THORN

Lights the World

PHOTO, STAGE & STUDIO LIGHT SOURCES

Tungsten Halogen Incandescent Lamps

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CP39	5	8
CP40	5	8
CP41	6	9
CP43	2	6
CP51	9	11
CP52	9	11
CP53	11	12
CP58	14	14
CP59	1	6
CP60	15	15
CP61	15	15
CP62	15	15
CP70	3	7
CP77	13	13
CP79	2	6
CP81	4	8
CP82	4	8
CP83	8	10
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CP87	16	16
CP88	16	16
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CP90	3	7
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HX48	6	9
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ANSI Code	Table	Page
BTL	9	11
BTM	9	11
BTN	9	11
BTP	9	11
BTR	9	11
BVT	12	13
BVV	12	13
BVW	12	13
BWF	1	6
BWG	1	6
BWL	1	6
CWZ	12	13
CXZ	6	9
CYV	6	9
CYX	6	9
DPY	7	9
DSE	1	6
DSF	1	6
DTA	10	12
DTY	8	10
DWN	20	19
DXN	24	21
DXW	24	21
DXX	19	19
EGE	10	12
EGG	10	12
EGJ	10	12
EGK	10	12
EGN	5	8
EGR	5	8
EGT	5	8
EHC	13	13
EHD	13	13
EHF	13	13
EHG	13	13
EJG	21	20
EKM	23	21

ANSI Code	Table	Page
EMD	21	20
EME	21	20
EMF	21	20
EWE	10	12
EXA	10	12
EXC	15	15
EXD	15	15
EXE	15	15
FAD	19	19
FBX	19	19
FCV	13	13
FCM	21	20
FDB	25	22
FDF	21	20
FDN	21	20
FEP	13	13
FEX	22	20
FEY	22	20
FFN	17	17
FFP	17	17
FFR	17	17
FFS	17	17
FFT	25	22
FHM	21	20
FKA	9	11
FKB	9	11
FKC	9	11
FKD	9	11
FKE	10	12
FKF	9	11
FKG	5	8
FKH	5	8
FKJ	5	8
FKK	6	9
FKL	9	11
FKM	9	11
FKN	9	11
FKR	13	13
FKV	13	13
FMR	4	8
FWG	1	6
FWJ	1	6
FWM	1	6
GCS	4	8
GCT	4	8
GCV	4	8
GCW	4	8
GFA	18	18
GFB	18	18
GFC	18	18
GFD	18	18
GFE	18	18
GFF	17	17

Notes

A – Designed for Ellipsoidal Mirror Spotlights. May not be suitable for Fresnels.
B – Frosted envelope available to special order.
C – 110/115V rating available to special order.
D – Twin filament lamp. Filament sizes relate to major and minor coils.
E – Specially designed for Searchlight applications.
F – Twin filament lamp. Lumen figures relate to single and twin filament options.
G – Non-stock item available to special order.

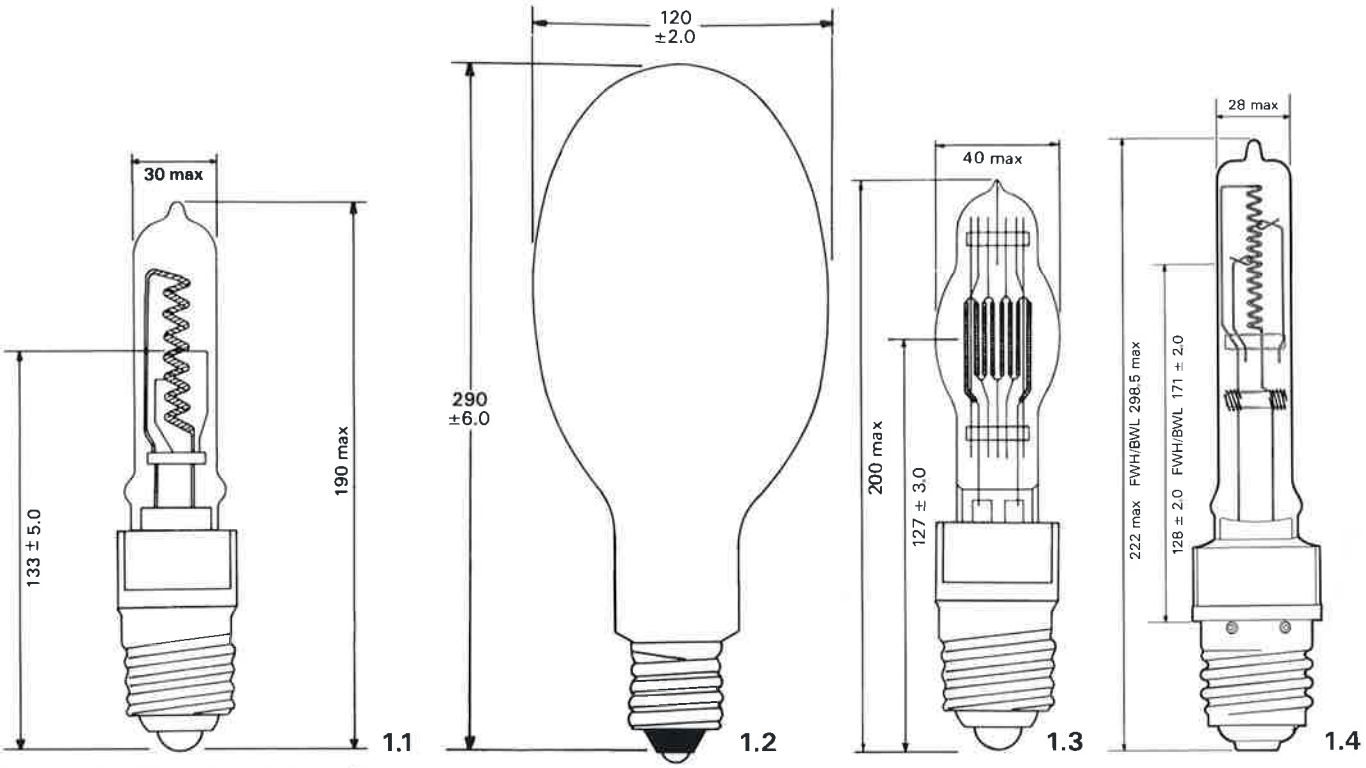


Table 1 E40s Base (Mogul Screw)

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
1000		DSE	120	3200	26.0	500			ANY		1.2
1500		DSF	120	3200	41.0	750			ANY		1.2
2000	CP59		220/230, 240	3200	50.0	300	CC	40×7.5	*		1.1
2000		BWF	120	3200	59.0	400	CC	40×8.0	*		1.1
2000		BWG	120	3200	56.0	400	CC	40×8.0	*	Frost	1.1
2000	HX26		220, 240	3200	54.0	400	MP	22×22.5	VBD±90	G	1.3
2000	HX26		120	3200	56.0	400	MP	24×21.5	VBD±90	G	1.3
2000		FWG	120	3200	58.0	500	CC	40×9.0	*		1.4
2000		FWJ	120	3200	56.0	500	CC	40×9.0	*	Frost	1.4
2000		FWM	120	3200	58.0	500	CC	40×9.0	*		1.4
2000		BWL	120	3200	56.0	500	CC	40×9.0	*	Frost	1.4

* See Fig. 3 page 54

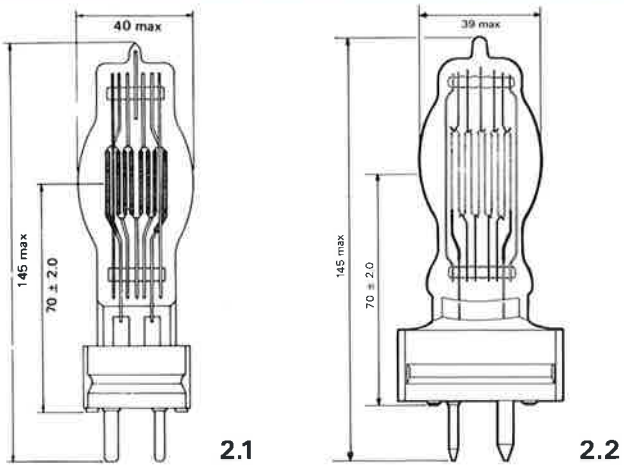
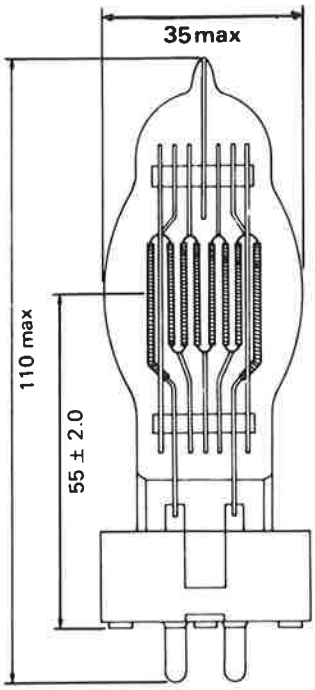


Table 2 GY16 Base

Watts	Lamp Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
2000	CP43	220, 240	3200	54.0	400	MP	22×22.5	VBD±90		2.1
2000	CP43	115/120	3200	54.0	400	MP	24×21.5	VBD±90		2.1
2000	CP43	120	3200	54.0	400	MP	24×21.5	VBD±90		2.2
2000	CP79	220, 240	3200	54.0	350	BP	18.5×17.0	VBD±90		2.1
2000	HX27	240	3200	52.0	300	CC	40×7.5	ANY		
2000	HX27	220/230	3200	52.0	300	CC	40×7.5	ANY		

* See Fig. 3 page 54



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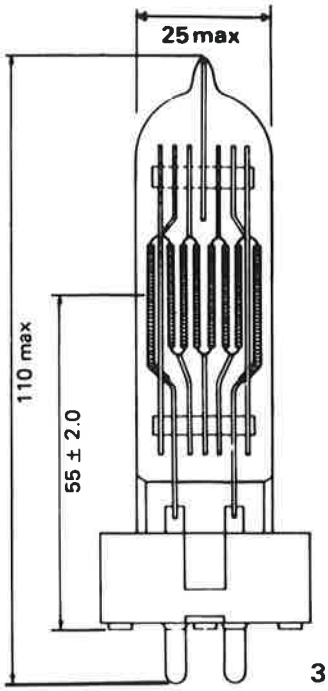
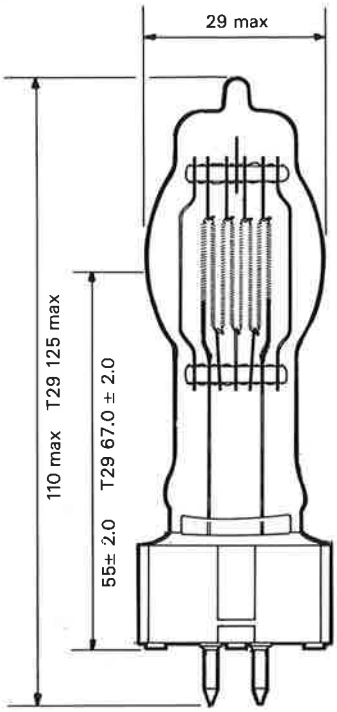


3.2

Table 3 GX9.5 Base

Watts	Lamp Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
650	T12	220, 240	3000	13.5	750	MP	15.5×14.5	VBD±90		3.2
650	T12	115/120	3000	13.5	750	MP	13×14	VBD±90		3.2
650	CP23	220, 240	3200	16.9	100	MP	12.5×14.5	VBD±90		3.2
650	CP23	115/120	3200	16.9	100	MP	14×11.5	VBD±90	21 max bulb.	3.2
750	HX144	55/60	3150	20.0	200	CC	12 × 7.5	*		
1000	CP24	220, 240	3200	26.0	200	MP	18.5×17.5	VBD±90		3.1
1000	CP24	115/120	3200	27.0	200	MP	14.5×14	VBD±90		3.1
1000	T11	220, 240	3050	23.0	750	MP	18×17.5	VBD±90		3.1
1000	T11	115/120	3050	23.0	750	MP	16.5×14	VBD±90		3.1
1000	T19	220, 240	3050	21.0	750	BP	15×12	VBD±90		3.1
1000	CP70	220, 240	3200	25.0	200	BP	15×12	VBD±90		3.1
1200	T29	120	3050	30.5	400	BP	15×13	VBD±90		3.3
1200	T29	220, 240	3050	29.0	400	BP	16×13	VBD±90		3.3
1200	CP90	120	3200	34.5	200	BP	15×12	VBD±90		3.3
1200	CP90	220, 240	3200	33.0	200	BP	16×12	VBD±90		3.3

* See Fig. 3 page 54.



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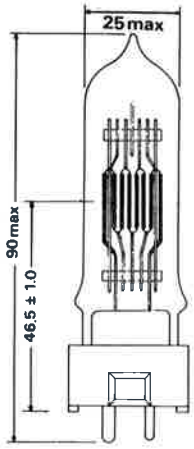

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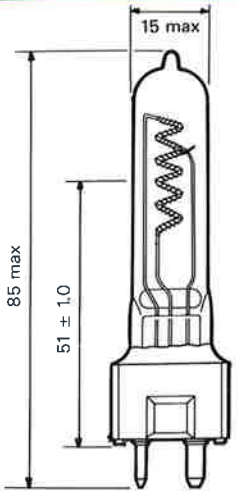
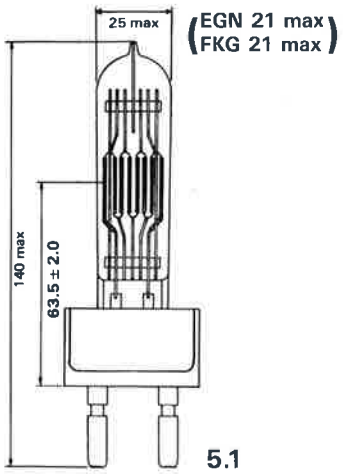


4.2

Table 4 GY9.5 Base

Watts	Lamp Codes	ANSI Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
300	CP81		120	3200	6.9	150	MP	12×13	VBD±90		4.1
300	CP81		220/230, 240/250	3200	6.6	150	†	12×13	VBD±90		4.1
500	CP82		120	3200	13.0	150	MP	12.5×11.5	VBD±90		4.1
500	CP82		220, 240	3200	12.5	150	MP	13×13	VBD±90		4.1
500	T18		120	3050	12.0	400	MP	12.5×11.5	VBD±90		4.1
500	T18	GCV	220	3050	12.0	400	MP	12.5×11.5	VBD±90		4.1
500	T18	GCW	240	3050	12.0	400	MP	12.5×11.5	VBD±90		4.1
650	T26		120	3050	15.0	400	MP	13.5×13.5	VBD±90		4.1
650	T26	GCT	220	3050	15.0	400	MP	13.5×15.5	VBD±90		4.1
650	T26	GCS	240	3050	15.0	400	MP	13.5×15.5	VBD±90		4.1
650	CP89		120	3200	16.9	200	MP	12.5×11.5	VBD±90		4.1
650	CP89		220, 240	3200	16.25	150	MP	13×13	VBD±90		4.1
650		FMR	120	3000	12.6	2000	CC	16×6	*		4.2

† Staggered Filament
* See Fig. 3 page 54



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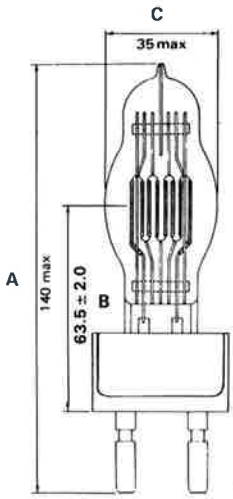


5.2

A CP91/92 175 max
B CP91/92 90.0 ± 2.0
C CP91/92 40 max.

Table 5 G22 Base (Med. Bipost) 63.5 and 90.0 LCL

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500		EGN	120	3200	13.0	150	MP	12×11.5	VBD±90		5.1
650	CP39	FKG	115/120	3200	16.9	100	MP	14×11.5	VBD±90		5.1
650	CP39	FKH	220, 240	3200	16.9	100	MP	12×14.5	VBD±90		5.1
750		EGR	120	3200	20.5	200	MP	12.5×14	VBD±90		5.1
1000		EGT	120	3200	28.0	250	MP	14.5×14	VBD±90		5.2
1000	CP40	FKJ	220, 240	3200	26.0	200	MP	18.5×17.5	VBD±90		5.2
1000	CP40		115/120	3200	27.0	200	MP	14.5×14	VBD±90		5.2
1000	T30		220, 240	3000	21.0	750	BP	15×12	VBD±90		5.2
1200	CP93		120	3200	34.0	200	BP	15×12	VBD±90		5.2
1200	CP93		220, 240	3200	33.0	200	BP	16×12	VBD±90		5.2
1200	T31		220, 240	3050	29.0	400	BP	16×13	VBD±90		5.2
2500	CP91		220, 240	3200	67.5	400	BP	24×18	VBD±90		5.2
2000	CP92		220, 240	3200	52.0	400	BP	18.5×17	VBD±90		5.2

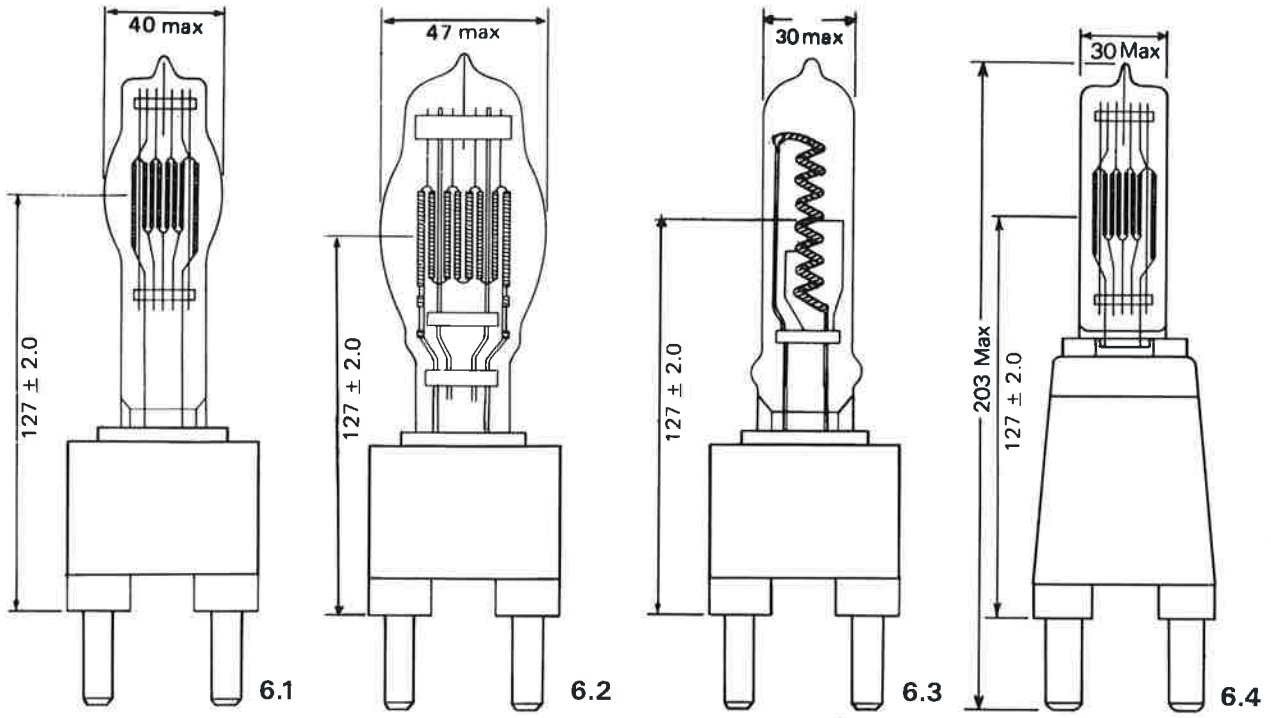


Table 6 G38 Base (Mogul Bipost) 127 LCL

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens × 1000	Ave. Life Hrs	Filament Form	Filament H × W	Burning Position	Notes	Fig. No.
1000		CYV	120	3200	28.0	250	MP	17.5 × 16	VBD±90		6.4
1500		CXZ	120	3200	41.0	300	MP	19 × 17	VBD±90		6.1
2000		BWA	120	3200	59.0	400	CC	40 × 8	ANY*		6.3
2000		CYX	120	3200	56.0	400	MP	19 × 21	VBD±90		6.1
2000	CP41		115/120	3200	54.0	400	MP	24 × 21.5	VBD±90		6.1
2000	CP41	FKK	220, 240	3200	54.0	400	MP	22 × 22.5	VBD±90		6.1
2500	CP94		220, 240	3200	67.5	400	MP	24 × 18	VBD±90		6.1
3000	HX48		110, 115, 120	3200	82.0	400	MP	24 × 26	VBD±45	E	6.2
3000	HX48		220, 240	3200	82.0	400	MP	24 × 26	VBD±45	E	6.2

*See Fig. 3 page 54.

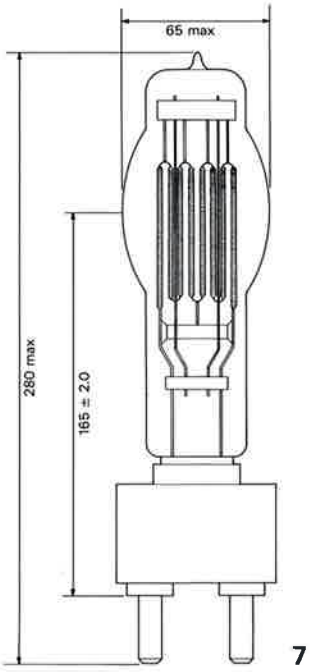
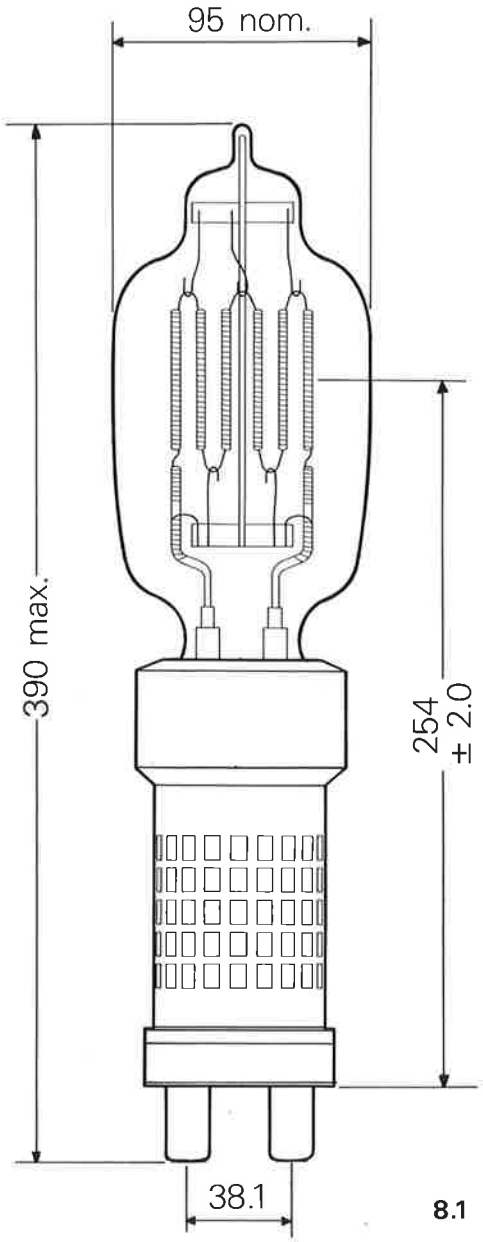


Table 7 G38 Base (Mogul Bipost) 165 LCL

Watts	Lamp Code	ANSI Code	Voltage Temp. K	Col. × 1000	Lumens Hrs	Ave. Life Form	Filament H × W	Filament Position	Burning	Notes	Fig. No.
5000	CP29		220, 240	3200	145.0	500	MP	30 × 36	VBD±45		7
5000		DPY	120	3200	145	500	MP	31 × 36	VBD±45		7



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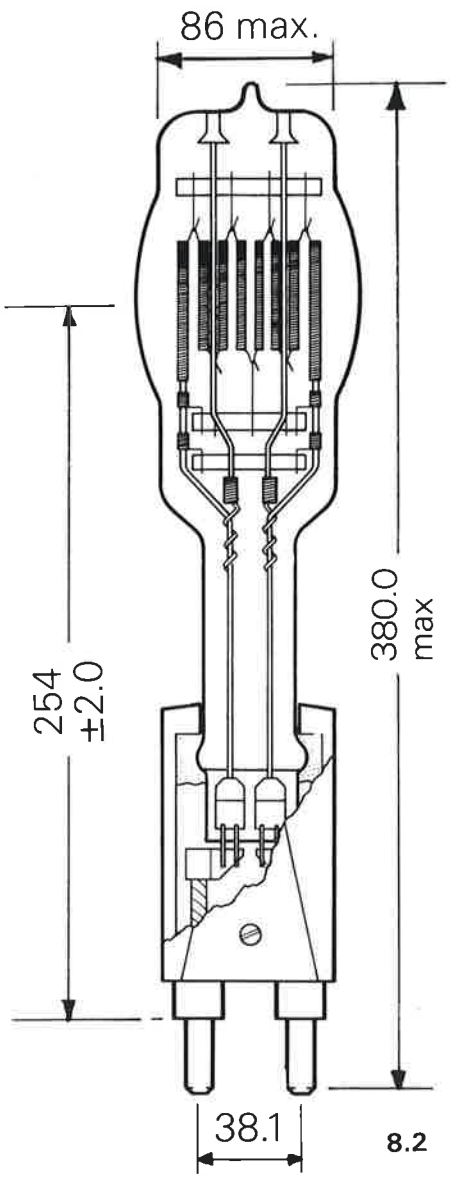
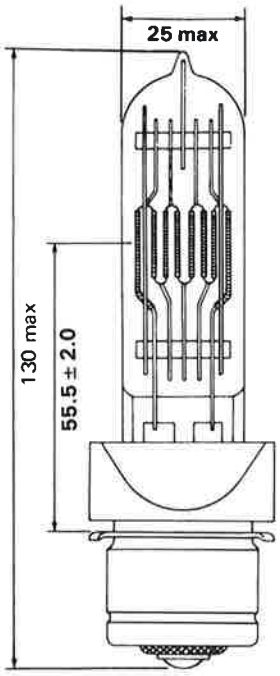


8.2

Table 8 G38 Base (Mogul Bipost) 254 LCL

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
10,000		DTY	120	3200	290	300	MP	45×45	VBD±45		8.1
10,000	CP83		220, 240	3200	290	500	MP	41×52	VBD±45		8.2



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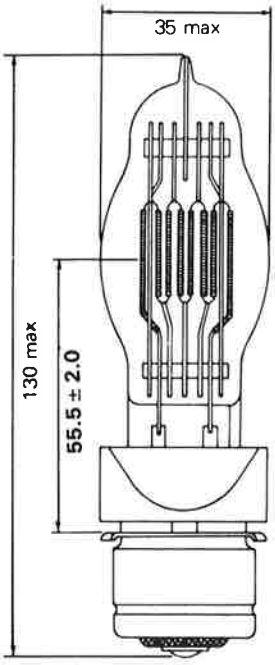

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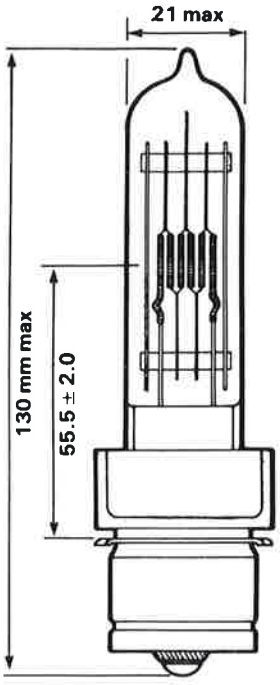
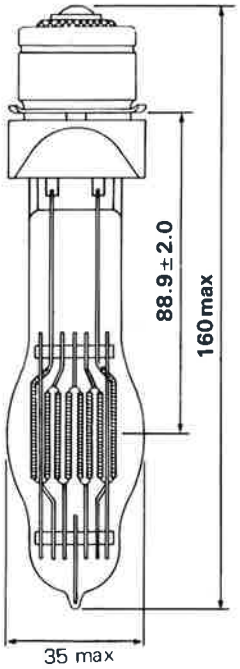


9.3

Table 9 P28s Base (Med. Prefocus)

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament H x W	Burning Position	Notes	Fig. No.
500		BTL	120	2950	11	750	MP	13.5 x 11.5	VBD±90		9.3
500		BTM	120	3200	13	150	MP	12 x 11.5	VBD±90		9.3
500	T28		220, 240	3000	11	300	MP	15 x 12	VBD±90		9.3
500	T17		115/120	2950	10.5	750	MP	13.5 x 11.5	VDB±90		9.3
500	T17	FKF	220/240	2950	9.5	750	MP	13.5 x 14.5	VBD±90		9.3
650	T13	FKA	115/120	3000	13.5	750	MP	13 x 14	VBD±90		9.1
650	T13	FKB	220, 240	3000	13.5	750	MP	15.5 x 14.5	VBD±90		9.1
650	CP51	FKL	115/120	3200	17.0	100	MP	14 x 11.5	VBD±90		9.3
650	CP51	FKM	220, 240	3200	16.9	100	MP	12 x 14.5	VBD±90		9.1
750		BTN	120	3000	17	750	MP	14 x 14	VBD±90		9.1
750		BTP	120	3200	20.5	200	MP	12.5 x 14	VBD±90		9.1
1000		BTR	120	3200	28	250	MP	14.5 x 14	VBD±90		9.2
1000		FKC	120	3050	24.5	750	MP	16 x 14	VBD±90		9.2
1000	T14		115/120	3050	23	750	MP	13.5 x 11.5	VBD±90		9.2
1000	T14	FKD	220, 240	3050	23	750	MP	17.5 x 17.5	VBD±90		9.2
1000	CP52		115/120	3200	27	200	MP	14.5 x 14	VBD±90		9.2
1000	CP52	FKN	220, 240	3200	26	200	MP	18.5 x 17.5	VBD±90		9.2



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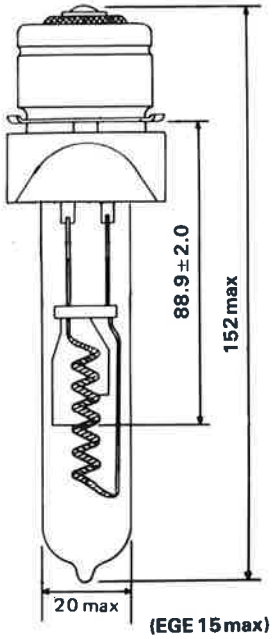
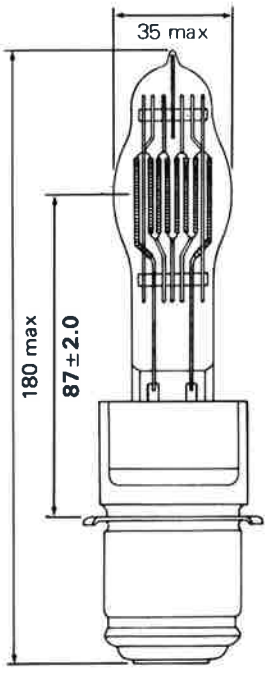


10.2

Table 10 P28s Base (Medium Prefocus) 88.9 LCL

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500		EGE	120	2900	10	2000	CC	18×5	VBU±30	A	10.2
750		EGG	120	2900	15	2000	CC	19×7	*	A	10.2
1000		EGJ	120	3200	27.5	500	CC	19×7	*	A	10.2
1000		EXA	120	3050	24.5	750	MP	16×14	ANY	A	10.1
1000	T15		115/120	3050	23	750	MP	16×14	ANY	A	10.1
1000	T15	FKE	220, 240	3050	23	750	MP	17.5×17.5	ANY	A	10.1
1000		EWE	220, 240	3200	26.5	250	CC	24×6	*	A	10.2
1000		EGK	120	3200	26.5	500	CC	19×7	*	A Frost	10.2

* See Fig. 3 page 54.



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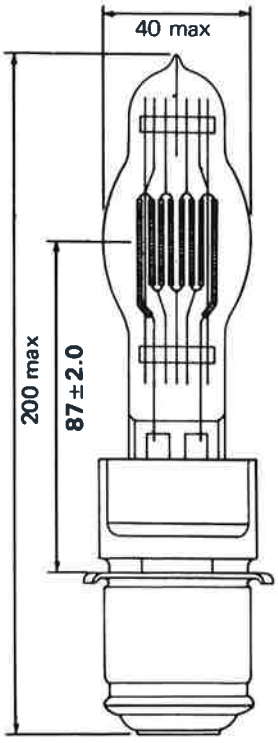
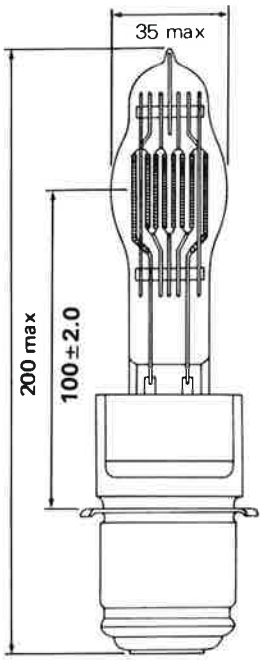


11.2

Table 11 P40s Base (Mogul Prefocus) 87 LCL

Watts	Lamp Code	ANSI Code	Voltage Temp. K	Col. ×1000	Lumens Hrs	Ave. Life Form	Filament H×W	Filament Position	Burning	Notes	Fig. No.
1000	T16		220, 240	3050	23	750	MP	17.5×17.5	VBD±90		11.1
1500		DTA	120	3200	41	300	MP	19×17	VBD±90		11.2
2000	CP53		115/120	3200	54	400	MP	24×21.5	VBD±90		11.2
2000	CP53		220, 240	3200	54	400	MP	22×22.5	VBD±90		11.2



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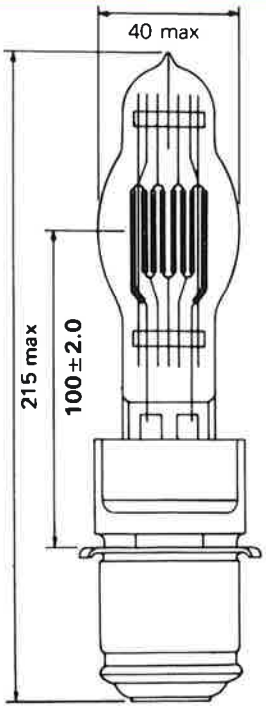
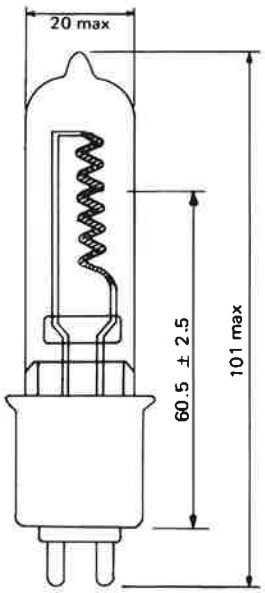


12.2

Table 12 P40s Base (Mogul Prefocus) 100 LCL

Watts	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament H x W	Burning Position	Notes	Fig. No.
1000	BVT	120	3050	24.5	500	MP	16 x 14	VBD±90	A	12.1
1000	BVV	120	3200	28	250	MP	14.5 x 14	VBD±90	A	12.1
1500	CWZ	120	3200	41	300	MP	19 x 17	VBD±90	A	12.2
2000	BVW	120	3200	56	400	MP	24 x 21.5	VBD±90	A	12.2

(EHC 15 max)

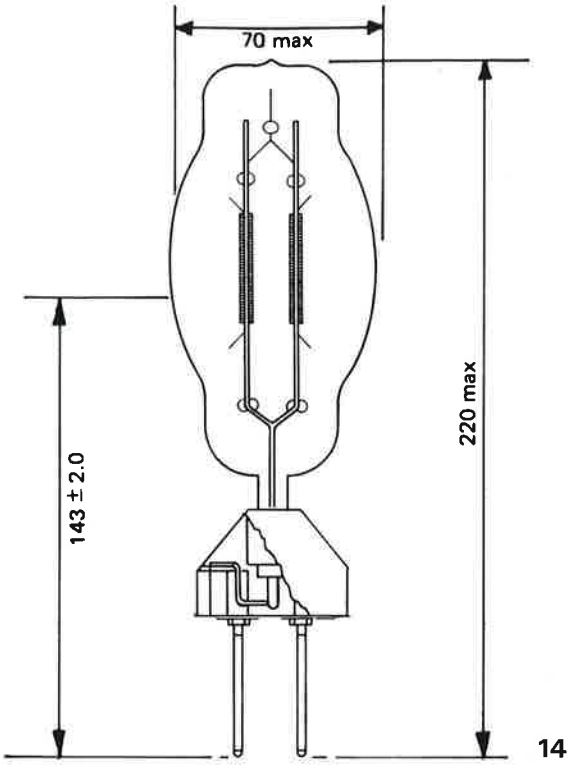


13

Table 13 G9.5 Base (Med. 2 pin)

Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament H x W	Burning Position	Notes	Fig. No.
500		EHC	120	3200	13	300	CC	19 x 5	*		13
500		EHD	120	2900	10	2000	CC	18 x 5	*		13
650		FKR	220, 240	3100	15	300	CC	24 x 5	*		13
650		FKV	120	3150	17	300	CC	12 x 8	*		13
750		EHG	120	3000	15	2000	CC	19 x 7	*		13
750		EHF	120	3200	20	300	CC	19 x 7	*		13
1000	CP77	FEP	220, 240	3200	25	300	CC	24 x 7	*		13
1000	CP77	FEL	120	3200	27.5	300	CC	19 x 7	*		13
1000		FCV	120	3200	26.5	300	CC	19 x 7	*	Frost	13

* See Fig. 3 page 54.

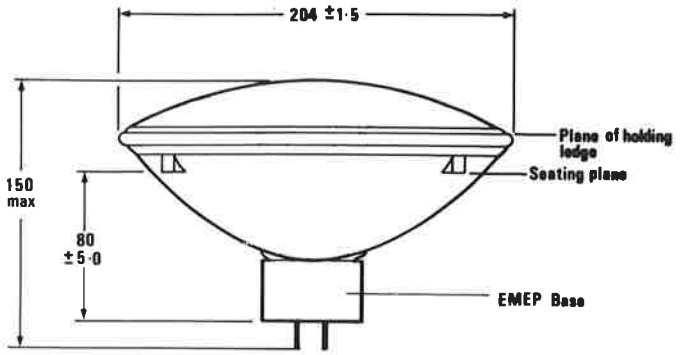


14

Table 14 GX38q Base

Watts	Lamp Code	Voltage	Col. Temp. K	Lumens × 1000	Ave. Life Hrs	Filament Form	Filament H × W	Burning Position	Notes	Fig. No.
1250/1250	CP30	220, 240	3200	27/56	300	TF	24 × 18.5 24 × 18.5	VBD±45	F	14
1250/2500	CP58	220, 240	3200	27/59/91	300	TF	27.5 × 25 24 × 22	VBD±45	F D	14
2500/2500	CP32	220, 240	3200	59/127	300	TF	27.5 × 25 27.5 × 25	VBD±45	F	14

Tungsten Halogen Par 64 Sealed Beam Lamp – 1000W (220V, 240V)



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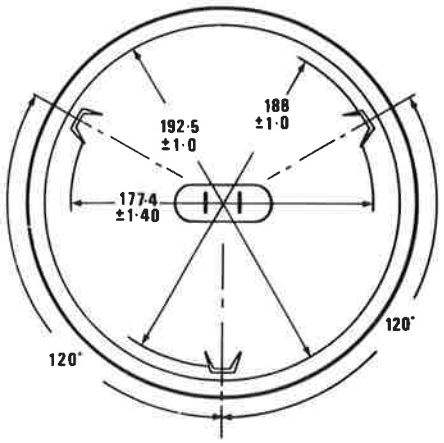


Applications

For use with fittings designated for studio, theatre and similar applications.

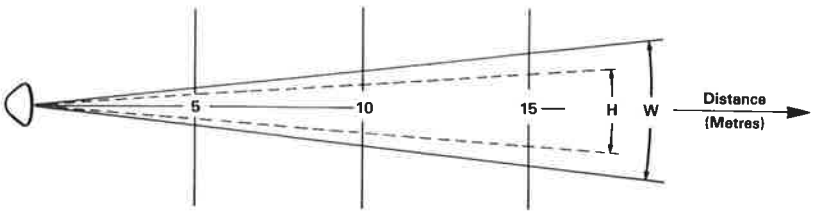
Characteristics

Ref No	CP60, CP61, CP62, CP95
Volts	220V,240V
Watts	1 kW
Life (Hrs Ave)	300
Operating Position	ANY
Colour Temp. K	3200
Base	E M E P
Fig. No.	15

Luminous characteristics

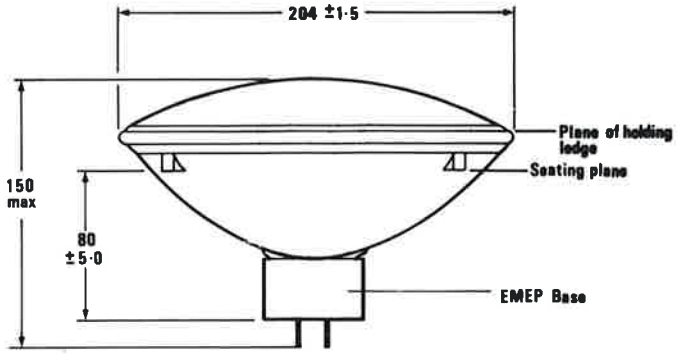
Lamp references	CP60	CP61	CP62	CP95
ANSI reference	EXC	EXD	EXE	–
	Clear 'Narrow Spot'	Stipple 'Spot'	Lens 'Flood'	Prismatic 'Extra wide'
Pk Beam Candle Power	320,000	270,000	125,000	15,000
Beam Spread ½ Pk.	9°H × 12°W	10°H × 14°W	11°H × 24°W	70°H × 70°W
Beam Spread 1/10 Pk.	17°H × 20°W	20°H × 22°W	20°H × 38°W	125°H × 95°W

TYPE	FIELD SIZE FOR 50% PEAK (METRES HxW)		
CP60	0.8 × 1.1	1.6 × 2.1	2.4 × 3.2
CP61	0.9 × 1.3	1.8 × 2.5	2.6 × 3.7
CP62	1.0 × 2.2	2.0 × 4.5	2.9 × 6.7
CP95	7.0 × 7.0	14.0 × 14.0	21.0 × 21.0



	PEAK ILLUMINATION (LUX)		
CP60	12800	3200	1420
CP61	10800	2700	1200
CP62	5000	1250	533
CP95	600	150	67

Tungsten Halogen Par 64 Sealed Beam Lamp – 500W (220V, 240V)



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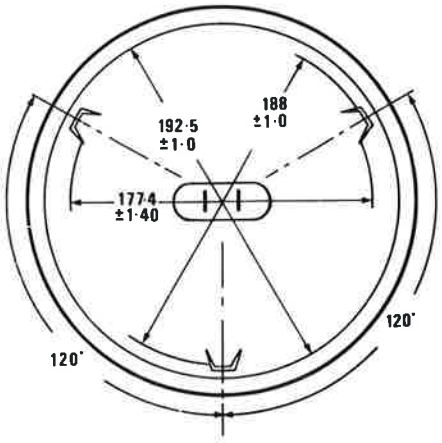


Applications

Lower wattage versions of the popular 1k lamps for effects lighting for discos at 50% power saving

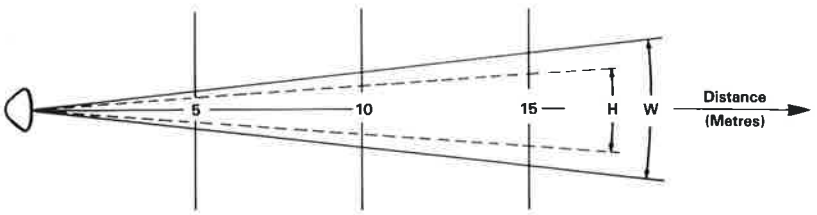
Characteristics

Ref No	CP86, CP87, CP88, HX115
Volts	220V,240V
Watts	500
Life (Hrs Ave)	300
Operating Position	ANY
Colour Temp. K	3200
Base	E M E P
Fig. No.	16

Luminous characteristics

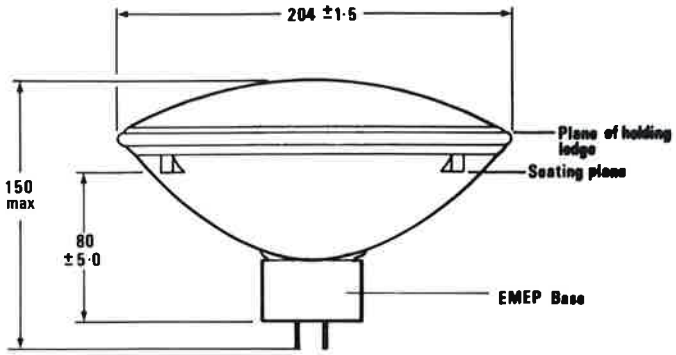
Lamp references	CP86	CP87	CP88	HX115
	Clear 'Narrow Spot'	Stipple 'Spot'	Lens 'Flood'	Prismatic 'Extra wide'
Pk Beam Candlepower	240,000	140,000	65000	7000
Beam Spread ½ Pk.	7°H × 16°W	9°H × 11°W	10°H × 21°W	66°H × 85°W
Beam Spread 1/10 Pk.	13°H × 16°W	16°H × 19°W	19°H × 32°W	85°H × 85°W

TYPE	FIELD SIZE FOR 50% PEAK (METRES HxW)		
CP86	0.6 × 0.9	1.2 × 1.8	1.8 × 2.6
CP87	0.8 × 1.0	1.6 × 1.9	2.4 × 2.9
CP88	0.9 × 1.9	1.8 × 3.7	2.6 × 5.6
HX115	6.5 × 6.5	13.0 × 13.0	19.5 × 19.5



	PEAK ILLUMINATION (LUX)		
CP86	9600	2400	1070
CP87	5600	1400	620
CP88	2600	650	290
HX115	280	70	31

Tungsten Halogen Par 64 Sealed Beam Lamp – 1000W (120V)



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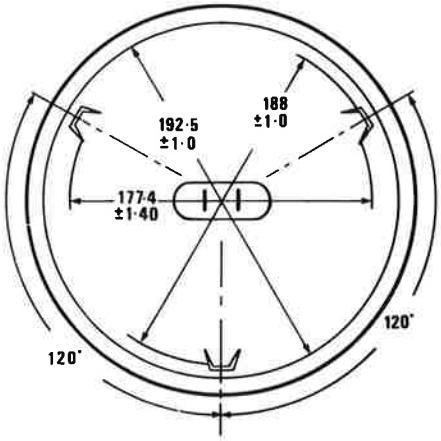


Table 17 120V Tungsten Halogen Par 64 Sealed Beam Lamp

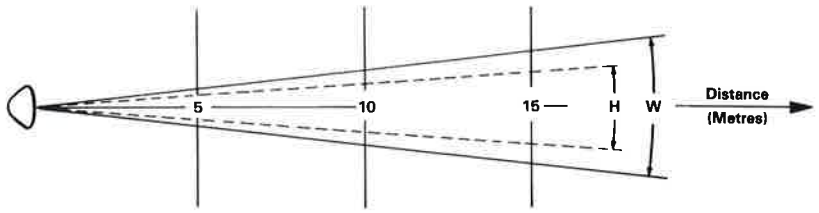
Characteristics

Ref No	FFN, FFP, FFR, FFS, GFF
Volts	120V
Watts	1kW
Life (Hrs Ave)	400
Operating Position	ANY
Colour Temp. K	3200
Base	E M E P
Fig. No.	17

Luminous characteristics

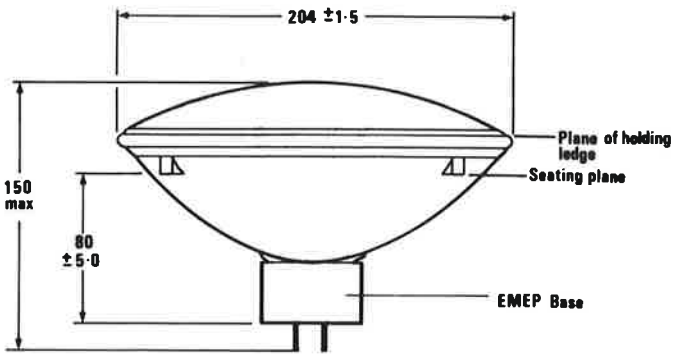
ANSI Reference	FFN	FFP	FFR	FFS	GFF
	'Very Narrow Spot'	'Narrow Spot'	'Med. Flood'	'Wide Flood'	'Extra Wide'
Pk Beam Candlepower	400,000	330,000	125,000	40,000	16,000
Beam Spread ½ Pk.	6°H×12°W	7°H×14°W	12°H×28°W	24°H×48°W	67°H×68°W
Beam Spread 1/10 Pk.	10°H×24°W	14°H×26°W	21°H×44°W	45°H×71°W	135°H×130°W

TYPE	FIELD SIZE FOR 50% PEAK (METRES HxW)		
FFN	0.5×1.0	1.0×2.1	1.6×3.2
FFP	0.6×1.2	1.2×2.4	1.8×3.7
FFR	1.1×2.5	2.1×5.0	3.2×7.5
FFS	2.1×4.1	4.2×8.3	6.4×12.4
GFF	3.3×3.4	6.6×6.7	9.1×10.1



	PEAK ILLUMINATION (LUX)		
FFN	16000	4000	1780
FFP	13200	3300	1470
FFR	5000	1250	533
FFS	1600	400	178
GFF	640	160	70

Tungsten Halogen Par 64 Sealed Beam Lamp – 1200W (120V)



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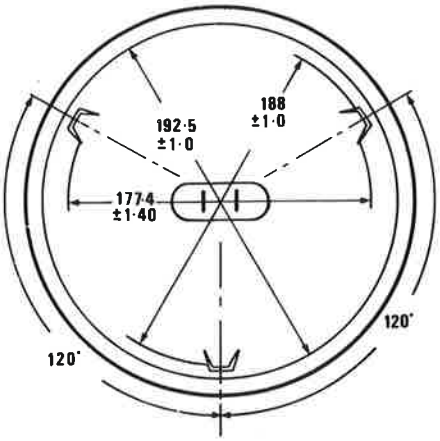


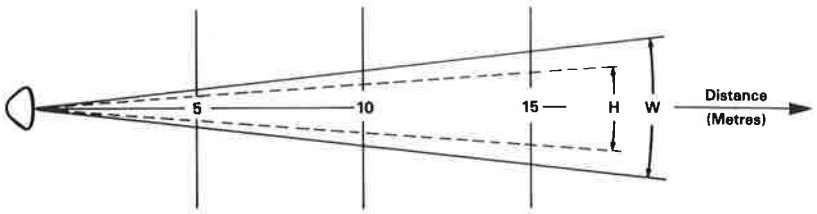
Characteristics

Ref No	HX156
Volts	120V
Watts	1200
Life (Hrs Ave)	400
Operating Position	ANY
Colour Temp. K	3200
Base	E M E P
Fig. No.	18

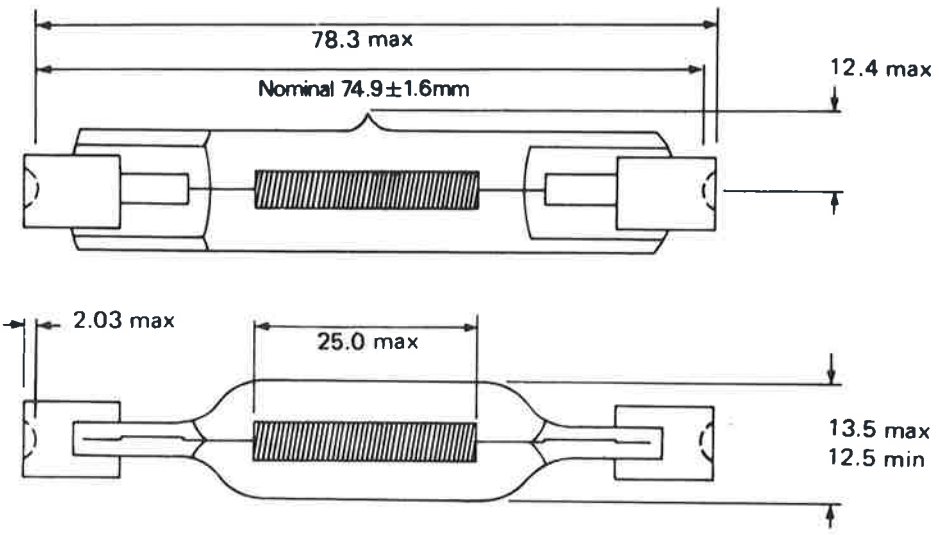
Luminous characteristics

Lamp code	HX156	HX156	HX156	HX156	HX156
ANSI code	GFC	GFB	GFA	GFE	GFD
	Clear 'Narrow Spot'	Stipple 'Spot'	Lens 'Flood'	Lens 'Wide Flood'	Lens 'Extra wide Flood'
Pk Beam Candlepower	540,000	450,000	160,000	45,000	20,000
Beam Spread ½ Pk.	8°H × 10°W	8°H × 18°W	13°H × 24°W	20°H × 58°W	65°H × 65°W
Beam Spread 1/10 Pk.	14°H × 16°W	16°H × 18°W	22°H × 36°W	34°H × 71°W	55°H × 145°W

TYPE	FIELD SIZE FOR 50% PEAK (METRES HxW)		
GFC	0.7 × 0.9	1.4 × 1.7	2.1 × 2.6
GFB	0.7 × 0.9	1.4 × 1.7	2.1 × 2.6
GFA	1.1 × 2.1	2.3 × 4.2	3.4 × 6.4
GFE	1.8 × 5.4	3.5 × 11.1	5.3 × 16.6
GFD	6.4 × 6.4	12.7 × 12.7	19.1 × 19.1



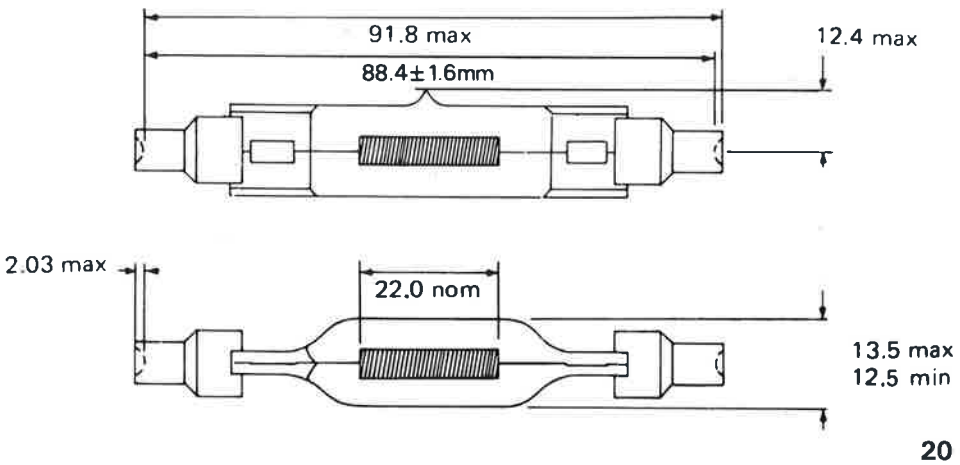
	PEAK ILLUMINATION (LUX)		
GFC	21,600	5400	2400
GFB	18,000	4500	2000
GFA	6,400	1600	710
GFE	1,800	450	200
GFD	800	200	90



19

Table 19 R7s Base (Recessed Single Contact) 78.3 MCL

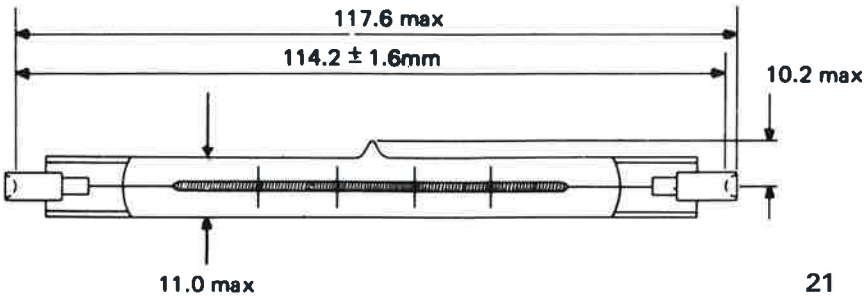
Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
650		FAD	120	3200	17	100	CC	25	ANY		19
650	P2/6		220/230	3200	17	100	CC	25	ANY		19
650		FBX	120	3200	17	100	CC	25	ANY	Frost	19
800	P2/13	DXX	220/230, 240/250	3200	20	75	CC	22	ANY		19



20

Table 20 R7s Base (Recessed Single Contact) 91.8 MCL

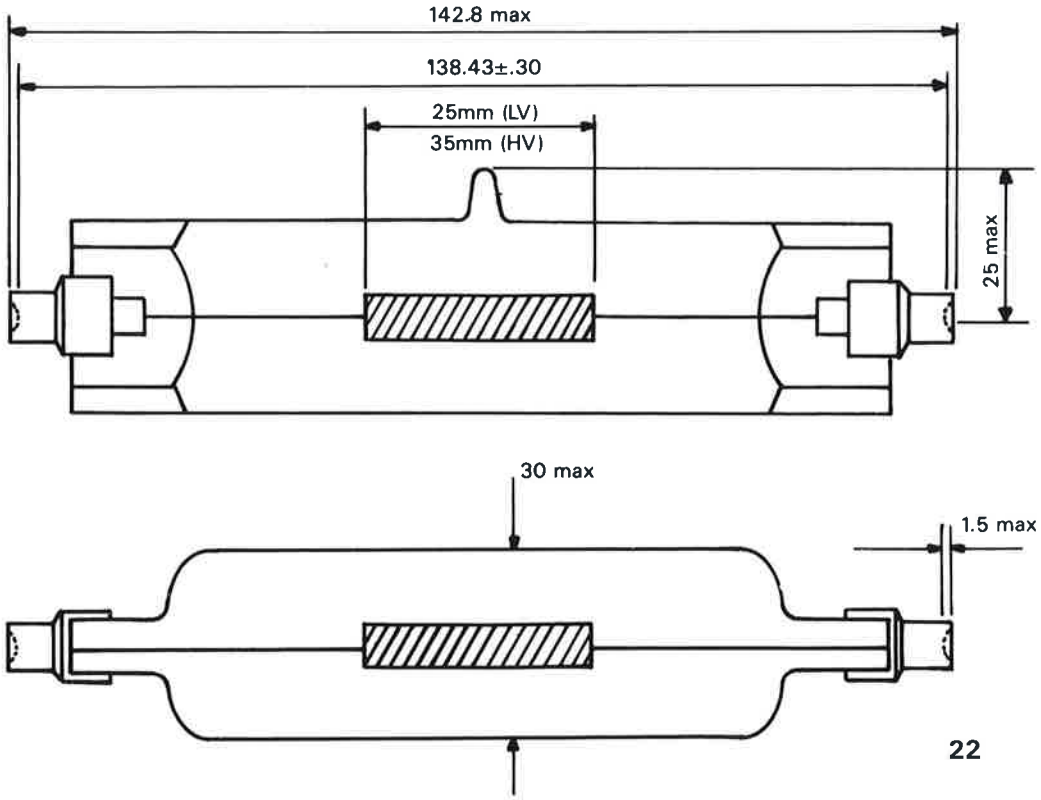
Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
800	P2/14 P2/14	DWN	220/230, 240/250	3200	20	50	CC	22	ANY		20



21

Table 21 R7s Base (Recessed Single Contact) 117.6 MCL

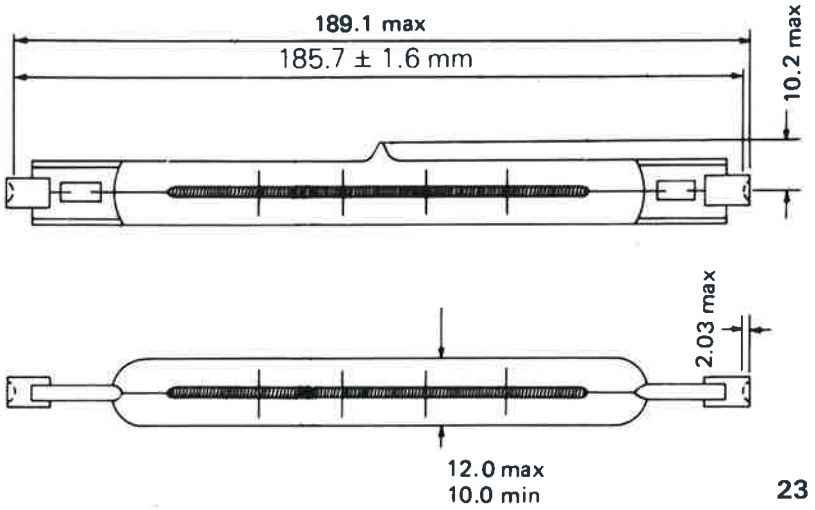
Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
500	P2/30	FDF	120	3200	13.25	400	SC	58	HOR±4		21
500	P2/31	FDN	120	3200	12.8	400	SC	58	HOR±4	Frost	21
750		EJG	120	3200	20	400	SC	68	HOR±4		21
750		EMD	120	3200	19	400	SC	68	HOR±4	Frost	21
800	P2/11	EME	220/230	3200	22	150	SC	68	HOR±4		21
800	P2/11	EME	240/250	3200	22	150	SC	68	HOR±4		21
800	P2/11	EMF	220/230	3200	21.6	150	SC	68	HOR±4	Frost	21
800	P2/11	EMF	240/250	3200	21.6	150	SC	68	HOR±4	Frost	21
1000	P2/28	FCM	120	3200	27	300	SC	74	HOR±4		21
1000	P2/29	FHM	120	3200	26.5	300	SC	74	HOR±4	Frost	21



22

Table 22 Rx7s Base (Recessed Single Contact) 141.2 MCL

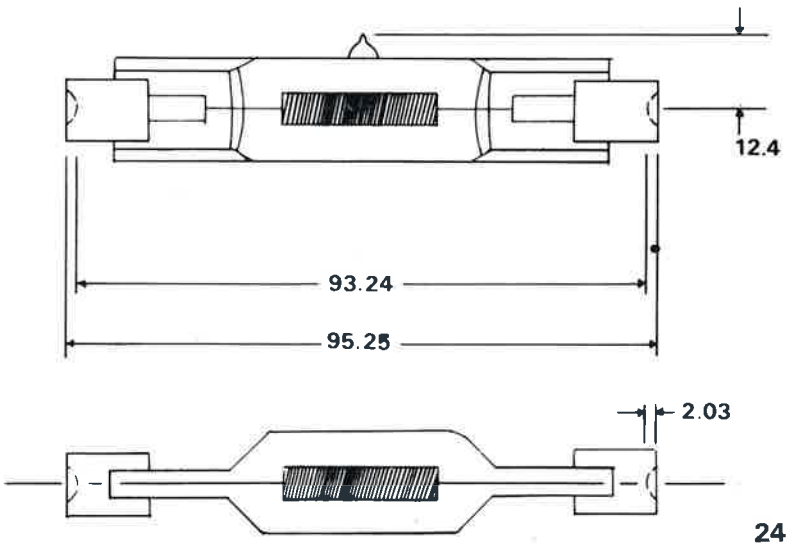
Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
2000		FEY	120	3200	56.6	300	CC	25	ANY		22
2000	P2/27	FEX	220/230	3200	50	300	CC	35	ANY		22
2000	P2/27	FEX	240	3200	50	300	CC	35	ANY		22



23

Table 23 R7s Base (Recessed Single Contact) 189.1 MCL

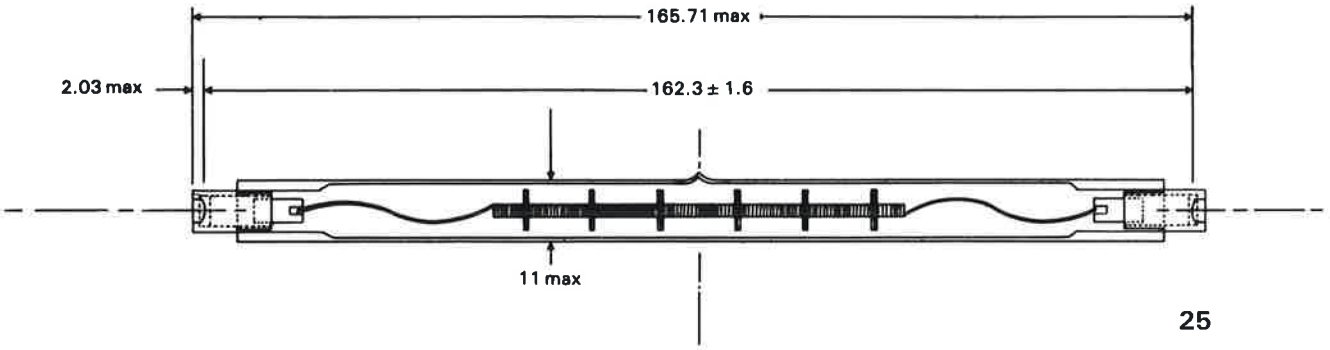
Watts	Lamp Code	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
625	P2/10		220/230	3200	15.5	200	SC	120	HOR±4		23
625	P2/10		240/250	3200	15.5	200	SC	120	HOR±4		23
1000	P2/7	EKM	220/230	3200	26	200	SC	120	HOR±4		23
1000	P2/7	EKM	240/250	3200	26	200	SC	120	HOR±4		23
1250	P2/12		220/230	3200	35	200	SC	120	HOR±4		23
1250	P2/12		240/250	3200	35	200	SC	120	HOR±4		23



24

Table 24 R7s Base (Recessed Single Contact) 93.25 MCL

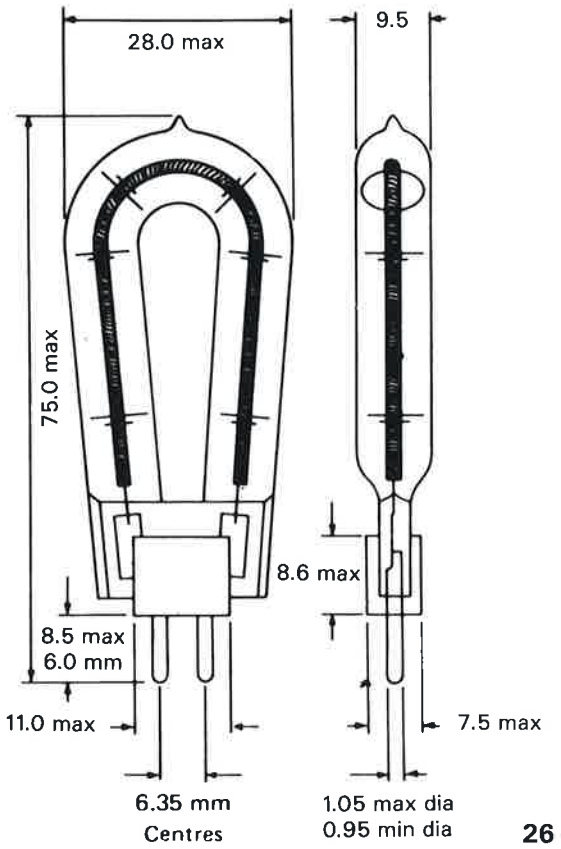
Watts	Lamp Code	ANSI	Voltage Temp. K	Col. x 1000	Lumens Hrs	Ave. Life Form	Filament Length	Filament Position	Burning	Notes	Fig. No.
1000		DXN	120	3400	33	50	CC	22.9	ANY		24
1000		DXW	120	3200	28	150	CC	25.5	ANY		24
1000		FBY	120	3200	26	150	CC	25.6	ANY	Frost	24
1000	P2/35		220, 240	3200	26.5	150	CC	26.5	ANY		24



25

Table 25 R7s Base (Recessed Single Contact) 162.3 MCL

Watts	ANSI Code	Voltage	Col. Temp. K	Lumens x 1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
1000	FFT	120	3200	26	500	SC	63.5	HOR±4		25
1500	FDB	120	3200	41	400	SC		HOR±4		25

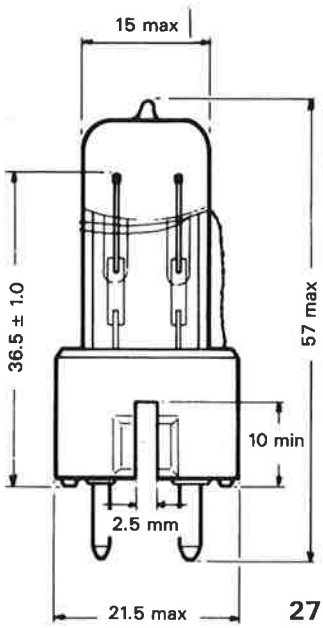


26

Table 26 G6.35 Base

Lamp Code	Voltage	Watts	Lamp Cap	Co. Temp. K	Lumens	Ave. Life Hrs.	Burning Position	Special Features	Fig. No.
P2/16	220/230, 240/250	650	G6.35	3200	17500	50	VBD±90	CDJ	26
P2/25	115/120	850	G6.35	3200	23000	50	VBD±90	DR	26
P2/17	220/230, 240/250	1000	G6.35	3200	28000	50	VBD±90	CDK	26
P2/26	220/230, 240/250	1250	G6.35	3200	35000	50	VBD±90	CDL	26

Index by Lamp Code



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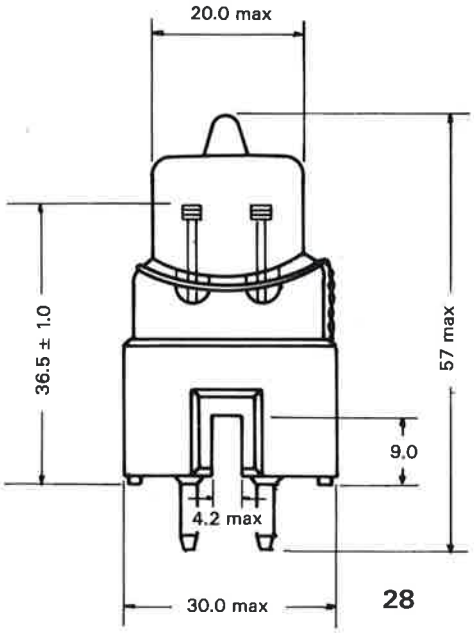

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Luminous Characteristics

Watts	Code Ref.	Lumens 100 hrs.	Maintenance	Life hours	Colour temp. K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
200	CID99-0211	14000	90% at 150 hrs.	150	5500±400	x0.332 y0.341	85	BD±90°	27	GY9.5
300	CID99-0413	21000	90% at 350 hrs.	350	5500±400	x0.332 y0.341	85	BD±90°	28	GY9.5

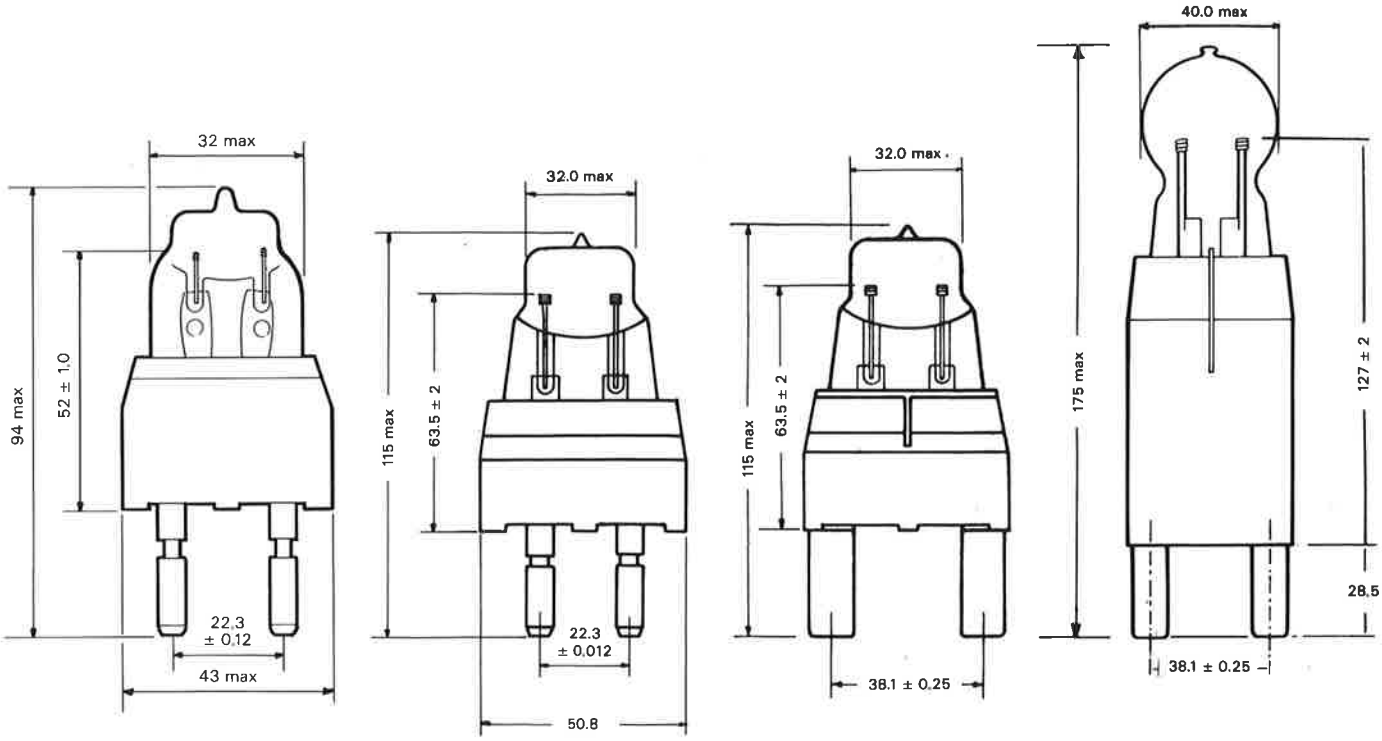
Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current (A)	Run up time sec.(max)	Starting pulse(nom)kV	Restrike time	Ignitor †	Ballast Choke	Fig. No.	Capacitor
200	CID99-0211	70	3.3	60	12 peak	Inst.	IREM AD312R	G53398.T	27	GC2346 (250V 25μF)
300	CID99-0413	100±10	3.5	60	15 peak	Inst.	IREM AD415/EB	+	28	GC2382 (250V 35μF)

† Requires additional essential components for hot restarting – Connect 1μF 250V AC capacitor and 100 ohms 2.5W resistor in series, between ballast/ignitor terminal and neutral for 200W and 300W circuits.

\+ Details on request.

Bipin Lamps C.I.D. (5500K)



29 30 31 32

Luminous Characteristics

Watts	Code Ref.	Lumens 100 hrs.	Maintenance	Life hours	Colour temp. K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
575	CID99-0415	40250	90% at 500 hrs.	500	5500±400	x0.332 y0.341	85	BD±90°	29	G22
1000	CID99-0222	70000	90% at 500 hrs.	500	5500±400	x0.332 y0.341	85	BD±90°	30	G22
1000	CID99-0422	70000	90% at 350 hrs.	500	5500±400	x0.332 y0.341	85	BD±90°	31	G38
2500	CID99-0431	200000	90% at 350 hrs.	350	5500±400	x0.332 y0.341	85	BD±90°	32	G38

Electrical Characteristics

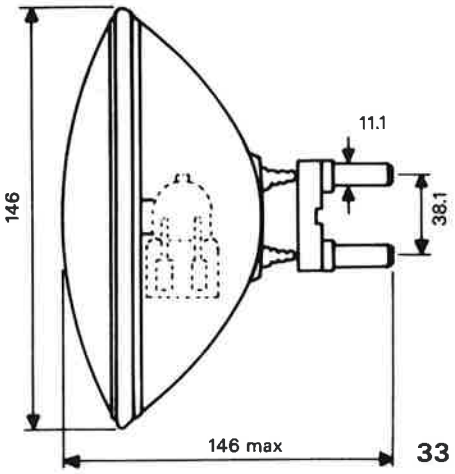
Watts	Code Ref	Lamp Volts	Current (A)	Run up time sec.(max)	Starting pulse(nom)kV	Restrike time minutes	Ignitor †	Ballast Choke	Fig. No.	Capacitor
575	CID99-0415	90±10	7	60	9 peak	5	Bag Turgi SE15/7U or	IREM ZA57	29	4×GC2331 (80μF 250V)
1000	CID99-0222	77	15	60	9 peak	5	Bag Turgi SE15/7U or G53444	G53307.T	30	7×GC2346 (175μF 250V)
1000	CID99-0422	77	15	60	25*	Inst.	G53352.T or IREM AD1540	G53307.T	31	7×GC2346 (175μF 250V)
2500	CID99-0431	100	28	60	50**	Inst.	IREM AD30/50	2× G53307.T	32	12× GC2346 (275μF or 300 μF 250V)

* Measured between sphere gap of 7.5mm in air.

** Measured between sphere gap of 17mm in air.

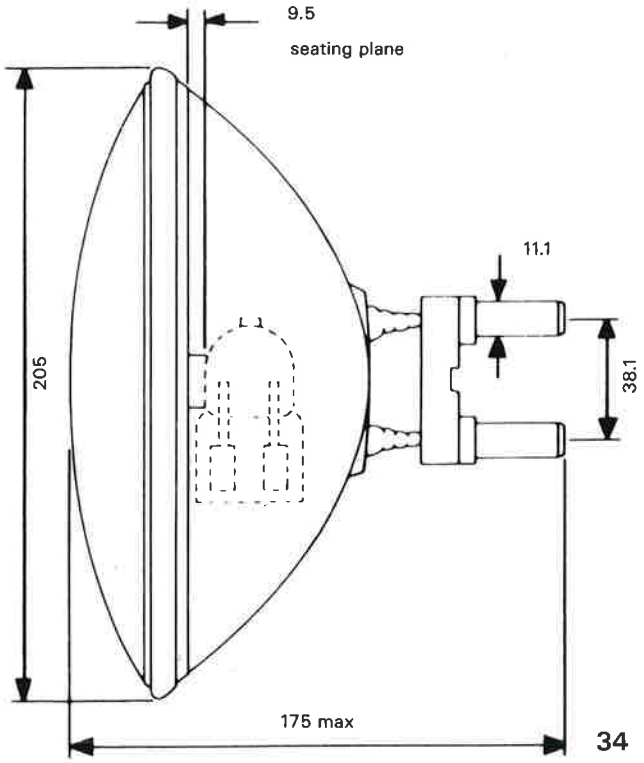
† Requires additional essential components. Connect 250 AC capacitor and 2.5W resistor in series, between ballast/ignitor terminal and neutral. C/R values – 575W 0.47μF/100 ohms; 2500W 2μF/5 ohms; 1000W for circuit with AD1540 only, requires 6μF/5 ohms (6W).

PAR C.I.D. (5500K) Sealed Beam Lamps



575W PAR 46

1000W & 1200W PAR 64



Luminous Characteristics

Watts	Code Ref.	Axial intensity cd.	Angle 1/2 peak degrees	Angle 1/10 peak degrees	Life hours peak degrees	Colour temp K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
575	99-1415	425000	8	18	1000	5500±400	x0.332 y0.341	85	Horiz±90°	33	G3B
1200	99-1435	820000	10	20	1000	5500±400	x0.332 y0.341	85	Horiz±90°	34	G38

Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current	Run up time sec.(max)	Starting pulse(nom)	Restrike time	Ignitor †	Ballast Choke	Fig. No.	Capacitor
575	99-1415	95	7	60	25*	Inst.	IREM AD825	IREM 2457	33	80µF 250V 6 x GC2331
1200	99-1435	100	14	80	50**	Inst.	IREM AD1550	G53307.T	34	150µF 250V 6 x GC2346

† Requires additional essential components for hot restarting – Connect 250V AC capacitor and 2.5W resistor in series, between ballast/ignitor terminal and neutral. C/R values – 575W 1µ/15 ohms, 1200W 2 µF/15 ohms.

* Measured between sphere gap of 7.5mm in air

** Measured between sphere gap of 17mm in air.

Luminous Characteristics

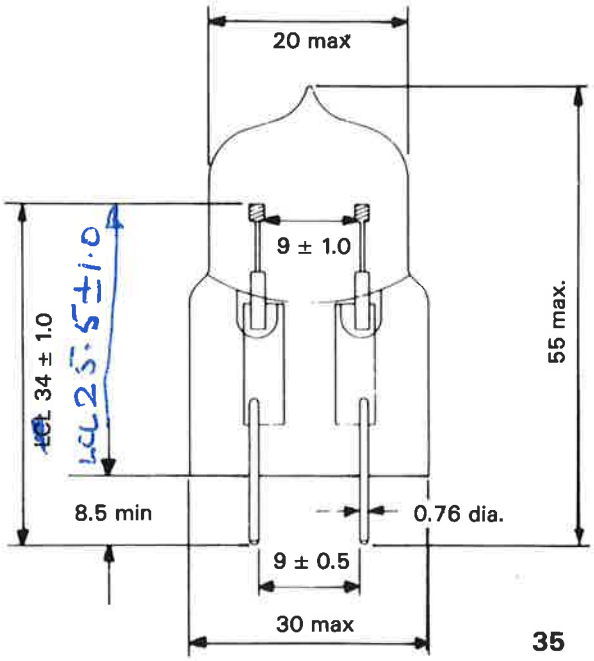
Watts	Code Ref.	Axial intensity cd.	Angle 1/2 peak degrees	Angle 1/10 peak degrees	Life hours peak degrees	Colour temp K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
1000	CID99-1225	850000	8	20	1500	5500±400	x0.332 y0.341	85	Horiz±90°	34	G3B
1000	CID99-1425	850000	8	20	1000	5500±400	x0.332 y0.341	85	Horiz±90°	34	G38

Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current	Run up time sec.(max)	Starting pulse(nom)	Restrike time minutes	Ignitor	Ballast Choke	Fig. No.	Capacitor
1000	CID99-1225	77	15	60	9 peak	10	Bag Turgi SE15/7U or G53444	G533307.T	34	7 x GC2346 (175µF 250V)
1000	CID99-1425	77	15	60	25*	Inst.	G53352.T or †IREM AD1540	G53307.T	34	7 x GC2346 (175µF 250V)

* Measured between sphere gap of 7.5mm in air

† Requires additional essential components for use with IREM AD1540 only. Connect 250V AC capacitor and 2.5W resistor in series, between ballast/ignitor terminal and neutral. C/R values – 1000W 6 µF/5 ohms (6W).



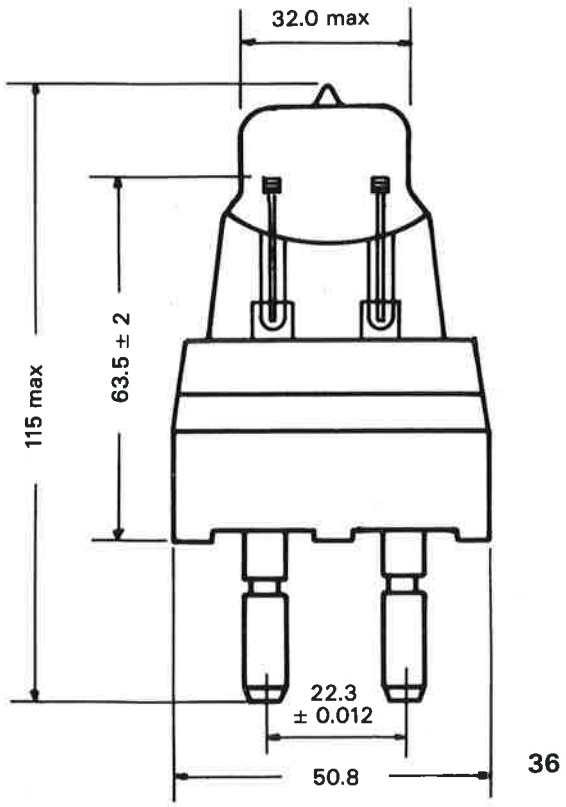
Luminous Characteristics

Watts	Code Ref.	Lumens 100 hrs.	Maintenance	Life hours	Colour temp. K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
400	CSI99-0201	32000	85% at 500 hrs.	500	4000±400	x0.395 y0.395	80	BD±90°	35	2 pin 9mm ±0.5 spacing

Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current (A)	Run up time sec.(max)	Starting pulse(nom)kV	Restrike time minutes	Ignitor †	Ballast Choke	Fig. No.	Capacitor
400	CSI99-0201	77	15	60	9 peak	5	Bag Turgi SE15/7U or G53444	G53371.T	35	2 × GC2331 (40μF 250V)

† Requires additional essential components for starting – connect 0.47μF 250v AC capacitor and 100 ohm 2.5W resistor in series, between ignitor "B" and "N" terminals.



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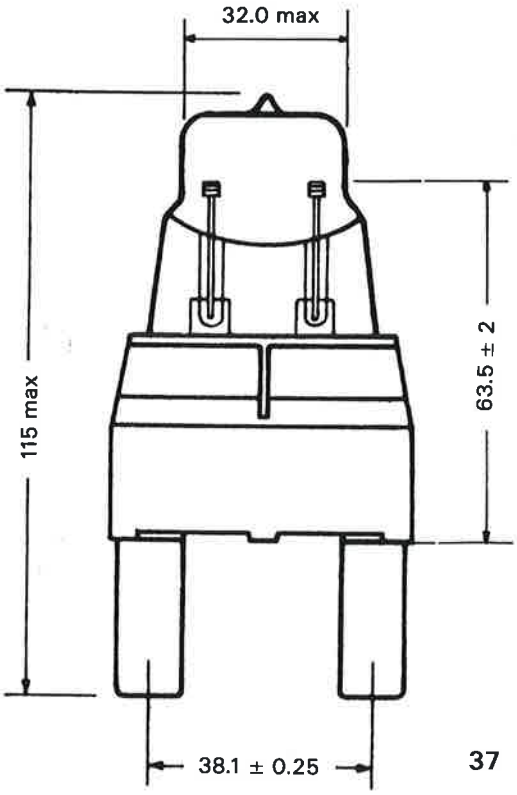

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Luminous Characteristics

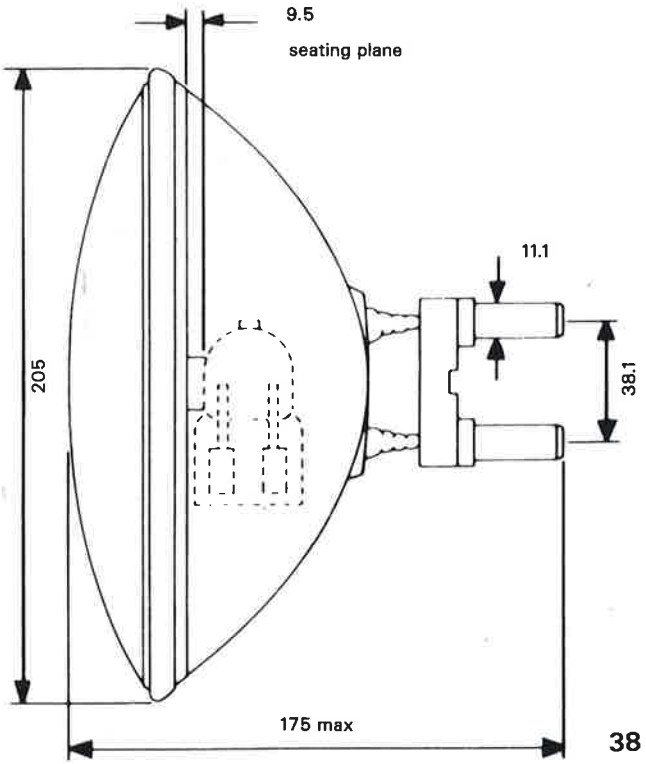
Watts	Code Ref.	Lumens 100 hrs.	Maintenance	Life hours	Colour temp. K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
1000	CSI99-0221	90000	85% at 500 hrs.	500	4000±400	x0.385 y0.395	80	BD±90°	36	G22
1000	CSI99-0421	90000	85% at 500 hrs.	500	4000±400	x0.385 y0.395	80	BD±90°	37	G38

Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current	Run up time sec.(max)	Starting pulse(nom)kV	Restrike time minutes	Ignitor	Ballast Choke	Fig. No.	Capacitor
1000	CSI99-0221	77	15	60	9 peak	5	Bag Turgi SE15/7U or G53444	G53307.T	36	7 × GC2346 (175µF 250V)
1000	CSI99-0421	77	15	60	25*	Inst.	G53352.T	G53307.T	37	7 × GC2346 (175µF 250V)

* Measured between sphere gap of 7.5mm in air.

1000W
PAR 64



Luminous Characteristics

Watts	Code Ref.	Axial intensity cd.	Angle 1/2 peak degrees	Angle 1/10 peak degrees	Life hours peak degrees	Colour temp K	Colour chromaticity co-ordinates	Colour rendering index Ra	Burning position	Fig. No.	Cap
1000	CSI99-1222	1350000	6	18	3500	3800±400	x0.393 y0.395	80	Horiz±90°	38	G38
1000	CSI99-1422	1350000	6	18	3500	3800±400	x0.393 y0.395	80	Horiz±90°	38	G38

Electrical Characteristics

Watts	Code Ref	Lamp Volts	Current	Run up time sec.(max)	Starting pulse(nom)	Restrike time minutes	Ignitor †	Ballast Choke	Fig. No.	Capacitor
1000	CSI99-1222	77	15	60	9 peak	10	Bag Turgi SE15/7U or G53444	G533307.T	38	7 x GC2346 (175µF 250V)
1000	CSI99-1422	77	15	60	25*	Inst.	G53352.T	G533307.T	38	7 x GC2346 (175µF 250V)

* Measured between sphere gap of 7.5mm in air

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A1/241	51	36
A1/242	51	36
A1/244	48	36
A1/245	48	36
A1/246	47	36
A1/247	48	36
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M81	70	42
M82	70	42
M91	66	41
M94	70	42
M95	61	41
M98	70	42
M249	73	43
M250	73	43
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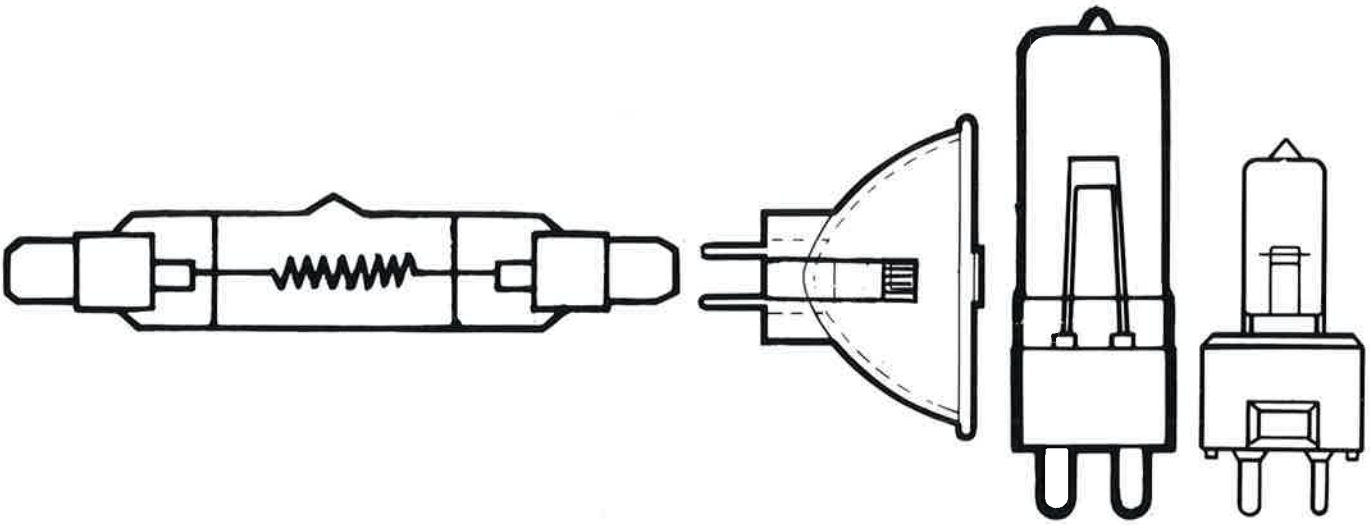
Special Features Key

A – Obscured top.
B – Forced cooling necessary – max. bulb wall temp 250°C.
C – Dual voltage.
D – Tungsten halogen – min. bulb wall temp 250°C.
E – Silvered bulb.
F – Due to integral reflector nominal lumens not shown.
G – Internal proximity reflector.
H – Integral aluminised reflector.
I – Integral dichroic reflector.
J – 3 or 4 amp H.B.C. fuse necessary.
K – 5 or 6 amp H.B.C. fuse necessary.
L – 6 or 7 amp H.B.C. fuse necessary.
M – Integral dichroic 'Multiflector' reflector.
N – Voltage range raised in 10v steps.
P – Pearl or frosted bulb.
Q – Reflector photoflood.
R – 10 amp H.B.C. fuse necessary.
S – High lumen figures apply to L.V. lamps.



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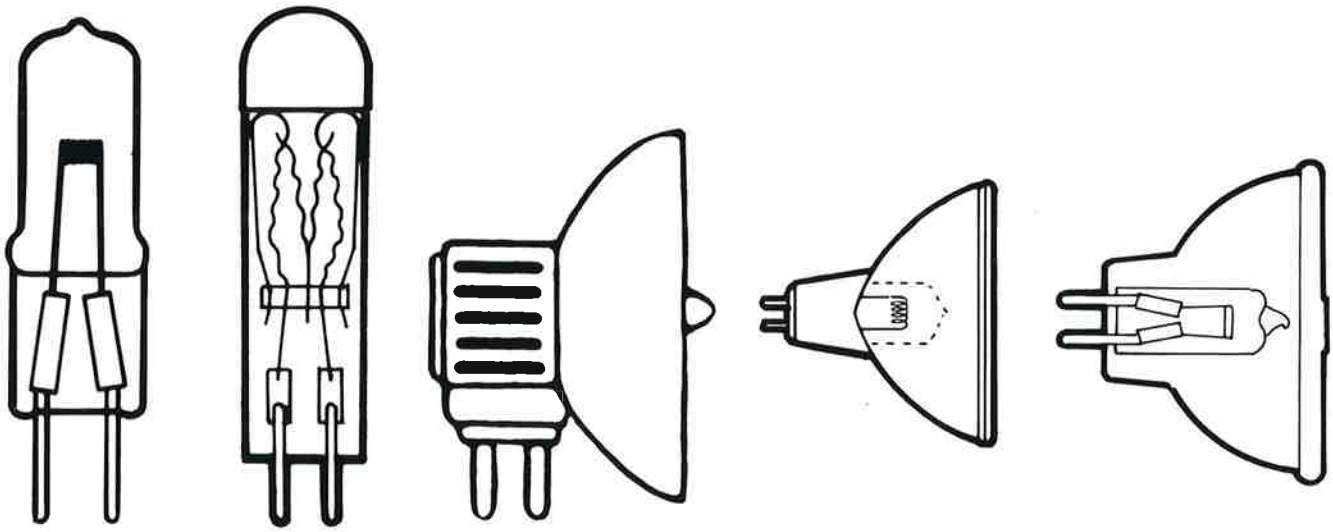

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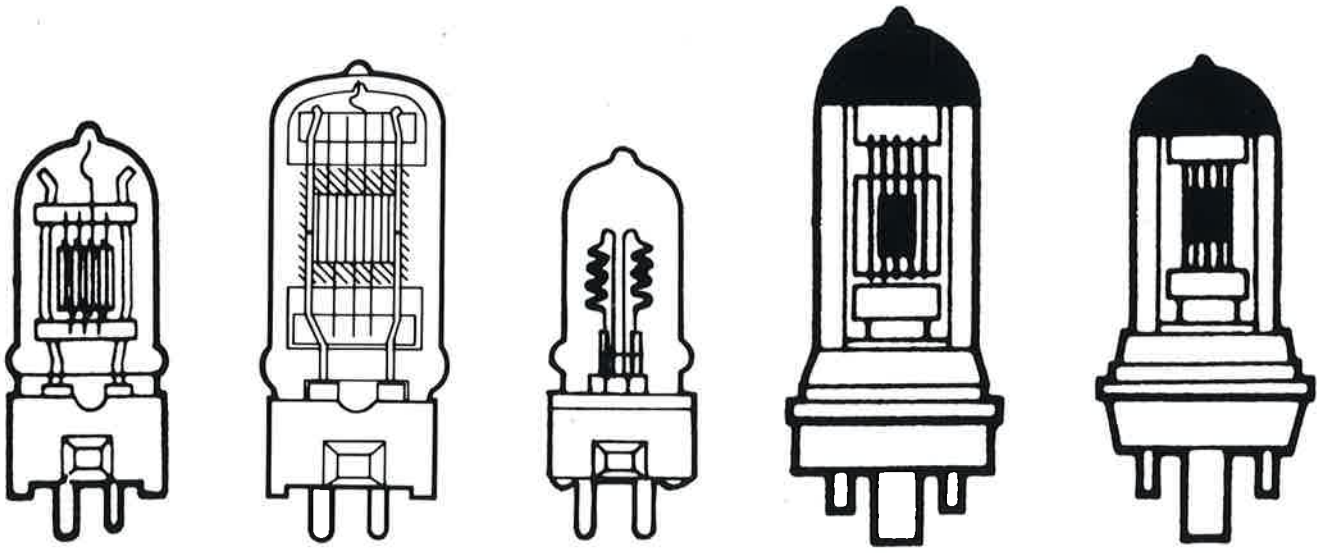

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A1 Class Projector Lamps

Lamp	ANSI Code	Volts	Watts	Lamp Cap	Average Life	Lumens Nominal	Light Centre	Focal Dis.	Overall Length	Overall Diameter	Operating Position	Special Features	Fig. No.
A1/209	FDX	12	100	G6.35	50	3000	24±0.5		44	11.0	BD±90	D	41
A1/215	FCR	12	100	G6.35	50	3000	30±0.5		44	11.0	BD±90	D	43
A1/216	FCS	24	150	G6.35	50	5000	32±0.5		47	13.5	BD±90	D	43
A1/220	BRL	12	50	G6.35	50	1400	30±0.5		42	11.0	BD±90	D	43
A1/223	EHJ	24	250	G6.35	50	8500	33±0.25		55	13.5	BD±90	D	43
A1/228	FCB	120	600	R7s	75	17000	36.5±0.5		96	13.5	HORIZ±4	CDJL	39
A1/228	FEB	220/230 240/250	600	R7s	75	16250	36.5±0.5		96	13.5	HORIZ±4	CDJL	39
A1/230	EFN	12	75	G6.35	50				42	50.0	HORIZ±4	DFI	40
A1/231	EFP	12	100	G6.35	50				42	50.0	HROIZ±4	DFI	40
A1/232	EFR	15	150	G6.35	50				42	50.0	HORIZ±4	DFI	40
A1/233	DYR	220/230 240/250	650	GY9.5	75	16500	36±1.0		64.5	22.5	BD±90	CDK	48
A1/234	BRJ	15	150	G6.35	50	4650	30±0.25		44	11.0	BD±90	D	43
A1/240		115/120 220/230 240/250	300	G17T	50	7050	39.7±1.0		79	30.05	BD	ACDJ	52
A1/241	EGH	115/120 220/230 240/250	500	G17T	50		39.7±1.0		94	30.05	BD	ACD FGJK	51
A1/242		120 220/230 240	1000	G17T	50		39.7±1.0		88.5	30.05	BD	ACD FGKR	51
A1/244		115/120 220/230 240	500	GY9.5	75	13000	36.5±1.0		75	28.50	BD±90	CDJK	48
A1/245		115/120 220/230 240	800	GY9.5	75	21500	44.5±1.0		87	28.50	BD±90	CDKRS	48
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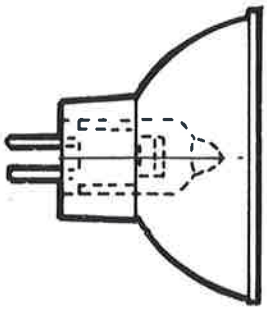
A1/247		120 220/230 240	650 650	GY9.5 GY9.5	75 75	18500 17750	36.5±0.5 36.5±0.5		75 75	28.5 28.5	BD±90 BD±90	CDKL CDKL	48
A1/248		115/120 220/230 240	150	G6.35	50	3000	40±0.5		62	16.30	BD±90	CD	44
A1/249		115/120 220/230 240	300	G6.35	50	7200	40±0.5		62	16.30	BD±90	ACDJ	44
A1/252	EJL	24	200	GX5.3	50			31.8	44.45	50.67	HORIZ	DFI	46
A1/258	EMM	24	250	GY7.9	50			65.8	43	44	HORIZ	DFIL	45
A1/259	ELC	24	250	GX5.3	50			31.8	44.45	50.67	HORIZ	DFI	46
A1/261	FDT	12	100	GY9.5	50	3000	27±0.25		57	22	BD±90	D	42
A1/262	DZE/FDS	24	150	GY9.5	50	4900	33.3±0.25		60	22	BD±90	D	42
A1/264	DYS	120	600	GY9.5	75	16000	36.5±1.0		64.5	22.5	BD±90	DL	50
A1/265	DZV	220/230 240	625	GY9.5	75		44.5±0.5		87	28.5	BD±90	CDFJK	49
A1/266	DNF	24	150	GY7.9	50			69.1	43	50.0	HORIZ		45
A1/268	EPS	220/230 240	500	G17T	50		39.7±7.0		94	30.5	BD	CD FGJ	51
	GCA	120	250	G5.3	200	5700	32±0.25		57	11.0	UNIV		
	GCB	30	200	G5.3	200	5300	32±0.25		57	11.0	UNIV		



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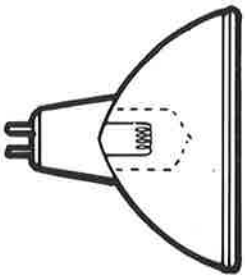

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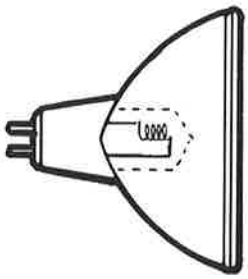

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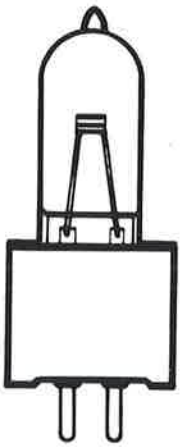
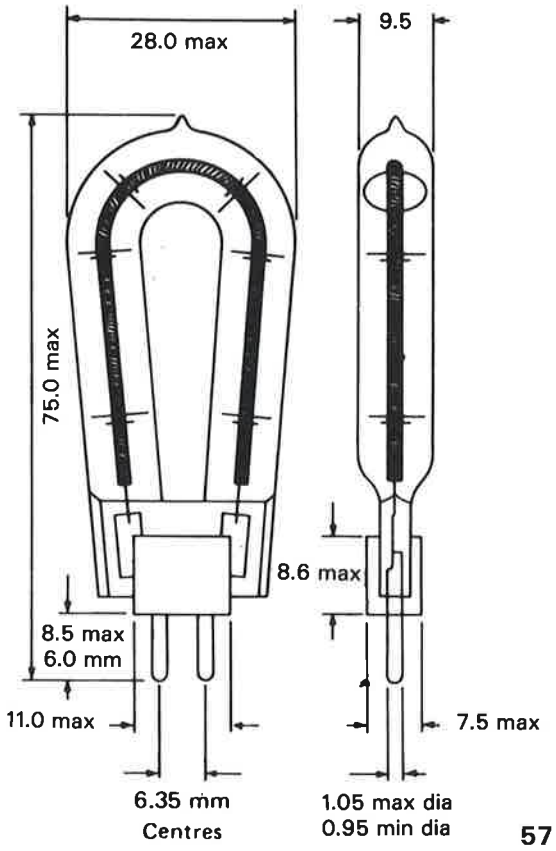


56

Micro Graphic Lamps

ANSI Code	Volts	Watts	Lamp Cap	Life Hours	Nominal Lumens	Centre Length	Focal Distance	Overall Length	Overall Diameter	Operating Position	Special Features	Fig. No.
DED	13.8	85W	GX5.3	1000			165	44.45	50.67	BD±90	DFM	54
ELD/DJN	21	150	GX5.3	40			165	44.45	50.67	BD±90	DFM	54
EPV	14.5	90	GX5.3	500			155	44.45	50.67	BD±90	DFM	54
EPX	14.5	90	GX5.3	500			165	44.45	50.67	BD±90	DFM	54
EPZ	13.8	50	GX5.3	1000			108	44.45	50.67	BD±90	DFM	54
FHR	12	50	G5.3	50	1300	29.4±0.25		48.75	50.67	BD±90	D	56
FHX	13.8	25	GX5.3	250			108	44.45	50.67	BD±90	DFM	54
FLT	13.8	25	GZ4	500			76 or 175*	35.0	35.3	UNIV	DFM	53
FLS	12	28	GZ4	1000			216	35.0	35.0	UNIV	DFM	53
DDL	20	150	GX5.3	500			197	44.45	50.67	BD±90	DFM	54
DDM	19	80	GX5.3	50			140	44.45	50.67	BD±90	DFM	54
DDS	21	80	GX5.3	500			165	44.45	50.67	BD±90	DFM	54
ELH	120	300	GY5.3	35			152.5	44.45	50.67	BD±90	DFM	55
ELS/ELR	16	50	GY7.9	650			120	43	44	HORIZ±4	DFI	55
ENL	12	50	GX5.3	3000			381	44.45	50.67	UNIV	DFM	55
ENX	82	360	GY5.3	75			289	44.45	50.67	BD±90	DFM	55
EWF	24	200	G5.3	50				44.45	50.67	HORIZ±4	DFI	54

* According to Reader Optics



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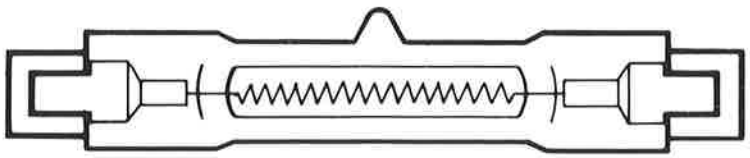

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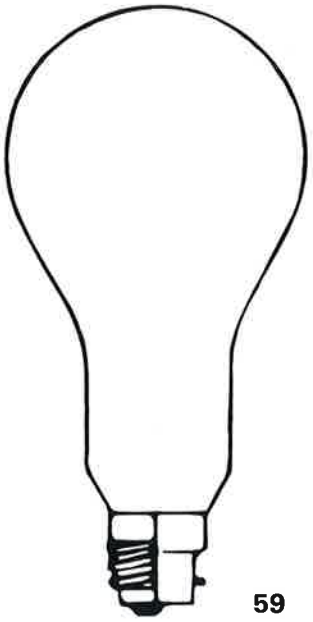
P Class Video and Cine Sun Gun Lamps

Lamp Code	ANSI Code	Voltage	Watts	Lamp Cap	Co. Temp. K	Lumens	Ave. Life Hrs.	Burning Position	Special Features	Fig. No.
P2/16		220/230, 240/250	650	G6.35	3200	17500	50	VBD±90	CDJ	57
P2/25		115/120	850	G6.35	3200	23000	50	VBD±90	CDR	57
P2/17		220/230, 240/250	1000	G6.35	3200	28000	50	VBD±90	CDK	57
P2/26		220/230, 240/250	1250	G6.35	3200	35000	50	VBD±90	CDL	57
P1/8	DWY	30	250	R7s	3400	8000	50	UNIV		58
P1/11		220/230, 240/250	800	R7s	3400	24500	50	UNIV		58
P1/12		240/250	100	R7s	3400	33000	50	UNIV		58
P1/13	BVM	220/230, 240/250	650	G6.35	3400	20000	50	BD±90	CDJ	57
P1/19		220/230, 240/250	1250	G6.35	3400	40000	50	BD±90	CDL	57
	DYG	30	250	GY9.5	3400	8000	50	BD±90		



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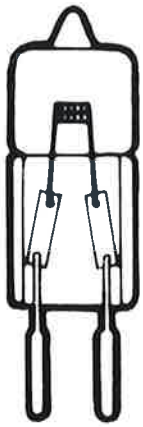
P Class Photo Flood and Enlarger Lamps

Lamp Code	Volts	Watts	Lamp Cap	Nominal Lumens	Overall Length	Overall Diameter	Operating Position	Ave. Life Hrs	Fig. No.
P1/1	240/250	275	B22 E27	8.3	110	61	UNIV	3	59
P1/2	240/250	500	B22 E27	15	166	81	UNIV	6	59
P3/3	240	75	B22 E27	1.15	110	61	UNIV	100	59
P3/4	240	150	B22 E27	2.5	110	61	UNIV	100	59

M Class Lamps

60



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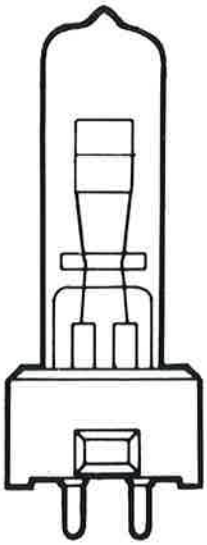

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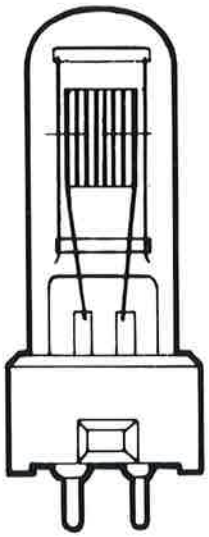

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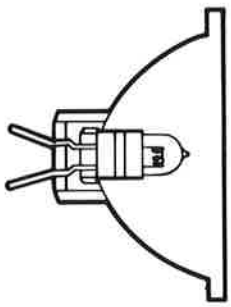

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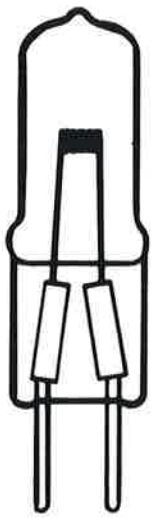

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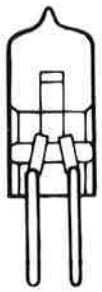

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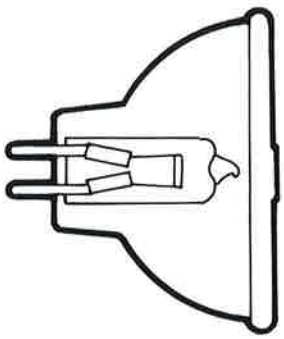

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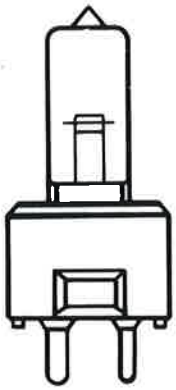

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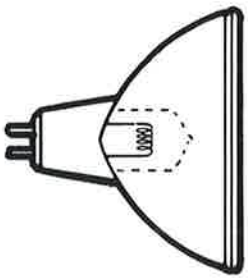
M Class Lamps (See also pages 42 and 43)

Lamp Code	ANSI Code	Volts	Watts	Overall Width	Light Overall Length	Centre Length	Focal Distance	Ave. Nominal Lumens	Life Hrs.	Lamp Cap.	Operating Position	Special Features	Fig. No.
M28	EVA	12	100	12	44	30±0.25		2400	2000	GY6.35	UNIV	D	60
M29	ESA	6	10	10	30	19.5±0.2		210	100	G4	UNIV	D	66
M30	ESB	6	20	10	30	19.5±0.2		420	100	G4	UNIV	D	66
M32		12	50	12	44	30±0.25		850	3000	GY6.35	UNIV	D	61
M33		24	250	13.5	55	33±0.2		8400	300	GY6.35	VBD±90	D	65
M34	FHE	6	20	10	30	19.5±0.25		350	2000	G4	UNIV	D	66
M35		12 13.2	20 23	10	30	19.5±0.25		500 650	0250 100	G4	UNIV	D	66
M36		24	250	15	58	37±0.25		5750	2000	GY6.35	VBD±90	D	60
M37		12	55	50	42		32		750	G6.35	UNIV	DFI	67
M38		115/120 220/230 240/250	300	15	80	46.5±0.25		5000	2000	GY9.5	UNIV	CDJ	62
M39		6	20	49.8	39		32		2000	2 Tabs	UNIV	Cross over beam DH	64
M40		115/120 220/230 240/250	500	22	85	46.5±0.2		8500	2000	GY9.5	UNIV	CDJK	63
M46		12	100	22	57	27±0.25		2150	2000	GY9.35	BD±90	D	68
M47		12	10	10	30	19.5±0.2		350	2000	G4	UNIV	D	66
M67		24	100	12	44	30±0.25		1800	2000	GY6.35	VBD±90	D	60
M73		12	57	12	44	30±0.25		1350	3000	GY6.35	UNIV	D	61
M74		12	50	12	44	30±0.25		900	3000	GY6.35	UNIV	D	61
M75		12	35	12	44	19.5±0.25		600	3000	GY6.35	UNIV	D	61
M76		12	20	12	44	19.5±0.25		300	3000	GY6.35	UNIV	D	61
M91		12	20	10	30	19.5±0.25		150	2000	G4	UNIV	D	66
M95		12	35	12	44	19.5±0.25		550	3000	GY6.35	UNIV	D	61



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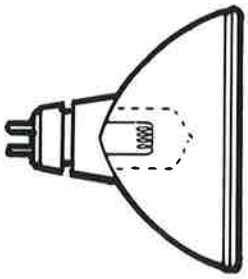

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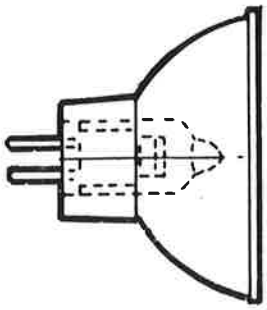

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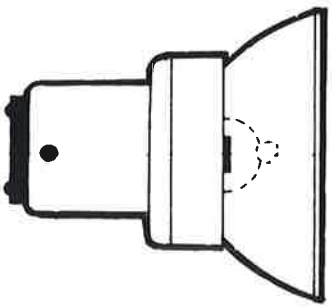

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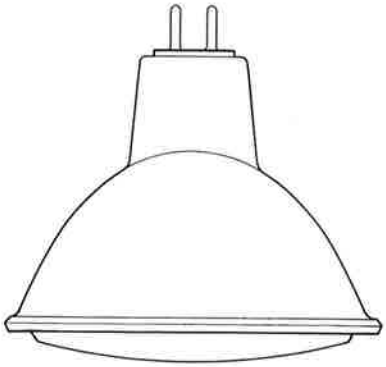
M Class Open Mirror Display Lamps

Lamp Code	ANSI Code	Volts	Watts	Overall Width	Overall Length	Peak Beam Candelas	Ave. Beam Angle To ½ Peak	Life Hrs.	Lamp Cap.	Operating Position	Special Features	Fig. No.
M49	EXT	12	50	50.67	44.45	10000	17 H 25 V	3000	GX5.3	UNIV	Spot DH	69
M50	EXZ	12	50	50.67	44.45	37000	38	3000	GX5.3	UNIV	Spot DH	69
M51	FTC	12	20	35.3	35	1760	17	3000	GZ4	UNIV	Med flood DM	71
M52	FTB	12	20	35.3	35	5500	10	3000	GZ4	UNIV	Spot DM	71
M54	FST	12	20	35.3	35	1760	17	3000	SBC B15d	UNIV	Med flood DM	72
M55	FSS	12	20	35.3	35	4800	7.75	3000	SBC B15d	UNIV	Spot DM	72
M56		12	50	50.67	44.45	3700	21	3000	SBC B15d	UNIV	Med flood DM	72
M57		12	50	50.67	44.45	12000	10	3000	SBC B15d	UNIV	Spot DM	72
M58	EXN	12	50	50.67	44.45	1550	12	3000	GX5.3	UNIV	Spot DH	69
M60	EYF	12	70	50.67	44.45	16000	12	3000	GX5.3	UNIV	Spot DH	69
M61	EYC	12	70	50.67	44.45	2250	38	3000	GX5.3	UNIV	Spot DH	69
M62	FTD	12	20	35.3	35	600	30	3000	GX5.3	UNIV	Wide flood DM	71
M63	FSB	12	20	35.3	35	600	30	3000	BCD B15d	UNIV	Wide flood DM	72
M64	FTA	12	12	35.3	35	6500	6.5	2000	GZ4	UNIV	Spot DM	71
M65	FTE	12	35	35.3	35	9000	8	3000	GZ4	UNIV	Spot DM	71
M66	FTF	12	35	35.3	35	3000	20	3000	GZ4	UNIV	Med flood DM	71
M68	ESX	12	20	50.67	44.45	2700	16 H 12 V	3000	GX5.3	UNIV	Spot DH	69
M69	BAB	12	20	50.67	47.45	500	36	3000	GX5.3	UNIV	Wide flood DM	70
M70	FRA	12	35	50.67	47.45	3600	8	3000	GX5.3	UNIV	Spot DM	70
M71	FRB	12	35	50.67	47.45	9000	18	3000	GX5.3	UNIV	Med flood DM	70
M80	FNV	12	50	50.69	47.45	700	60	3000	GX5.3	UNIV	Extra wide flood DM	70
M81	FMW	12	35	50.69	47.45	970	38	3000	GX5.3	UNIV	Wide flood DM	70
M82	FNW	12	75	50.69	47.45	7500	24	3000	GX5.3	UNIV	Med flood DM	70
M94	BBF	12	20	50.69	47.45	1000	24	3000	GX5.3	UNIV	Med flood DM	70
M98		12	75	50.69	47.45	900	68	3000	GX5.3	UNIV	Extra wide flood DM	70

M Class Closed Mirror Display Lamps



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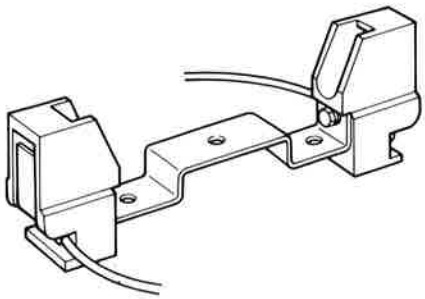
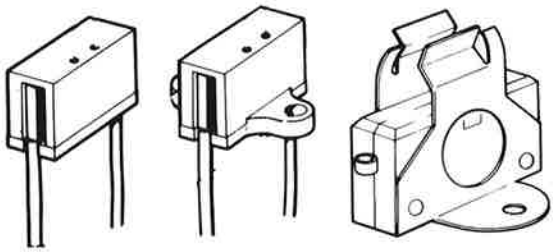
M Class Closed Mirror Display Lamps

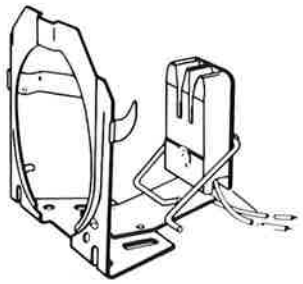
Lamp Code	Volts	Watts	Overall Width	Overall Length	Peak Beam Candelas	Beam Angle To ½ Peak	Ave. Life Hrs.	Lamp Cap.	Operating Position	Special Features	Fig. No.
M249	12	50	50.67	44.45	10000	17 H 25 V	3000	GU5.3	UNIV	Med flood DM	73
M250	12	50	50.67	44.45	37000	38	3000	GU5.3	UNIV	Wide flood DM	73
M258	12	50	50.67	44.45	1550	12	3000	GU5.3	UNIV	Spot DM	73
M260	12	70	50.67	44.45	16000	12	3000	GU5.3	UNIV	Spot DM	73
M261	12	70	50.67	44.45	2250	38	3000	GU5.3	UNIV	Wide flood DM	73
M268	12	20	50.67	44.45	2700	16 H 12 V	3000	GU5.3	UNIV	Spot DM	73
M269	12	20	50.67	47.45	500	36	3000	GU5.3	UNIV	Wide flood DM	73
M270	12	35	50.67	47.45	3600	8	3000	GU5.3	UNIV	Spot DM	73
M271	12	35	50.67	47.45	9000	18	3000	GU5.3	UNIV	Med flood DM	73
M280	12	50	50.69	47.45	700	60	3000	GU5.3	UNIV	Extra wide flood DM	73
M281	12	35	50.69	47.45	970	38	3000	GU5.3	UNIV	Wide flood DM	73
M282	12	75	50.69	47.45	7500	24	3000	GU5.3	UNIV	Med flood DM	73
M294	12	20	50.69	47.45	1000	24	3000	GU5.3	UNIV	Med flood DM	73
M298	12	75	50.69	47.45	900	68	3000	GU5.3	UNIV	Extra wide flood DM	73



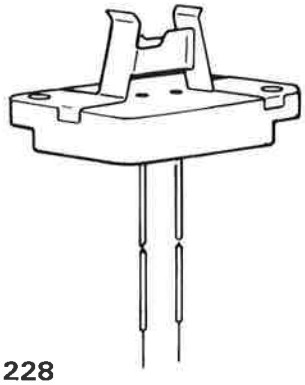
SUL 500
To fit R7s



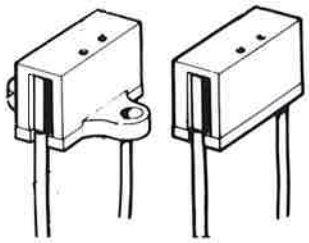
GL 1211 **GL 1212** **GL 1123-A**
Single Ended for GZ4 Base
G4 Base



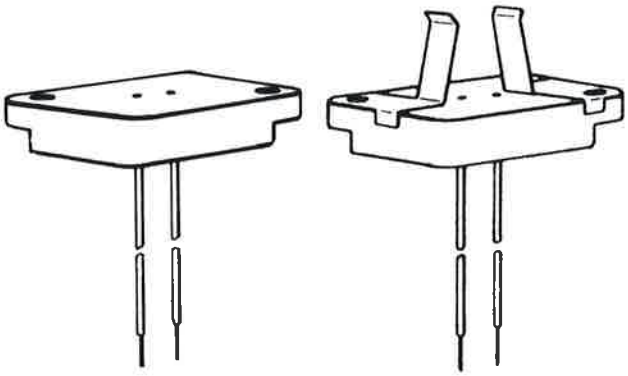
GL 1210L **GL 1210R**
Microfiche Lampholder for GX5.3 Base



GL 1228
Single Ended for GX5.3 Base with Notched Reflector

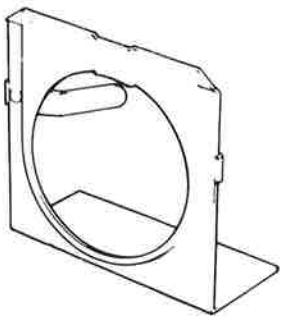


GL 1219 **GL 1218**
Single Ended for GX5.3 Base



GL 1079-W **GL 1079-SLW**
Single Ended for GY6.35 Base

GL 1177
Single Ended for GY9.5 Base



GL 1225
Bracket for 35mm Diameter Reflectors

1. Explanation of Lamp Codes Used

Lamps listed in this handbook are those designed for use in theatre and/or studio applications, as follows:

"CP" Prefix – Lamps designed for use in conjunction with film balanced for 3200K. These are single ended types intended for use in Fresnel/ellipsoidal Luminaires etc.

"P2" Prefix – Again for use with 3200K colour film stock for open faced Luminaires and video Sun Guns.

"T" Prefix – Lamps intended for theatre Luminaire applications. These are of lower colour temperature (2900-3050K) and longer life than the often similar CP types above.

ANSI Codes

A number of types are available made to American *ANSI Specification* and these use the random 3 letter codes allocated by the American National Standards Inst. where performance specifications are on file. Lamps carrying the ANSI code are directly interchangeable with similarly coded US domestic products. They are generally rated for 120V.

Special and Experimental Lamps

In addition to these standard ranges, a number of similar types are available to special order and in most cases, a minimum order quantity will apply. These include non-standard voltage ranges of some types e.g. 100V, 110/115V, 120V and also a number of experimental types which have the THORN EMI *"HX" prefix*.

2. Lamp Bases

The listings use the IEC International designations for lamp bases. Where appropriate, alternative local descriptions are appended.

3. Filament Format

The listings use the following codings for filament shape:

S.C. – Axial Single Coil – equivalent to ANSI C8.

C.C. – Axial Coiled Coil – equivalent to ANSI CC8.

M.P. – Monoplane Grid – equivalent to ANSI C13.

B.P. – Biplane Grid – equivalent to ANSI C13D.

T.F. – Twin Monoplate Grid – equivalent to ANSI 2C13.

4. CP Range of Lamps for Fresnel & spotlight fittings

As the result of extensive and sustained development work, much of it original, THORN EMI are able to offer a comprehensive range of lamps of quartz construction, operating on the Tungsten Halogen principle for all Television Studio, 'Motion' picture and Theatre lighting purposes.

THORN EMI have been strongly supported by the television and film industries in its decision to discontinue glass lamps for studio lighting purposes. This is because the industry has been quick to appreciate the financial advantages of quartz halogen lamps, and also their reliability and virtually constant colour temperature.

The increase in the use of the lamps we now manufacture is due to the THORN EMI policy of exploiting the important advantages of compact size offered by quartz halogen construction.

As a result THORN EMI are now able to supply quartz halogen lamps for use in Fresnel and spotlight fittings of from 300 watts to 10,000 watts. These lamps employ a wide range of commonly accepted bases.

THORN EMI also offer a similarly comprehensive range of lamps of orginal design which give fittings manufacturers more compact lamps and permit the construction of smaller lighter and more efficient luminaires.

5. 'T' class lamps for theatre spot light fittings

With this group of lamps THORN EMI are continuing their policy of developing quartz halogen lamps.

These lamps operate at a lower colour temperature than the CP range, the average life that can be offered now that lamps are available of quartz halogen construction, is a remarkable 750 hours for most of the range. Similar cost savings to those offered by quartz halogen CP lamps are now presented by the quartz halogen 'T' range.

THORN EMI continue to manufacture conventional glass lamps for theatre spotlight fittings as shown in table 26.

6. Lamps for Ellipsoidal Spotlights

A problem is encountered with some ellipsoidal spotlight luminaires due to the fact that a portion of the reflected beam of light is directed onto the cap of the lamp designed for Fresnel fittings. This leads to overheating of the cap and seal which may result in premature lamp failure.

THORN EMI have therefore designed lamps intended for use in ellipsoidal spotlights where the size of the cap has been reduced and the neck length correspondingly increased, thus removing the critical seal area from the reflected radiation and ensuring that optimum lamp life is obtained.

7. Linear and 'U' lamps – for studio lighting 3,200K

Whilst a comprehensive selection of lamps for spotlight fittings is important to the lighting director of almost equal importance is a range suitable for the many different fittings now on the market which use tungsten halogen lamps of tubular construction. THORN EMI believe their range gives a wide choice and is unmatched in performance and reliability.

The THORN EMI range of lamps of this type is also exceptional in as much as it offers lamps in an original 'U' shape. Developed by THORN EMI engineers to meet the demand for high wattage lamps of compact construction these lamps are widely used in a variety of light weight portable fittings.

8. Hardglass Halogen compared with Quartz Halogen

The tungsten halogen principle is now so well known and documented elsewhere that it is considered unnecessary to describe it here. However should you require details of this principle then please contact THORN EMI Lamps and Components or your nearest subsidiary company. It is important to distinguish between hard glass lamps that merely have a halogen compound added to the filling gas and lamps such as those enumerated, which are of quartz construction. The former are from the point of view of life and performance identical to conventional glass lamps of the same rating, the halogen only serving to prolong the usefulness of the lamp by preventing internal blackening due to evaporated tungsten. However, once a lamp is contructed from quartz with its higher melting point, instead of glass, the designer can make use of the much greater strength of the smaller envelope. It is then possible to increase the filling pressure which by reducing tungsten evaporation from the filament prolongs the life of the lamp to at least twice that of a glass lamp of equivalent efficacy.

9. Biplane or Monoplane?

The filament format of a lamp will have an effect on the beam performance of a luminaire.

In Fresnel optics a biplane will, due to its smaller area, produce a narrower spot of slightly increased peak intensity, compared to an equivalent monoplane filament. However, in intermediate and flood positions better light collection is obtained from a monoplane source, as the additional light collected by the rear mirror is largely obscured by a biplane. A wider angle beam for a given intensity is thus provided by a monoplane coil.

Ellipsoidal optics are designed around a specific filament area. Larger areas will allow some of the light to fall outside the gate and be lost. A smaller filament area will concentrate the light on the centre of the gate producing a hot spot. The choice between a monoplane and a biplane (smaller) is, therefore, dependent on luminaire design and customer preference.

THORN EMI pursue a policy of allowing the customers to make this choice by offering both monoplane and biplane versions of relevant lamp types.

10. Arc Prevention in Tungsten Halogen Studio Lamp Applications

Almost all production personnel in the film and television industry have, at some time, encountered sudden failure of incandescent studio lamps. When this occurrs at a crucial moment and forces a re-shoot the cost can be considerable.

Two significant features of these failures were that they almost always occurred during the first 20 hours of use, and the incidence of failure increased with operating temperatures. Failure invariably resulted from an arc across the filament plugs, which destroyed the tails of the filament.

The problems caused by the early failure of a small, but unpredictable number of lamps, have increased over the past few years. During this time substaintial changes have occurred in the design and use of both studio lamps and luminaires. The significant reductions in bulb sizes achieved by lamp manufacturers, following the introduction of tungsten halogen lamps, have been matched, or in some cases exceeded, by dimensional reductions in luminaires. During the same period there has been a trend towards the use of steeper burning angles and other changes in the use of luminaires for artistic reasons.

Tungsten halogen lamps are filled with nitrogen and the introduction of hydrogen is predicted to react with the halogen to 'slow down' the tungsten halogen cycle. In addition it is known that hydrogen will slowly diffuse through the hot quartz bulb, so that the hydrogen concentration would gradually diminish.

However, there is a narrow range of hydrogen addition which offers adequate arcing protection without significantly interfering with the halogen cycle. The rate of loss of hydrogen during lamp operation is less than previously predicted and based upon spectraradiometer measurements and calculations, maximum protection is only required during the initial 50 hours of life. Hence, the use of hydrogen additions is the most advantageous method of ensuring reliable operation of lamps during early life, particularly in demanding operating conditions.

Fig. 1a
Construction of a typical high wattage studio lamp.

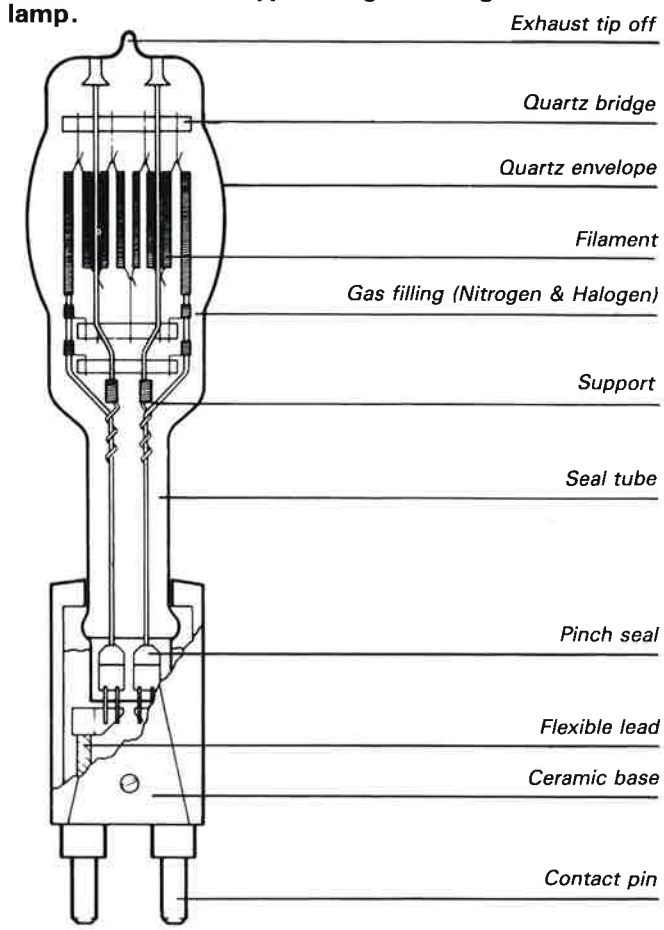


Fig. 1b
Construction of a typical 4 pin twin filament studio lamp.

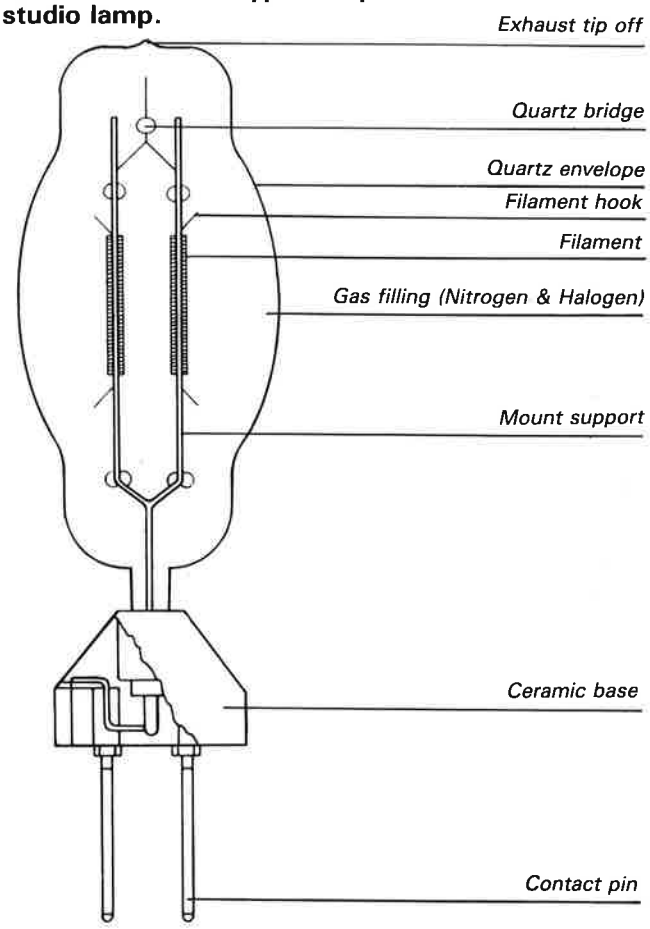


Fig. 1c
Construction of a typical low wattage theatre class Tungsten Halogen lamp.

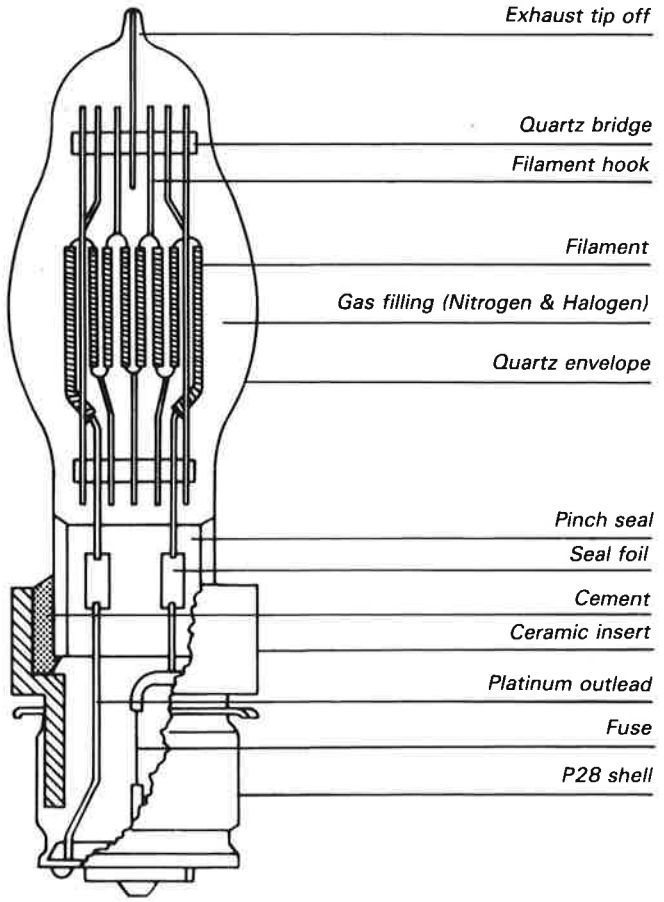


Fig. 1d
Construction of end section of a typical Quartz Linear Tungsten Halogen Photographic lamp.

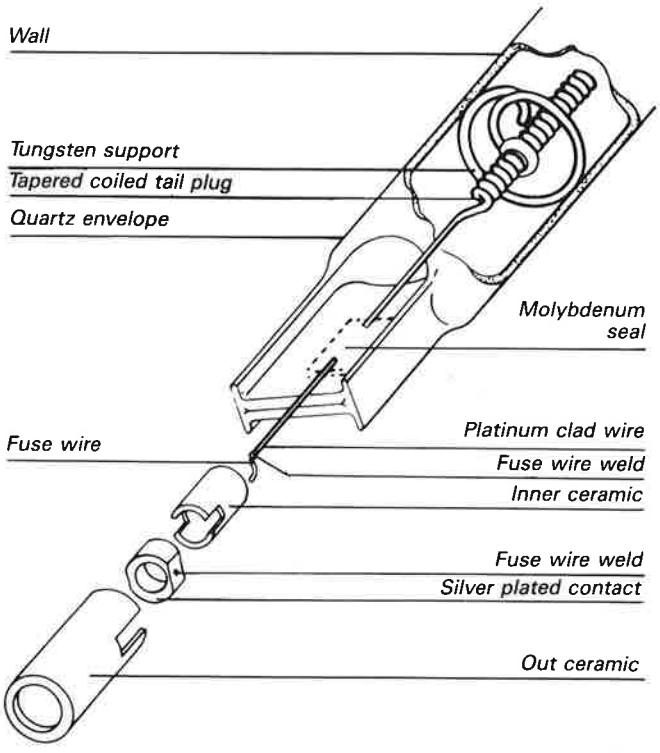


Fig. 2
Variation of light output and wattage with applied voltage for a typical studio lamp.

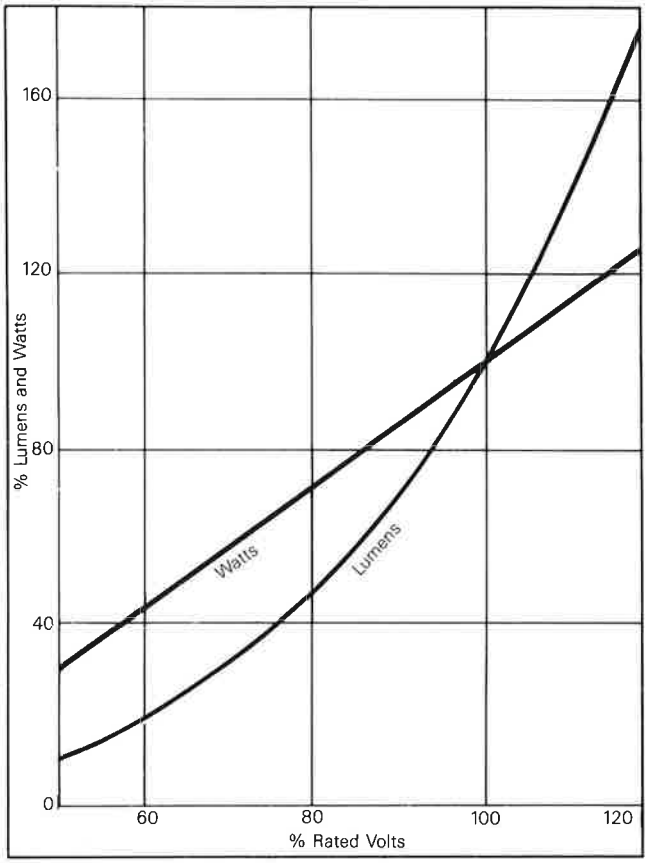


Fig. 3
Colour temperature variation with voltage for typical studio lamp.

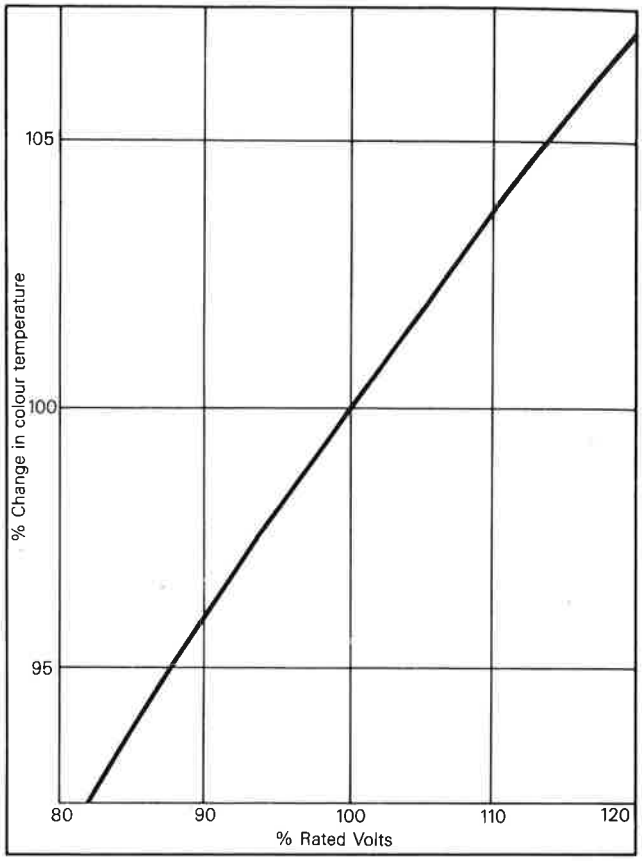


Fig. 4
Typical life variation against operating voltage.

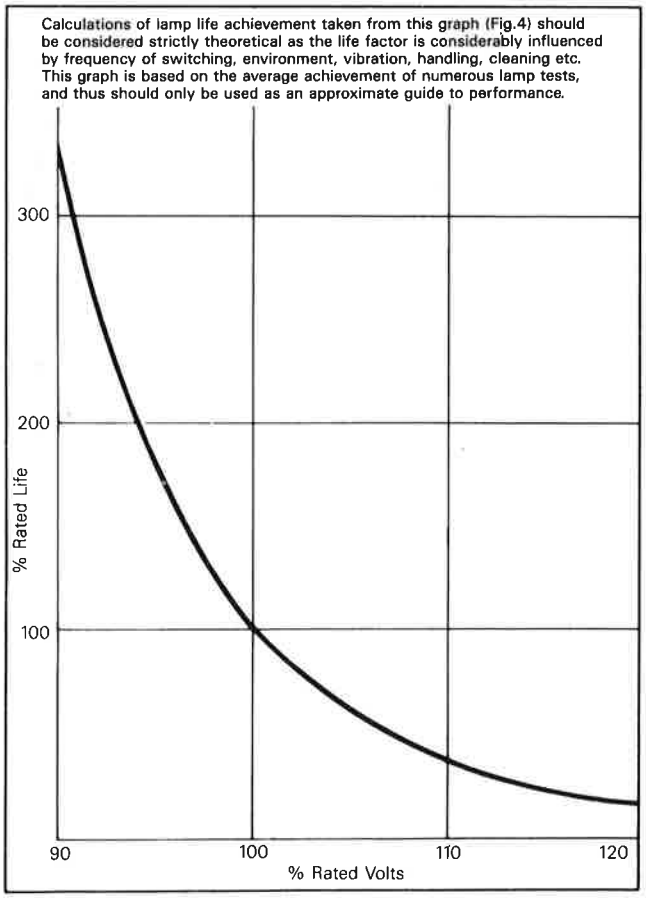


Fig. 5
Spectral distribution of luminous flux (Lumens) for typical theatre and studio lamp.

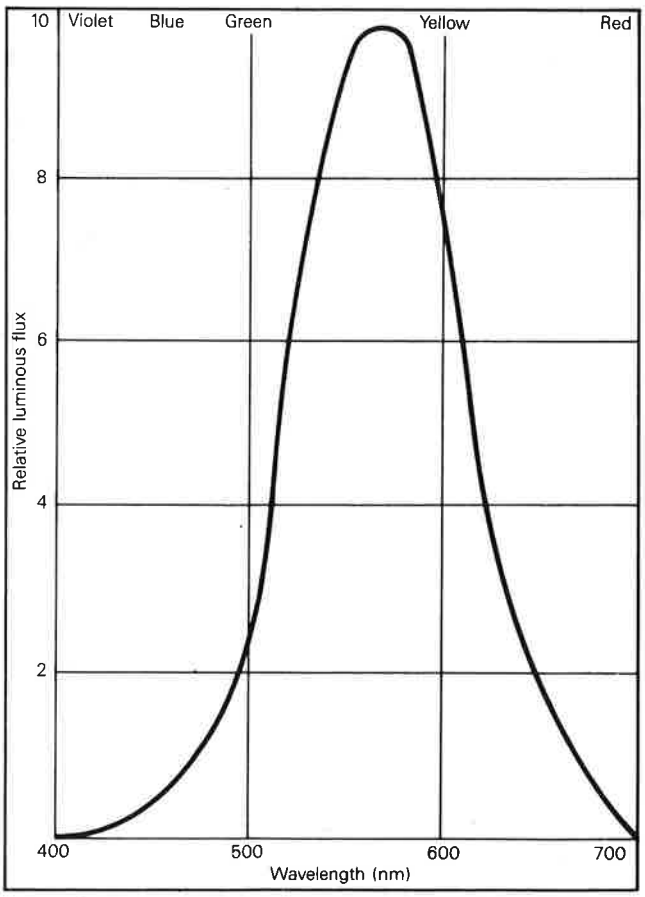
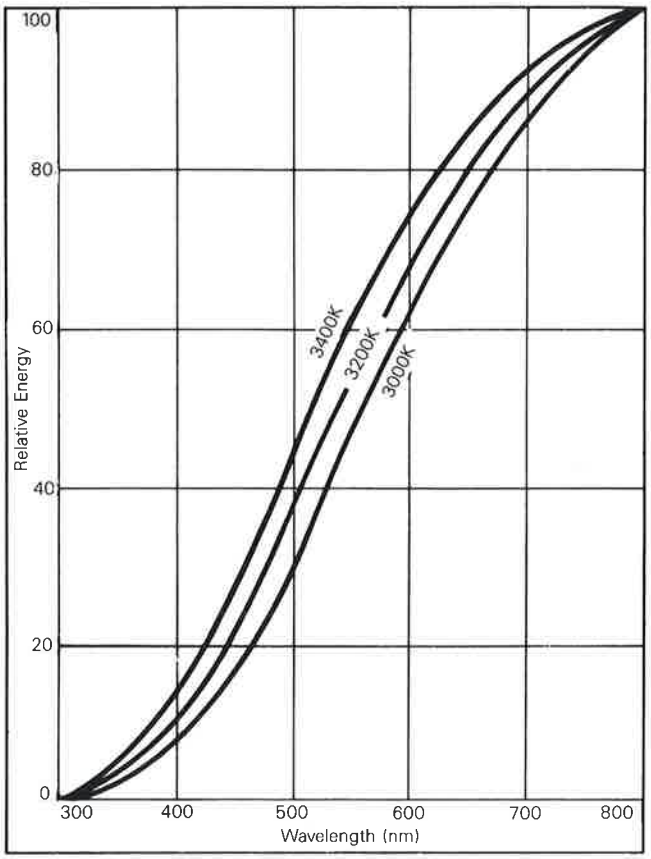


Fig. 6
Total spectral energy distribution of typical studio lamp.



Spectral energy distribution can be shown in absolute terms (Fig. 6) whereas radiation in terms of visible light is related to the response of the human eye (Fig. 5).

Operating temperatures of tungsten halogen studio lamps

The following maximum and minimum temperatures are suggested for optimum life. Operation outside these figures will not necessarily cause immediate failure but will affect life adversely to an increasing extent.

Seal – 450°C maximum

Above this figure the sealing foil oxidises at a rate increasing with temperature and is frequently the cause of short life due to seal failure.

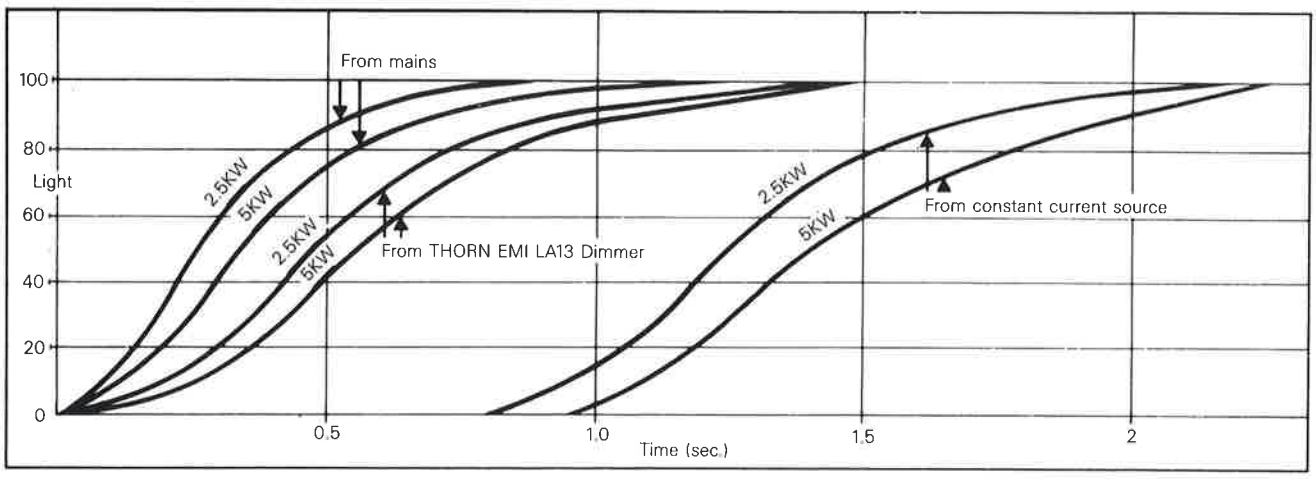
Bulb – 250–800°C

Outside this range the halogen cycle becomes less efficient and blackening may occur. Temperatures above 1200°C will cause the bulb to soften.

Pins – 300°C maximum

Above this figure the plating on the pins may lose adhesion and the contact deteriorate. Such deterioration may form local hot spots which rapidly worsen and may result in arcing and irrepairable damage to both lamp and holder. Should signs of this be evident on removal of a failed lamp it is important that a good contact is restored for the next lamp fitted otherwise this will rapidly fail in similar manner.

Fig. 7
Turn on time of studio lamps.



Surge Current

The cold resistance of a Studio lamp is approx. 1/17 of its value in normal operation. On switch on, theoretically a surge current of 17/ 2 X the normal current would flow and depending on the thermal mass of the filament* this will fall to the lamp normal current in approx. 1 sec. In practice this max. theoretical current does not appear due to (a) switch on does not always occur at the peak of the AC voltage, (b) the supply has some impedance which is comparable with the cold resistance of high wattage lamps, i.e. max possible surge current = $\frac{V\sqrt{2}}{Z}$ where V is applied voltage and Z is sum of lamp cold resistance and supply impedance.

Typically supply impedance is of the order of 0.3 ohm and lamp life is based on testing with such a supply in the rare cases where the line impedance is lower than this figure, an adverse effect on life may be encountered particularly with high wattage types, due to the then extremely high surge current on switching.

Lamp	Type	Cold Resistance (ohms)	Max. Surge Current (amps) Line impedance = 0 ohms	0.1 ohms	0.3 ohms	0.5 ohms	Normal Operating Current
240V	10KW	0.34	1000	774	530	405	41.5
240V	5KW	0.7	486	424	340	283	20.8
115V	5KW	0.15	1085	650	360	250	43.5
240V	2KW	1.7	200	189	170	154	8.35
117V	2KW	0.41	404	324	233	182	17.1
240V	1KW	3.4	100	97	92	87	4.15

*It should be noted that as the rated wattage is increased and/or the rated voltage decreased, the thermal mass of the filament is increased and it takes longer to reach operating temperature. The surge current will similarly take longer to fall to the normal operating current.

Fusing of Tungsten Halogen studio and theatre lamps

A lamp normally fails at end of life by fusing of the filament. Often an arc then forms and as there is little resistance to limit the current this rises to a very high value which if maintained can result in a serious overload on the envelope and seals. This might result in the lamp shattering.

It is recommended that a HBC fuse is connected in line to interrupt any such arcs forming. Suitable types are 415 – 500V working High Breaking Capacity fuses to BS 88 or IEC 241, rated as below.

Lamp Power (Watts)	Fuse (rated current) (amps) 100 – 115V	115 – 130V	220 – 250V
500	6	6	4
650	10	6	4
1000	16 (15 UK)	10	6
1500	20	16 (15 UK)	10
2000	25 (30 UK)	25 (20 UK)	10
2500	35 (30 UK)	25 (30 UK)	16 (15 UK)
5000	63 (60 UK)	50	25 (30 UK)
10000	125	100	50

1000W C.S.I. & 1200W C.I.D. for 220, 240V control gear 20 amp. HBC fuse (Arc volts 77)
2500W C.I.D. for 220, 240V control gear 30 amp HBC fuse (Arc volts 100 nom)

When a ray of light passing through air meets the surface of some translucent material in its path the energy of the light is divided up. Part of the light will be reflected, part absorbed, and part transmitted, and the relative amounts of these three parts will depend on the nature and geometry of the material. If the surface is flat and smooth (polished) it will act as a plain mirror and the laws of reflection will be obeyed (for example, the angle at which the ray meets the surface will equal the angle at which the reflected light leaves the surface). If the surface is rough (matt) the reflected light will be reflected in many directions, the latter form of reflections being known as diffuse, while the former is specular reflection. The material may have either matt or smooth surfaces and also be opaque, when no light will pass through, or transparent, when a great deal of light is transmitted, or something between transparent and opaque which is termed translucent, where a reduced amount of light is transmitted.

A piece of window glass would reflect specularly and would transmit a large proportion of light falling on it because of its transparency, and images could be formed or seen through it. It could be frosted, which would make the reflection diffuse, and the glass would also become translucent, and images could not be clearly formed or seen through it as a result, or the glass can be opaque, reflecting or transmitting selectively as to colour, as with many other substances which have 'colour' by absorbing all colours except the one reflected or transmitted. A red signal lamp glass transmits only red, while absorbing blue, green etc., and an emerald reflects green but absorbs all other colours.

These properties of reflecting, transmitting or absorbing can be specified by the terms reflectance, transmission or absorbance, and are a measure of the proportion of the total light falling upon the material which is reflected, transmitted, or absorbed.

Dealing now with polished transparent materials, a further effect has to be taken into account. As the ray of light leaves or enters the surface between, say, air and glass, it changes direction : if the ray passes right through the glass it will be diverted twice. The amount by which it is diverted will depend on the angle at which it meets the surface and a property of the glass known as its refractive index. As shown in the diagram Fig. 8(a), if the ray is directed perpendicularly towards glass, it passes through without refraction (or bending). The ray is said to be 'normal' to the surface, and angles of meeting the surface are measured from the normal position, as shown in Fig. 8(b) where the angle of incidence is 30° (to the dotted

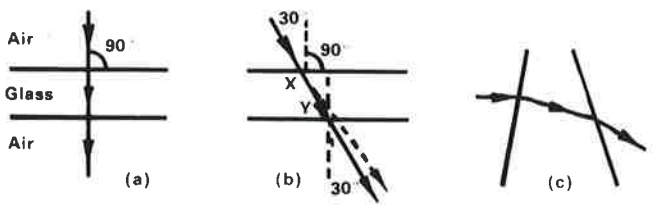


Fig. 8

line normal). In this case refraction takes place at X and again at Y and if the two surfaces are parallel to each other the direction of the ray in air is the same on both sides of the glass, but a sideways displacement takes place. It is evident that the two surfaces can be made other than parallel, in which case the final direction of the ray is not the same as the direction of the ray entering the glass. This is shown in Fig. 8(c) and the two surfaces might well be imagined as those of a prism or part of a simple lens. A lens is essentially a piece of transparent material which has front and back surfaces curved so that light rays passing through them are refracted in a predetermined manner. If the curved surfaces are practically part of a sphere, which is the most usual shape.

the almost parallel rays from a distant object will be refracted so as to meet at a point some way from the lens. This point is called the focus, and the distance from the lens, the focal length. This is shown in Fig. 9A and it is fairly evident that the deeper the curvature the shorter will be the focal length, and also the double convex lens with both sides curved will have a shorter focal length than a similar lens with one surface plain or flat (plano-convex) (Fig. 9B).

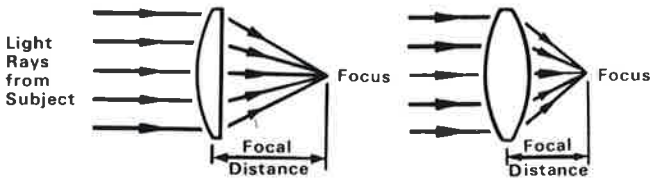


Fig. 9

It is also evident that if the source of light were placed at the focus, the rays passing through the lens would form a parallel beam. This is the basis of design of a spotlight. When the source is further away from the lens than the focus a converging beam is formed, and an image of the source can be produced on a screen. When the source is closer than the focal point a divergent beam is produced and this is the effect obtained with a floodlight.

A lens for a high-powered studio fitting would need to be about 12 inches in diameter, and a plano- or bi-convex lens of this diameter would be heavy and difficult to make. The thickness of the lens in the centre can, however, be greatly reduced without altering substantially the optical 'power' of the lens. This may be achieved by taking the convex surface of the lens and dividing this theoretically into circular sections, reducing the thickness of all sections to a common minimum acceptable, and sliding them back to the level of the original flat surface. Such a lens is called a 'Fresnel' lens and is usually as shown in the diagram (Fig. 10).

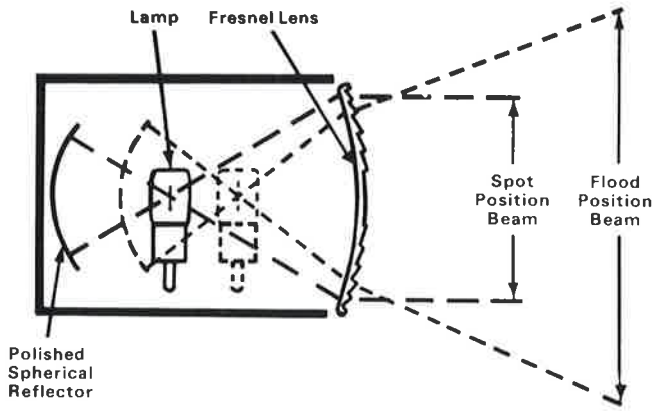


Fig. 10

A degree of compensation is needed to correct for the change in position of the annular sections relative to the focal point, and this is greatly helped by making the plano surface slightly concave, as shown in Fig. 10 (drawing of Fresnel studio housing).

The reflector behind the lamp in this fitting is a sphereical curvature, and is used to collect light rays directed away from the lens, which would thus be wasted, and reflect them back through the source towards the lens. The source is at the centre of curvature of this mirror, and moves in fixed spacial relationship with the mirror from the 'spot' to the 'flood' position, as required.

The method which originated in the United States of America to measure the performance of luminaires is becoming more and more generally accepted internationally. The characteristics are expressed in terms of beam angle and field angle (see Fig. 11). The limit of the beam angle is the points on the curve where the candle power is 50% of the maximum and the field

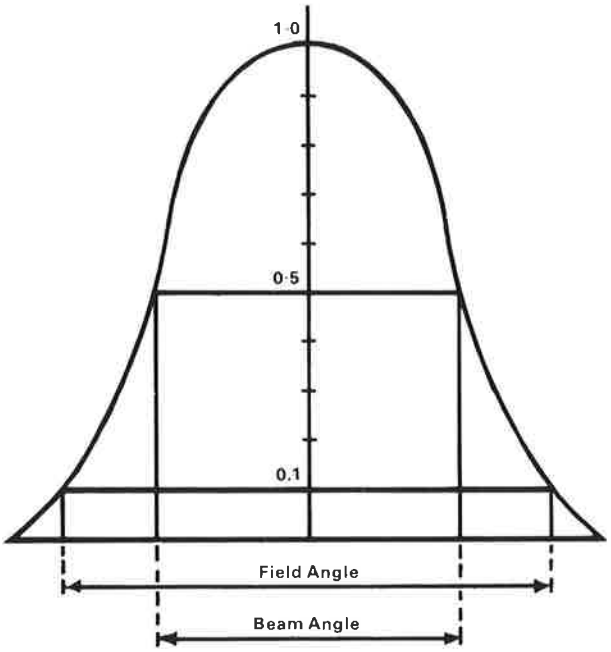


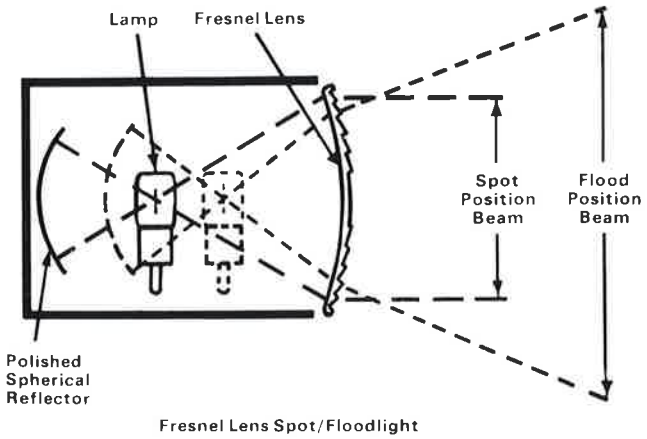
Fig. 11

angle is limited by those points of the curve where the candle power is 10% of the maximum.

The efficiency of luminaires is expressed as a ratio of the luminous flux leaving the fitting to the lumens given out by the light source. Beam efficiency is the ratio of lumens within the beam angle to that given out by the light source. Field efficiency is the ratio of lumens within the field angle to that given out by the light source.

Efficiencies of typical luminaires calculated from the luminous flux in the field angle for various types of fittings are:–

Fresnel Spotlights (Fig. 12)
Efficiencies of 0.08 in the spot position to 0.28 in the flood position are usual for this type of fittings. The average for a group of Fresnel spots is apporximately 0.18 or 18%.



Fresnel Lens Spot/Floodlight

Fig. 12

Ellipsoidal Spotlights (Fig. 13)
Efficiencies range between 0.28 and 0.40 and for a group of fittings is approximately 0.35 or 35%.

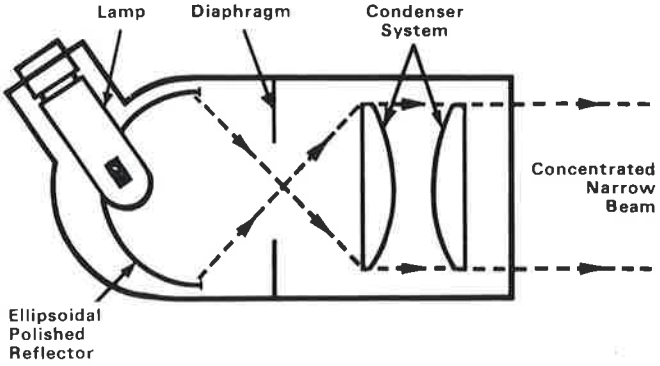


Fig. 13 Ellipsoidal Spotlight

Soft Lights and Cyclorama (Fig. 14)
Efficiencies for this type of lighting vary between 0.40 and 0.64, and for a group of fittings is approximately 0.50 or 50%.

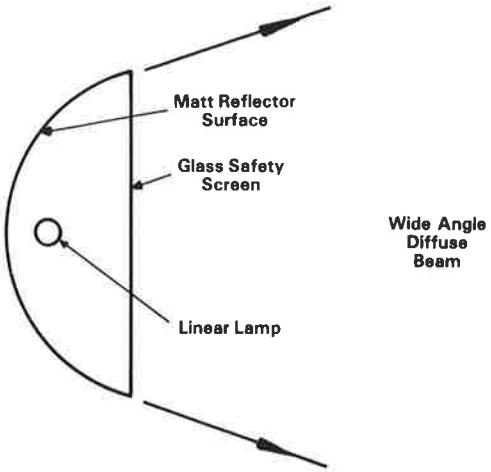


Fig. 14 Cyc Light

PAR Lamps (Fig. 15)
Efficiencies of .4 for spot to .5 for flood are typical. Note for applications where a non-variation of beam pattern is acceptable, this high efficiency can give significant savings in power required for a given lighting level.

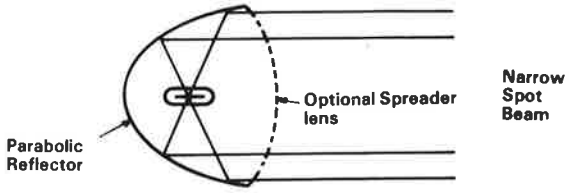


Fig. 15 PAR Lamp

Note. The foregoing values can only be expressed as averages and due consideration must be given to the effect of oxidation of reflecting surfaces, and during the course of time lamp envelopes and fitting lenses may transmit less light if dust is allowed to accumulate; therefore regular maintenance should be carried out to ensure that best performance is achieved.

Important Operating Notes

Caution notices are included with all Studio/Theatre lamps. Users are urged to read and comply with these.

1 Handling precautions
Lamps with quartz envelopes should not be handled without suitable precautions. If accidently touched with the skin, the lamp must be cleaned with alcohol applied with a soft clean cloth. Failure to observe this precaution will permanently mark the bulb.

2 Operating precautions
All lamps in this catalogue should be operated with a series fuse in the circuit, as recommended in the Technical Digest.

Lamps of quartz construction use a gas filling at a pressure higher than atmospheric, and as the lamp can in rare instances shatter in use, suitable shielding techniques should be employed where appropriate. Also protect the lamp from mishandling, scratches and abrasions, and do not operate at above correct rated voltage.

3 Operating position
The correct operating position for the lamps in this catalogue are included in the specifications given. These should be observed to ensure optimum performance and life.

In all cases permitted burning angles refer only to orientation in the vertical plane at right angles to the normal V.B.D. filament plane, see fig. 2. Angled burning by rotation in the plane of the filament is not recommended, see fig. 1.

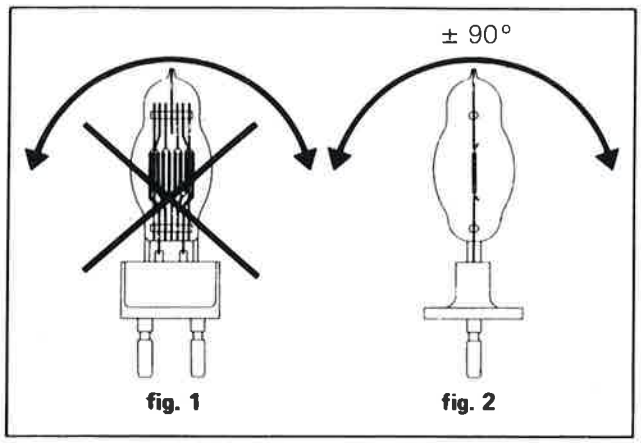


fig. 1 fig. 2

Coiled Coil (see tables 1, 6, 10, 13)
Axial coiled coil single ended lamps will generally give better reliability against premature arcing if orientations in which the main support spine is under the filament are avoided. See fig. 3.

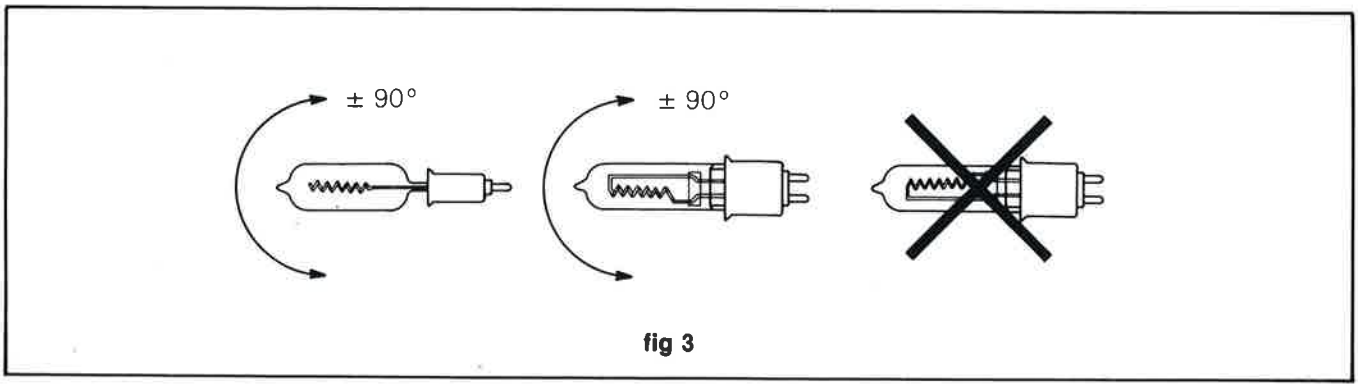
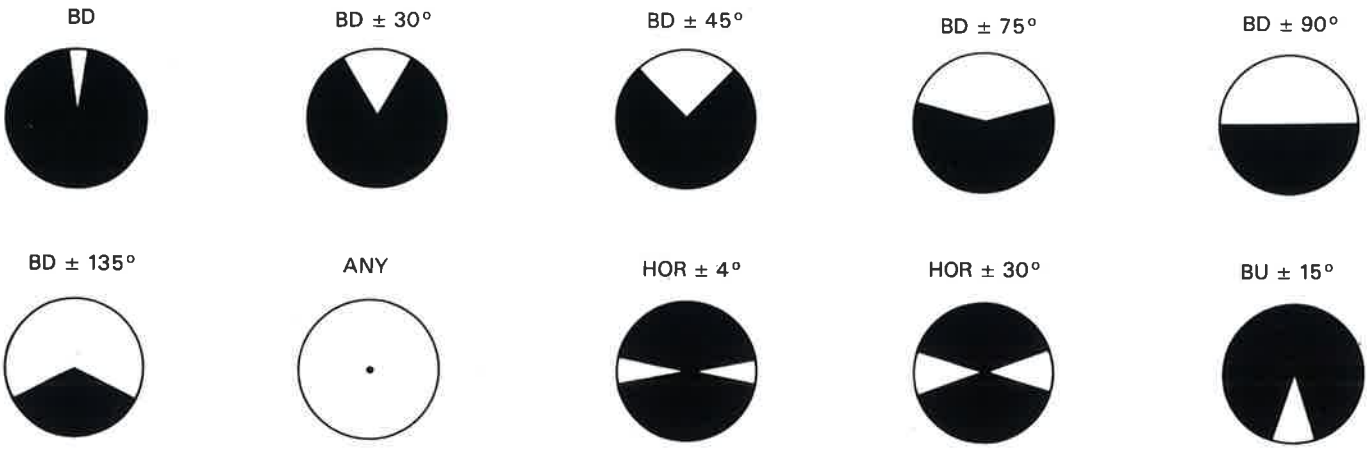


fig 3

Operating Positions



Tungsten Halogen Studio and Theatre Lamps – Caution

1. To avoid any possibility of electrical shock, disconnect the equipment from the power supply before removing and/or replacing the lamp or fuse.

2. Articles fabricated from quartz or glass are inherently fragile and there is a remote possibility of a lamp shattering violently if subjected to mechanical/thermal shock or abrasion. Inserting the lamp into the holder, by holding the bulb, could cause mechanical breakage of the envelope and/or seal. For your safety, install by holding the lamp cap and use eye protection where appropriate.

3. Oils/grease or handling of the quartz envelopes may contaminate the surface on operation and reduce performance. If the quartz is handled, clean before operation with a lint free cloth moistened with alcohol or Methylated Spirit.

4. Avoid improper operation of the lamp, e.g. at over voltage; in equipment (or at burning angles) not designed for the lamp type or rating. Operate in series with a rapid acting, high breaking capacity fuse of suitable voltage, rated as given in the table below. Non-observation of these points may damage the lamp or equipment.

5. In operation, the lamp:
a) develops a high internal pressure and could shatter;
b) develops a high surface temperature.
c) Direct exposure may cause ultra-violet irritation to skin and eyes. The use of glass or other UV filters is advised if the lamp is used in close proximity or for a prolonged period. When reflectors are used to concentrate the light the safe exposure period will be reduced.

Appropriate screening for people and surroundings must be provided.
Avoid operation in proximity to combustibles. Allow to cool before attempting replacement.

6. Life expired lamps should be broken in a suitable robust container, or wrapping, to retain flying fragments. There is a slight toxic content in the fill gas and larger quantities should only be broken in a well ventilated area.

Lamp Power	Fuse (rated current) 110-115V	115-130V	220-250V
500W	6A	6A	4A
650W	10A	6A	4A
1000W	16A (15A UK)	10A	6A
1500W	20A	16A (15A UK)	10A
2000W	25A (30A UK)	25A (30A UK)	10A
2500W	35A (30A UK)	25A (30A UK)	16A (15A UK)
5000W	65A (60A UK)	50A	25A (30A UK)
10000W	125A	100A	50A

Additional precautions for the operation of metal halide discharge lamps and discharge lamps made for special applications also high pressure lamps without outer bulb.

Check that replacement lamp is correct type for the application, that rating, cap and control gear are correct.

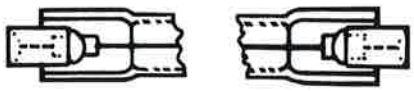
Lamps having outer bulbs must not be operated if the outer glass is broken.

Instructions given with high pressure lamps must be carefully followed in all respects. Protection against the explosion of lamp must be maintained, do not remove any covering or shields until the lamp is located in an approved enclosed housing.

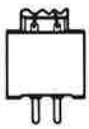
Certain lamps generate ozone in use and should be operated only in well ventilated locations.

High pressure mercury and xenon discharge lamps with quartz envelopes without glass outer bulbs emit short wave ultra violet radiation which is harmful to eyes and skin. Operators must be shielded from direct or indirect short wave ultra violet radiation.

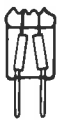
Lamp Caps



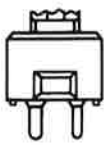
R7s



G5.3 (FHR)



G6.35



GY9.5

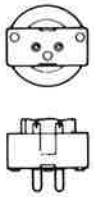
GX5.3 (Multiflector 50)

GZ4 (Multiflector 35)

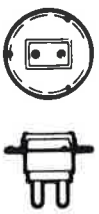
E27s

GY7.9

SES E14s



GX9.5

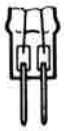


PG22

G17t

GY5.3

GY6.35



G4

SBC B15d

BC B22d

THORN EMI Lamps and Components Ltd
Miles Road
Mitcham, Surrey CR4 3YX
Telephone 01-640 1221
Telex 25534 TELC G
Fax 01-685 9625

European Division Administration

THORN Lighting Limited
Jules Thorn Lighting Laboratory,
Great Cambridge Road,
Enfield, Middlesex EN1 1UL

THORN Lighting Limited Subsidiaries

EUROPEAN

Austria
THORN Licht GmbH
Erzherzog-Karl-Strasse 57, A-1220 Wien

Denmark
THORN Belysning A/S
Brogrenen 8, DK-2635 Ishøj

Finland
THORN Orno Oy
Santaniitynkatu 11, PO Box 11, 04251 Kerava

France
THORN Europhane
156 Boulevard Haussmann, 75009 Paris

Germany
Glühlampenfabrik Jahn GmbH
Carl-Zeiss-Str 15, Postfach 1509, D-4460 Nordhorn

Ireland
THORN Lighting (Ireland) Limited
320 Harolds Cross Road, Dublin 6

Italy
SIVI Illuminazione Spa.
Casella Postale 604, 36100 Vicenza

Norway
THORN Scanlux AS
Industrivn 11, PO Box 63, 1481 Hagan

Sweden
THORN Belysning AB
Anderstorpsvägen 4, Box 4203, S-17104 Solna

OVERSEAS

Australia
THORN Lighting Limited
210 Silverwater Road, Lidcombe, New South Wales 2141

Canada
THORN Lighting Canada Limited
1400 Meyerside Drive, Mississauga, Ontario L5T 1H2

Hong Kong
THORN Lighting (HK) Co.
Jardine Engineering House, 260 King's Road
PO Box 517 GPO

New Zealand
THORN Lighting (NZ) Limited
399 Rosebank Road, Avondale, Auckland 7

South Africa
THORN Lighting (SA) PTY Limited
PO Box 43075, 26 Blumberg Street
Industria 2042, Transvaal

Publication No. 89:98:07