
| XBO 4000 W/HS OFR    | 248  |
| XBO 4000 W/HS XL OFR | 248  |
| XBO 4000 W/HTP OFR   | 248  |
| XBO 4200 W/CA OFR    | 249  |
| XBO 4200 W/GS OFR    | 249  |
| XBO 4200 W/HPS OFR   | 249  |
| XBO 4500 W/DHP OFR   | 249  |
| XBO 4500 W/DTP OFR   | 249  |
| XBO 4500 W/HS OFR    | 250  |
| XBO 4500 W/HSLA OFR  | 250  |
| XBO 4500 W/HTP OFR   | 250  |
| XBO 5000 W/H OFR     | 250  |
| XBO 5000 W/HTP OFR   | 250  |
| XBO 6000 W/DHP OFR   | 251  |
| XBO 6000 W/DTP OFR   | 251  |
| XBO 6000 W/HS OFR    | 251  |

| Type                | Page |
|---------------------|------|
| XBO 6000 W/HSLA OFR | 251  |
| XBO 6000 W/HTP OFR  | 251  |
| XBO 6500 W/DHP OFR  | 252  |
| XBO 6500 W/HSLA OFR | 252  |
| XBO 7000 W/HS OFR   | 252  |
| XBO 8000 W/HS OFR   | 252  |
| XERADEX 20          | 270  |
| XERADEX 20/HV       | 270  |
| XERADEX 20/SY45/45  | 270  |
| Xstage 2000W OFR    | 253  |
| Xstage 3000W OFR    | 253  |
| Xstage 4000W OFR    | 253  |
| Xstage 7000W OFR    | 253  |

| Type  | Page |
|-------|------|
| 54214 | 214  |
| 54231 | 211  |
| 54232 | 217  |
| 54233 | 214  |
| 54241 | 230  |
| 54242 | 231  |
| 54243 | 236  |
| 54245 | 214  |
| 54246 | 213  |
| 54247 | 214  |
| 54248 | 213  |
| 54249 | 211  |
| 54250 | 211  |
| 54251 | 212  |
| 54252 | 214  |
| 54253 | 213  |
| 54254 | 211  |
| 54255 | 212  |
| 54256 | 213  |
| 54257 | 214  |
| 54258 | 214  |
| 54259 | 212  |
| 54260 | 212  |
| 54261 | 212  |
| 54262 | 214  |
| 54263 | 213  |
| 54264 | 213  |
| 54265 | 227  |
| 54268 | 231  |
| 54269 | 231  |
| 54270 | 230  |
| 54271 | 236  |
| 54272 | 211  |
| 54273 | 214  |
| 54274 | 214  |
| 54275 | 214  |
| 54276 | 213  |
| 54277 | 213  |
| 54278 | 214  |
| 54280 | 230  |
| 54281 | 231  |
| 54282 | 230  |
| 54283 | 230  |
| 54287 | 236  |
| 54288 | 236  |
| 54289 | 226  |
| 54296 | 230  |
| 54297 | 232  |
| 54298 | 232  |
| 54299 | 232  |
| 54300 | 232  |
| 54301 | 214  |
| 54302 | 214  |
| 54303 | 214  |
| 54310 | 225  |
| 54311 | 236  |
| 54312 | 236  |
| 54313 | 227  |
| 54314 | 227  |
| 54315 | 228  |
| 54316 | 228  |
| 54317 | 228  |
| 54319 | 231  |
| 54321 | 226  |
| 54329 | 229  |
| 54350 | 216  |
| 54354 | 214  |
| 54356 | 214  |
| 54357 | 226  |
| 54359 | 232  |
| 54366 | 212  |
| 54383 | 213  |
| 54386 | 213  |
| 54387 | 216  |
| 54388 | 212  |
| 54392 | 212  |
| 54394 | 212  |
| 54399 | 233  |
| 54400 | 213  |
| 54409 | 211  |
| 54411 | 211  |
| 54412 | 216  |
| 54428 | 216  |

# Index by Product Number (continued)

| Type  | Page | Type  | Page | Type  | Page | Type  | Page |
|-------|------|-------|------|-------|------|-------|------|
| 54430 | 213  | 54670 | 217  | 56004 | 218  | 58905 | 220  |
| 54435 | 216  | 54681 | 216  | 56005 | 218  | 58906 | 221  |
| 54436 | 216  | 54685 | 215  | 56006 | 218  | 58907 | 220  |
| 54441 | 216  | 54686 | 215  | 56007 | 218  | 58908 | 220  |
| 54442 | 216  | 54687 | 215  | 56008 | 218  | 58930 | 217  |
| 54446 | 213  | 54688 | 215  | 56009 | 218  | 58936 | 216  |
| 54448 | 213  | 54689 | 215  | 56010 | 218  | 58937 | 215  |
| 54455 | 213  | 54690 | 215  | 56011 | 218  | 58938 | 220  |
| 54459 | 216  | 54691 | 215  | 56012 | 218  | 58939 | 213  |
| 54460 | 217  | 54692 | 215  | 56014 | 218  | 58941 | 213  |
| 54466 | 213  | 54694 | 215  | 56015 | 218  | 58942 | 216  |
| 54471 | 216  | 54696 | 215  | 56016 | 218  | 58952 | 221  |
| 54483 | 216  | 54698 | 211  | 56017 | 218  | 58953 | 221  |
| 54488 | 216  | 54699 | 216  | 56018 | 218  | 58958 | 217  |
| 54499 | 217  | 54701 | 217  | 56019 | 218  | 58960 | 221  |
| 54500 | 215  | 54702 | 215  | 56086 | 218  | 58961 | 221  |
| 54506 | 215  | 54703 | 217  | 56213 | 218  | 58963 | 221  |
| 54507 | 217  | 54704 | 217  | 56214 | 218  | 58964 | 220  |
| 54508 | 216  | 54706 | 215  | 56215 | 218  | 59078 | 221  |
| 54510 | 216  | 54711 | 216  | 56216 | 219  | 59803 | 219  |
| 54512 | 216  | 54716 | 215  | 56217 | 218  | 59822 | 219  |
| 54514 | 216  | 54717 | 215  | 56220 | 221  | 59841 | 219  |
| 54515 | 216  | 54723 | 212  | 56222 | 220  | 59850 | 219  |
| 54516 | 216  | 54726 | 211  | 56223 | 220  | 59859 | 219  |
| 54518 | 216  | 54730 | 211  | 56229 | 220  | 59860 | 219  |
| 54521 | 219  | 54732 | 211  | 56232 | 218  | 59864 | 219  |
| 54522 | 217  | 54734 | 212  | 56233 | 218  | 59867 | 219  |
| 54523 | 217  | 54737 | 211  | 56234 | 218  | 59870 | 219  |
| 54532 | 216  | 54743 | 212  | 56280 | 218  | 59928 | 220  |
| 54534 | 216  | 54745 | 212  | 56281 | 218  | 59934 | 219  |
| 54537 | 219  | 54747 | 211  | 56283 | 218  | 59936 | 219  |
| 54547 | 213  | 54752 | 219  | 58493 | 221  | 69000 | 229  |
| 54548 | 219  | 54753 | 211  | 58497 | 215  | 69119 | 257  |
| 54549 | 216  | 54755 | 211  | 58497 | 217  | 69120 | 257  |
| 54551 | 216  | 54770 | 229  | 58506 | 220  | 69121 | 264  |
| 54555 | 219  | 54776 | 212  | 58510 | 215  | 69122 | 262  |
| 54559 | 216  | 54787 | 215  | 58524 | 214  | 69125 | 257  |
| 54560 | 219  | 54793 | 215  | 58525 | 217  | 69127 | 265  |
| 54561 | 211  | 54796 | 217  | 58545 | 220  | 69134 | 258  |
| 54570 | 216  | 54798 | 217  | 58639 | 217  | 69135 | 266  |
| 54571 | 216  | 54799 | 217  | 58649 | 221  | 69136 | 258  |
| 54574 | 216  | 54804 | 212  | 58697 | 220  | 69137 | 266  |
| 54584 | 219  | 54807 | 217  | 58703 | 221  | 69138 | 267  |
| 54585 | 211  | 54811 | 212  | 58704 | 220  | 69153 | 247  |
| 54588 | 219  | 54812 | 211  | 58705 | 220  | 69154 | 246  |
| 54589 | 216  | 54814 | 212  | 58706 | 221  | 69155 | 243  |
| 54598 | 216  | 54815 | 217  | 58707 | 221  | 69160 | 245  |
| 54602 | 217  | 54817 | 217  | 58708 | 221  | 69161 | 266  |
| 54603 | 217  | 54825 | 217  | 58709 | 221  | 69162 | 266  |
| 54604 | 217  | 54835 | 215  | 58717 | 221  | 69163 | 256  |
| 54605 | 217  | 54836 | 215  | 58722 | 220  | 69164 | 267  |
| 54606 | 214  | 54837 | 216  | 58724 | 221  | 69165 | 266  |
| 54607 | 214  | 54840 | 212  | 58726 | 221  | 69166 | 263  |
| 54608 | 214  | 54841 | 212  | 58729 | 213  | 69167 | 239  |
| 54611 | 217  | 54842 | 212  | 58730 | 220  | 69168 | 258  |
| 54613 | 215  | 54875 | 216  | 58758 | 220  | 69169 | 265  |
| 54614 | 217  | 54882 | 218  | 58759 | 221  | 69171 | 261  |
| 54618 | 217  | 54883 | 218  | 58771 | 212  | 69172 | 264  |
| 54619 | 217  | 54897 | 213  | 58777 | 221  | 69174 | 265  |
| 54622 | 217  | 54898 | 213  | 58782 | 212  | 69175 | 260  |
| 54623 | 217  | 54900 | 216  | 58786 | 212  | 69176 | 260  |
| 54625 | 217  | 54901 | 214  | 58787 | 220  | 69177 | 260  |
| 54629 | 216  | 54904 | 213  | 58813 | 220  | 69179 | 261  |
| 54631 | 216  | 54912 | 213  | 58815 | 221  | 69180 | 261  |
| 54633 | 219  | 54913 | 212  | 58821 | 221  | 69181 | 262  |
| 54638 | 216  | 54916 | 212  | 58827 | 215  | 69182 | 254  |
| 54647 | 215  | 54924 | 211  | 58831 | 211  | 69183 | 239  |
| 54648 | 215  | 54927 | 212  | 58846 | 220  | 69184 | 239  |
| 54649 | 217  | 54928 | 212  | 58849 | 213  | 69186 | 239  |
| 54652 | 215  | 54944 | 211  | 58850 | 220  | 69189 | 263  |
| 54653 | 217  | 54957 | 212  | 58851 | 221  | 69190 | 238  |
| 54654 | 215  | 54979 | 213  | 58854 | 221  | 69191 | 237  |
| 54655 | 215  | 54984 | 212  | 58855 | 221  | 69195 | 261  |
| 54656 | 215  | 54986 | 212  | 58860 | 216  | 69197 | 237  |
| 54659 | 215  | 54988 | 212  | 58862 | 216  | 69198 | 255  |
| 54660 | 211  | 55002 | 212  | 58877 | 220  | 69199 | 263  |
| 54662 | 215  | 55052 | 217  | 58889 | 220  | 69200 | 261  |
| 54664 | 215  | 55139 | 227  | 58891 | 220  | 69205 | 259  |
| 54665 | 217  | 56000 | 218  | 58892 | 220  | 69206 | 259  |
|       |      | 56001 | 218  | 58893 | 220  | 69213 | 254  |
|       |      | 56002 | 218  | 58894 | 220  | 69214 | 254  |
|       |      | 56003 | 218  | 58899 | 220  | 69215 | 254  |
|       |      |       |      |       |      | 69217 | 254  |
|       |      |       |      |       |      | 69222 | 255  |
|       |      |       |      |       |      | 69223 | 255  |
|       |      |       |      |       |      | 69224 | 255  |
|       |      |       |      |       |      | 69225 | 256  |
|       |      |       |      |       |      | 69226 | 259  |
|       |      |       |      |       |      | 69228 | 259  |
|       |      |       |      |       |      | 69231 | 237  |
|       |      |       |      |       |      | 69232 | 237  |
|       |      |       |      |       |      | 69233 | 237  |
|       |      |       |      |       |      | 69234 | 238  |
|       |      |       |      |       |      | 69235 | 238  |
|       |      |       |      |       |      | 69236 | 239  |
|       |      |       |      |       |      | 69237 | 238  |
|       |      |       |      |       |      | 69238 | 238  |
|       |      |       |      |       |      | 69241 | 240  |
|       |      |       |      |       |      | 69242 | 240  |
|       |      |       |      |       |      | 69243 | 240  |
|       |      |       |      |       |      | 69244 | 240  |
|       |      |       |      |       |      | 69245 | 240  |
|       |      |       |      |       |      | 69246 | 258  |
|       |      |       |      |       |      | 69247 | 244  |
|       |      |       |      |       |      | 69248 | 245  |
|       |      |       |      |       |      | 69249 | 245  |
|       |      |       |      |       |      | 69250 | 247  |
|       |      |       |      |       |      | 69251 | 246  |
|       |      |       |      |       |      | 69252 | 247  |
|       |      |       |      |       |      | 69254 | 248  |
|       |      |       |      |       |      | 69256 | 244  |
|       |      |       |      |       |      | 69257 | 241  |
|       |      |       |      |       |      | 69260 | 241  |
|       |      |       |      |       |      | 69261 | 241  |
|       |      |       |      |       |      | 69263 | 241  |
|       |      |       |      |       |      | 69264 | 241  |
|       |      |       |      |       |      | 69265 | 242  |
|       |      |       |      |       |      | 69266 | 242  |
|       |      |       |      |       |      | 69267 | 242  |
|       |      |       |      |       |      | 69268 | 242  |
|       |      |       |      |       |      | 69269 | 242  |
|       |      |       |      |       |      | 69270 | 244  |
|       |      |       |      |       |      | 69273 | 260  |
|       |      |       |      |       |      | 69282 | 269  |
|       |      |       |      |       |      | 69284 | 269  |
|       |      |       |      |       |      | 69287 | 263  |
|       |      |       |      |       |      | 69288 | 264  |
|       |      |       |      |       |      | 69289 | 264  |
|       |      |       |      |       |      | 69292 | 263  |
|       |      |       |      |       |      | 69294 | 249  |
|       |      |       |      |       |      | 69295 | 252  |
|       |      |       |      |       |      | 69296 | 248  |
|       |      |       |      |       |      | 69299 | 264  |
|       |      |       |      |       |      | 69303 | 262  |
|       |      |       |      |       |      | 69306 | 262  |
|       |      |       |      |       |      | 69310 | 244  |
|       |      |       |      |       |      | 69311 | 255  |
|       |      |       |      |       |      | 69315 | 250  |
|       |      |       |      |       |      | 69316 | 256  |
|       |      |       |      |       |      | 69319 | 262  |
|       |      |       |      |       |      | 69327 | 268  |
|       |      |       |      |       |      | 69336 | 250  |
|       |      |       |      |       |      | 69338 | 270  |
|       |      |       |      |       |      | 69339 | 251  |
|       |      |       |      |       |      | 69340 | 251  |
|       |      |       |      |       |      | 69343 | 259  |
|       |      |       |      |       |      | 69344 | 265  |
|       |      |       |      |       |      | 69347 | 260  |
|       |      |       |      |       |      | 69349 | 270  |
|       |      |       |      |       |      | 69350 | 249  |
|       |      |       |      |       |      | 69351 | 252  |
|       |      |       |      |       |      | 69352 | 270  |
|       |      |       |      |       |      | 69359 | 250  |
|       |      |       |      |       |      | 69360 | 250  |
|       |      |       |      |       |      | 69364 | 258  |
|       |      |       |      |       |      | 69384 | 243  |
|       |      |       |      |       |      | 69385 | 243  |
|       |      |       |      |       |      | 69386 | 251  |
|       |      |       |      |       |      | 69389 | 250  |
|       |      |       |      |       |      | 69390 | 247  |
|       |      |       |      |       |      | 69394 | 248  |
|       |      |       |      |       |      | 69456 | 265  |
|       |      |       |      |       |      | 69459 | 249  |
|       |      |       |      |       |      | 69460 | 251  |

| Index by Product Number<br>(continued) |      | Index by ANSI Code |      | Type    | Page |
|----------------------------------------|------|--------------------|------|---------|------|
| Type                                   | Page | Type               | Page |         |      |
| 69461                                  | 252  | BAA                | 211  | ENL     | 212  |
| 69462                                  | 245  | BBA                | 211  | ENX     | 212  |
| 69463                                  | 249  | BCA                | 215  | ENX-5   | 212  |
| 69470                                  | 243  | BCM                | 215  | ENX-7   | 212  |
| 69474                                  | 248  | BHC/DYS/DYV        | 215  | EPT     | 212  |
| 69475                                  | 246  | BHC/DYS/DYV-5      | 215  | EPX     | 212  |
| 69476                                  | 251  | BRJ/EVB            | 211  | EPZ     | 212  |
| 69477                                  | 243  | BRL                | 211  | ESA/FHD | 212  |
| 69478                                  | 246  | BRN                | 211  | ESB     | 212  |
| 69479                                  | 247  | BTL                | 215  | ETJ     | 212  |
| 69480                                  | 245  | BTM                | 215  | EVA     | 212  |
| 69481                                  | 248  | BTN                | 215  | EVC     | 212  |
| 69482                                  | 253  | BTP                | 215  | EVD     | 212  |
| 69483                                  | 253  | BTR                | 215  | EVW     | 212  |
| 69484                                  | 253  | BVE                | 211  | EXC     | 218  |
| 69485                                  | 253  | BVM                | 215  | EXD     | 218  |
| 69486                                  | 244  | BVT                | 215  | EXE     | 218  |
| 69487                                  | 246  | BVV                | 215  | EXR     | 212  |
| 69488                                  | 249  | BWW                | 215  | EXW     | 212  |
| 69489                                  | 252  | CAX                | 211  | EXY     | 212  |
| 76302                                  | 215  | CXZ                | 215  | EYB     | 213  |
| 76302                                  | 219  | CYV                | 215  | EYB-5   | 213  |
| 76304                                  | 214  | CYL                | 211  | EYB-7   | 213  |
| 76304                                  | 219  | DDL                | 211  | EZE     | 213  |
| 76305                                  | 214  | DDM                | 211  | FAD     | 216  |
| 76311                                  | 213  | DDS                | 211  | FAL     | 216  |
| 76311                                  | 219  | DED                | 211  | FCB     | 216  |
| 76313                                  | 213  | DNE                | 211  | FCM     | 216  |
| 76313                                  | 219  | DNF                | 211  | FCR     | 213  |
| 76314                                  | 213  | DNS/FMC            | 215  | FCS     | 213  |
| 76314                                  | 219  | DPY                | 215  | FDA     | 216  |
| 76321                                  | 213  | DTA                | 215  | FDB     | 216  |
| 76321                                  | 219  | DTY                | 215  | FDG     | 216  |
|                                        |      | DWE                | 215  | FDN     | 216  |
|                                        |      | DWT                | 215  | FDS/DZE | 213  |
|                                        |      | DXW                | 215  | FDT     | 213  |
|                                        |      | DYH                | 211  | FDV     | 213  |
|                                        |      | DZE/FDS            | 211  | FEL     | 216  |
|                                        |      | EBV                | 211  | FEP     | 216  |
|                                        |      | ECA                | 211  | FER     | 216  |
|                                        |      | ECR                | 215  | FEV     | 216  |
|                                        |      | ECT                | 211  | FEX     | 216  |
|                                        |      | EFM                | 211  | FEY     | 216  |
|                                        |      | EFN                | 211  | FFJ     | 216  |
|                                        |      | EPF                | 211  | FFM     | 216  |
|                                        |      | EPF/X              | 211  | FFN     | 218  |
|                                        |      | EFR                | 211  | FFP     | 218  |
|                                        |      | EFR-5/X            | 211  | FFR     | 218  |
|                                        |      | EFX                | 215  | FFS     | 219  |
|                                        |      | EGE                | 215  | FFT     | 216  |
|                                        |      | EGG                | 215  | FHM     | 216  |
|                                        |      | EGJ                | 215  | FHS     | 213  |
|                                        |      | EGK                | 215  | FKJ     | 216  |
|                                        |      | EGN                | 215  | FKK     | 216  |
|                                        |      | EGR                | 215  | FKT/EYH | 213  |
|                                        |      | EGT                | 215  | FKW     | 216  |
|                                        |      | EGW                | 215  | FLE     | 213  |
|                                        |      | EHA                | 211  | FLK     | 216  |
|                                        |      | EHC/EHB            | 215  | FLK     | 216  |
|                                        |      | EHD                | 216  | FMR     | 216  |
|                                        |      | EHE                | 211  | FNS     | 213  |
|                                        |      | EHF                | 216  | FNT     | 213  |
|                                        |      | EHG                | 216  | FRG     | 216  |
|                                        |      | EHJ                | 211  | FRK     | 216  |
|                                        |      | EHP                | 216  | FRL     | 216  |
|                                        |      | EHR                | 216  | FRN     | 219  |
|                                        |      | EJA                | 211  | FSH     | 216  |
|                                        |      | EJG                | 216  | FSX     | 213  |
|                                        |      | EJL                | 211  | FSY     | 213  |
|                                        |      | EJM                | 211  | FTK     | 216  |
|                                        |      | EJV                | 211  | FVL     | 216  |
|                                        |      | EKB                | 216  | FVM     | 216  |
|                                        |      | EKE                | 212  | FXL     | 213  |
|                                        |      | EKE/X              | 212  | FXL-HL  | 213  |
|                                        |      | EKP/ENA            | 212  | GCA     | 216  |
|                                        |      | ELC                | 212  | GCB     | 213  |
|                                        |      | ELD                | 212  | GLA     | 216  |
|                                        |      | ELH                | 212  | GLC     | 217  |
|                                        |      | ENG                | 212  | GLD     | 217  |
|                                        |      | ENH                | 212  | GLE     | 217  |
|                                        |      | ENH-5              | 212  | GLF     | 217  |

## WARNING

### TUNGSTEN HALOGEN & INCANDESCENT DISPLAY/OPTIC LAMPS

The following information pertains to all Display/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, Display/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.**

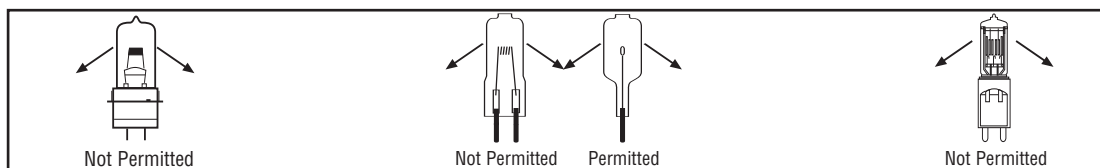
**ALL OF THE FOLLOWING PROCEDURES MUST BE FOLLOWED FOR SAFETY AND TO OBTAIN SATISFACTORY LAMP PERFORMANCE.**

#### 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 Display/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 Display/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 DISPLAY/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 DISPLAY/OPTIC LAMPS [HCD<sup>®</sup>, HMI<sup>®</sup>, HMD<sup>®</sup>, HMP<sup>®</sup>, HSD<sup>®</sup>, HSR<sup>®</sup>, HTI<sup>®</sup>]

#### WARNING:

In accordance with ANSI/IESNA Standard RP-27, Display/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 Display/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 Display/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 Display/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 DISPLAY/OPTIC LAMPS [HCD<sup>®</sup>, HMI<sup>®</sup>, HMD<sup>®</sup>, HMP<sup>®</sup>, HSD<sup>®</sup>, HSR<sup>®</sup>, HTI<sup>®</sup>] (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. Display/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, Display/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 Display/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 Display/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 Display/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 Display/Optic metal halide lamps at higher than rated wattage ("boosted operation"). Only OSRAM HMP Display/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 Display/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. Display/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:

Display/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, Display/Optic metal halide lamps produce a spectrum that ranges from about 150 nm in the ultraviolet region to the infrared region.
- If the quartz glass bulb is transparent in the ultraviolet region between 180 and 220 nm, this short-wave radiation will convert a small quantity of atmospheric oxygen (O<sub>2</sub>) surrounding the lamp into ozone (O<sub>3</sub>). Moreover, the oxygen molecules will link together with the nitrogen (N<sub>2</sub>) in the air, creating nitrogen oxides (NO<sub>x</sub>). (Some believe that the smell attributed to ozone is in actuality from the nitrogen oxides.)
- Ozone gas is toxic when inhaled in high concentrations over long periods of time. Ozone levels can be measured and monitored with commercial measuring equipment. Always keep ozone levels below the applicable TLV (threshold limit value)
- An "ozone smell" (or smell of nitrogen oxide) may be detected shortly after ignition. There are two probable causes for this condition. O<sub>3</sub> and NO<sub>x</sub> 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 Display/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 DISPLAY/OPTIC LAMPS [HCD<sup>®</sup>, HMI<sup>®</sup>, HMD<sup>®</sup>, HMP<sup>®</sup>, HSD<sup>®</sup>, HSR<sup>®</sup>, HTI<sup>®</sup>] (continued)

### LAMP TRANSPORTATION:

1. All Display/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 Display/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                          |
| HCD         | 23                           |

### PROPERTIES OF MERCURY:

- Chemical symbol: Hg
- Atomic number: 80
- Molecular Weight: 200.59
- Density: 13.6 g/cm<sup>3</sup> @ 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/m<sup>3</sup> @ 20°C / 68°F
  - 29.6 mg/m<sup>3</sup> @ 30°C / 86°F
  - 62.7 mg/m<sup>3</sup> @ 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](http://www.lamprecycle.org) or 1-866-666-6850**

### WARNING

#### VIP SUPER HIGH PRESSURE MERCURY LAMPS (DISPLAY/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 (DISPLAY/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/cm<sup>3</sup> @ 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 (DISPLAY/OPTIC) (continued)

- Concentration in air: 13.6 mg/m<sup>3</sup> @ 20°C / 68°F  
29.6 mg/m<sup>3</sup> @ 30°C / 86°F  
62.7 mg/m<sup>3</sup> @ 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](http://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 (O<sub>3</sub>). 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 (O<sub>3</sub>) is generated by the conversion of oxygen (O<sub>2</sub>) 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 lamps<sup>1</sup> into steel drum<sup>2</sup> 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.

<sup>1</sup> The lamps should not exceed the half-full point in the drums. Adjust the maximum number of lamps accordingly.  
<sup>2</sup> 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.

## WARNING

### HBO® HIGH PRESSURE MERCURY LAMPS

#### WARNING:

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

**Read and understand this warning before using this bulb!**

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

1. The discharge vessel of HBO lamps is constructed of quartz glass that is filled with a quantity of mercury and either Argon or Xenon gas. Most HBO lamps are not at positive pressure when cold (not operating, at room temperature). However, there are several HBO lamps that DO have a positive internal pressure of up to approximately 8 bar (or approximately 120 psi) in the cold (room temperature) state. The printing of the following bold warning statement on individual packages identifies them as positive-pressure lamps.

#### WARNING

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

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

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

#### BROKEN LAMPS (MERCURY VAPOR RELEASE AND DISPOSAL):

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

#### GENERAL SAFETY & INSTALLATION TIPS

##### INSTALLATION:

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

##### OPERATION:

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

## 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            | 1,000                        |
| 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/cm<sup>3</sup> @ 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/m<sup>3</sup> @ 20°C / 68°F
  - 29.6 mg/m<sup>3</sup> @ 30°C / 86°F
  - 62.7 mg/m<sup>3</sup> @ 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.

 **Lamp Contains Mercury**

**Manage in accordance with disposal laws**  
**See [www.lamprecycle.org](http://www.lamprecycle.org) or 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 Display/Optic lamps. For more information on lamp disposal labeling, see the inside back cover of this catalog.

 **Lamp Contains Mercury**

**Manage in accordance with disposal laws**  
**See [www.lamprecycle.org](http://www.lamprecycle.org) or 1-866-666-6850**