THORN LIGHTING

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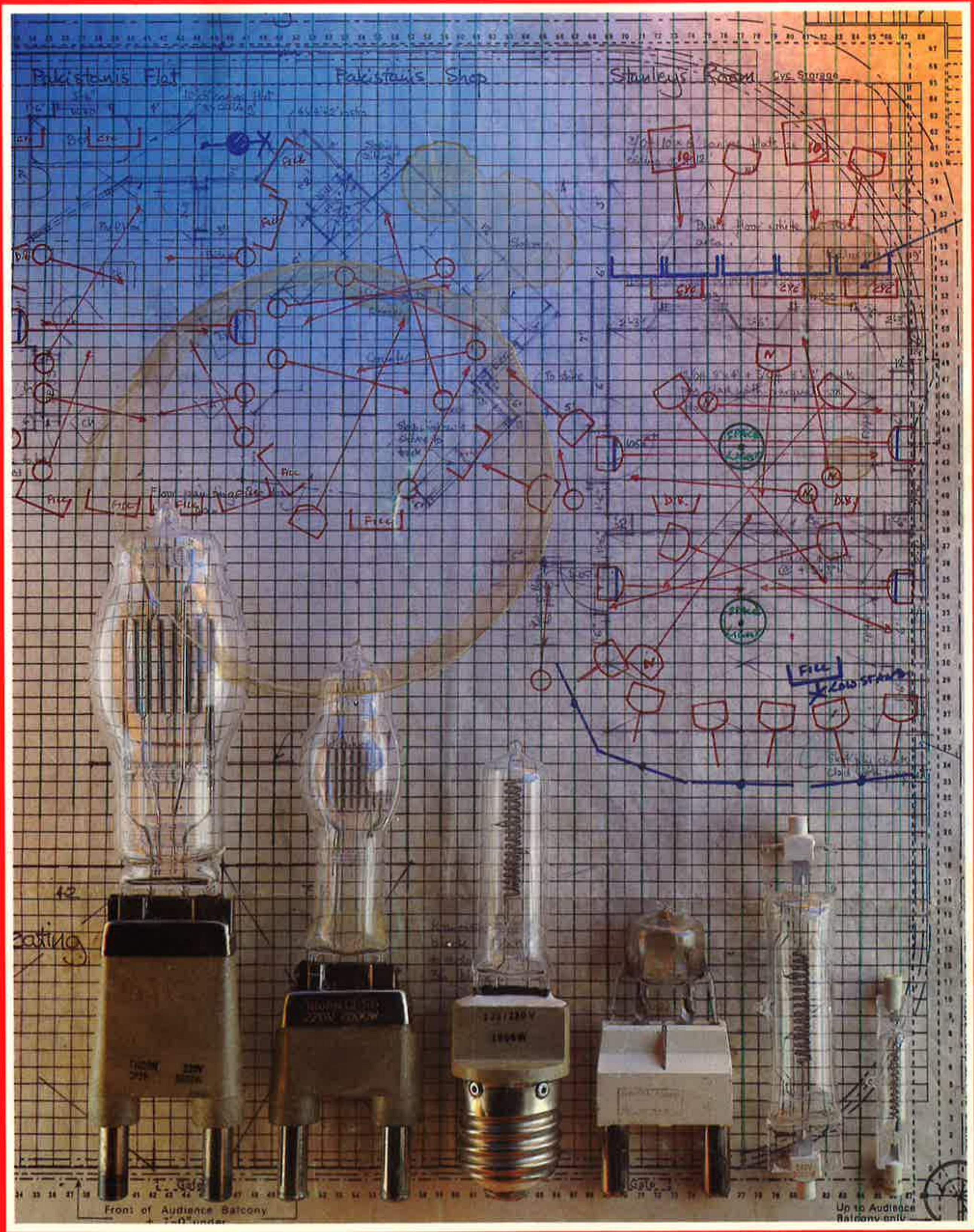
Studio & Theatre Lamps Handbook



Studio Lamps

Contents

Notes for Technical Specifications

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

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 shown on page 8.

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.

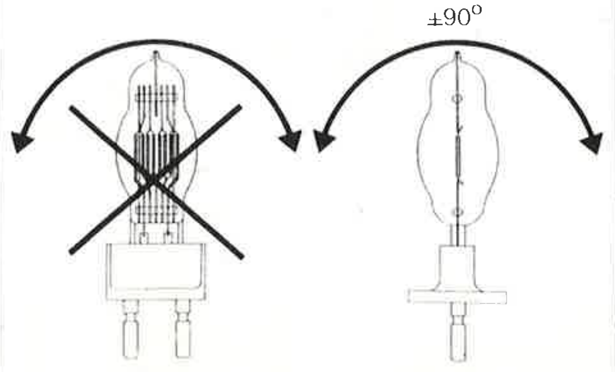


fig. 1 fig. 2

1. Explanation of Lamp Codes Used

Lamps listed in this handbook are those designed for use in theatre and/or studio applications. Standard lamps are shown in bold typeface, thus **CP40**, in the listings and are registered with the Lighting Industries Federation (UK) in the following groups:

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

"P2" Prefix – Again for use with 3200K colour film stock for floodlighting applications and movielights.

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

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 Thorn *"HX" prefix* and are indicated in fine type face.

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.

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 Monoplane 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 Lighting are now able to offer a comprehensive range of lamps operating on the Tungsten Halogen principle and of quartz contsruction, for all Television, Studio 'Motion' picture and Theatre lighting purposes.

The range of lamps available is now so wide that it has been unnecessary to continue to supply lamps with glass envelopes for film and television studio lighting purposes.

Thorn have been strongly supported by the television and film industries in this decision to discontinue glass lamps for studio lighting purposes. This is because the industry has been quick to appreciate not only the financial advantages of quartz halogen lamps, but also their superiority from the point of view of reliability and virtually constant colour temperature.

The increase in the use of the lamps we now manufacture is due to the Thorn policy of supplying direct replacement quartz halogen lamps for those glass studio lamps in common use simultaneously with the development of original types. These exploit the important advantages of compact size offered by quartz halogen construction.

As a result Thorn are now able to supply direct replacement quartz halogen lamps for use in fresnel and spotlight fittings of from 500 watts to 10,000 watts. These lamps employ a wide range of commonly accepted bases.

Thorn also offer a similarly comprehensive range of lamps of original 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 have continued their policy of developing a quartz halogen equivalent for existing glass lamps. There is a quartz halogen replacement lamp for all popular lamps used in theatre spot fittings.

Because 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 continue to manufacture conventional glass lamps for theatre spotlight fittings as shown in table 10.

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 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. Lamps developed for this application are **CP56**, HX81 and lamp types in tables 6, 12 and 14.

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

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 believe their range gives a wide choice and is unmatched in performance and reliability.

The Thorn range of lamps of this type is also exceptional in as much as it offers lamps in an original 'U' shape. Developed by Thorn 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 your nearest Thorn Lighting Subsidiary or Branch. 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 constructed 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.

Thorn 'Compact Source Iodide' Discharge Lamps (C.S.I.)

This group of lamps known under the generic term of C.S.I. lamps were developed by Thorn some years ago as high efficiency compact source light sources; initially for follow spot fittings and later in the sealed beam version for the illumination of stadia to meet the stringent demands of colour television.

Brief details are included in this booklet as these lamps are now commonly used for location film and television work. Their popularity for this type of work is mainly due to the increasing demand for reliable light weight luminaires which can be used for location filming or * O.B. work in colour, with outstanding economy, not only from the point of view of the demand made on generator capacity but also because of initial low cost and relatively long lamp life.

Development work has enabled Thorn to offer these lamps in "Hot Restrike" versions and this important feature adds considerably to the versatility of this type of light source and greatly increases its usefulness to the lighting director.

Full specifications of the Thorn C.S.I. Hot Restrike lamps mentioned above can be found in the relative Thorn data sheets (ref. L5/TA and L12/TA). Details of standard versions which have similar operating characteristics are contained in data sheets (ref L28/T and 99-122).

Control gear necessary for the operation of these lamps is available from Thorn Lighting Ltd. and full details will be found in the above data sheets.

Please note that the lamps average rated life may be affected if the pinch seal or ferrule temperature exceeds 400°C.

*Outside Broadcast.

Tungsten Halogen Studio and Theatre Lamps — Caution

1. To avoid any possibility of electric 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) may cause UV irritation to skin and eyes on prolonged direct exposure.

Use appropriate screening for people and surroundings. 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	Fuse (rated current)		
Power	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.

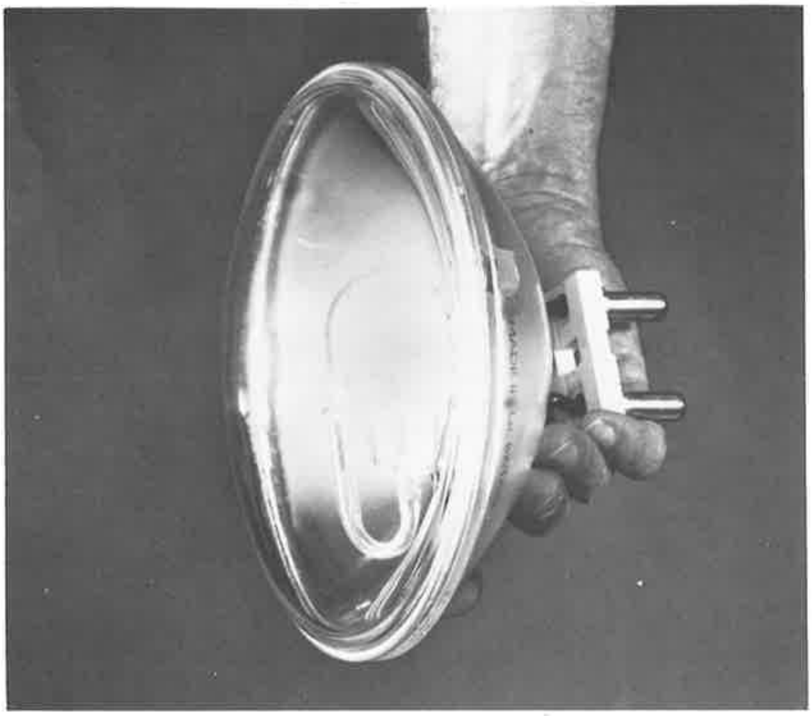
Lamps having outer bulbs must not be operated if the outer glass is broken.

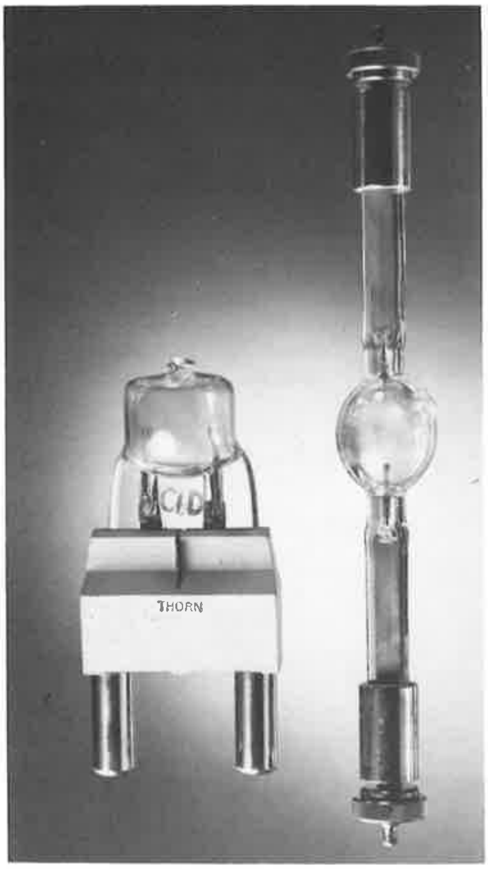
Instructions given with high pressure lamps must be carefully followed in all respects. Protection against the explosion of lamp must be maintained, do not remove any covering or shields until the lamp is located in an approved enclosed housing.

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

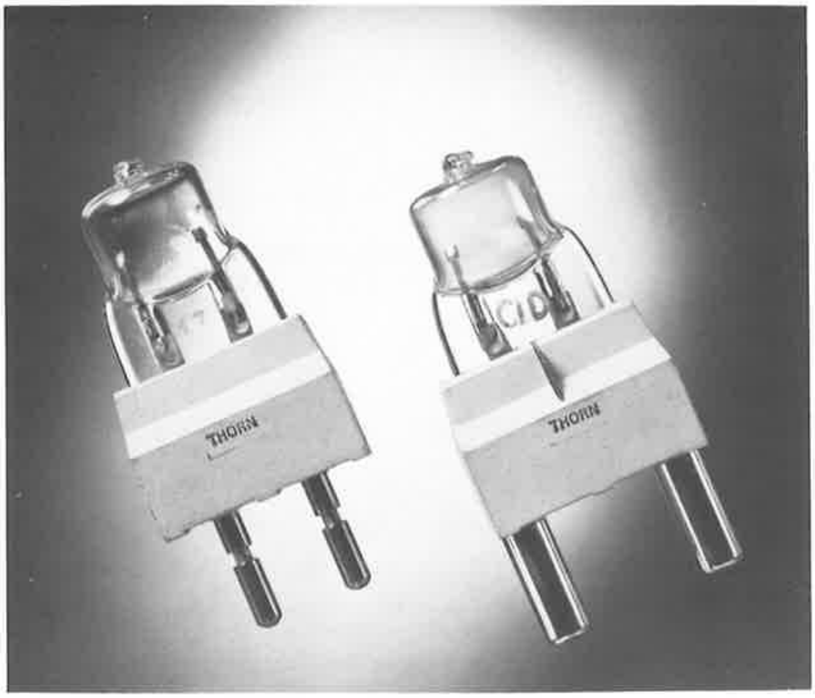
High pressure mercury and xenon discharge lamps with quartz envelopes without glass outer bulbs emit short wave ultra violet radiation which is harmful to eyes and skin. Operators must be shielded from direct or indirect short wave ultra violet radiation.

Introducing CID Thorn compact iodide daylight lamp
The exciting new concept in daylight filming





Comparison of single-ended CID with double-ended lamp.



Standard and hot-restrike 1kW CID lamps with G 22 and G 38 bi-post bases respectively.

At their Leicester laboratory, Thorn Lighting scientists have developed a new single-ended discharge lamp to meet demand from the TV and film industry for reliable 'daylight' colour rendering.

The Compact Iodide Daylight (CID) lamp is one of the most important developments in the lighting industry for many years, offering for the first time an extremely robust single-ended lamp which gives correct colour rendering on film stock balanced for 5500°K. There are bare lamp and sealed beam versions available in 1 kW ratings, and a 2½ kW bare lamp version. The 1 kW rating will be produced as a standard or hot restrike lamp.

The CID lamp is able to meet the very stringent demands of film lighting cameramen and TV lighting directors because of these combined advantages :—

1. Correlated colour temperature of 5500°K±400.
2. Ra. colour rendering index of 85.
3. DIN standard 5035 classification class 1.
4. Unique single-ended construction.
5. Maintenance of colour throughout life.
6. Reduced flicker.

These features will commend the CID lamp to those lighting directors and cameramen who will appreciate its value as a key light, fill light and for high speed photography. With suitable control gear and lampholder the 2½ kW bare lamp may be used in luminaires currently utilising the CP41 lamp, when modified to ensure adequate ventilation and mechanical compatibility. Discharge light sources currently offered cannot match this exclusive development.

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

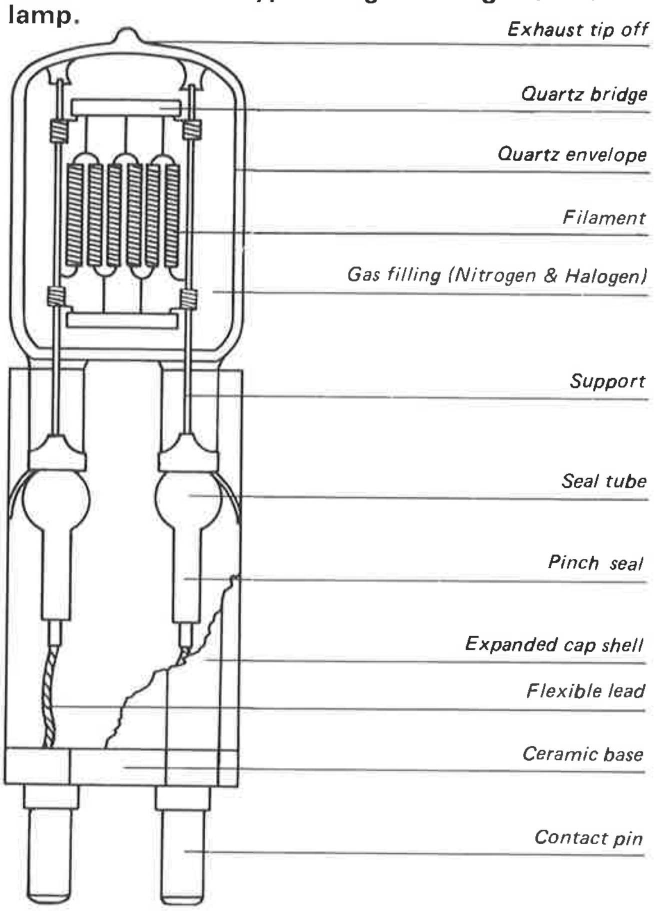


Fig. 1b.
Construction of a typical 4 pin twin filament studio lamp.

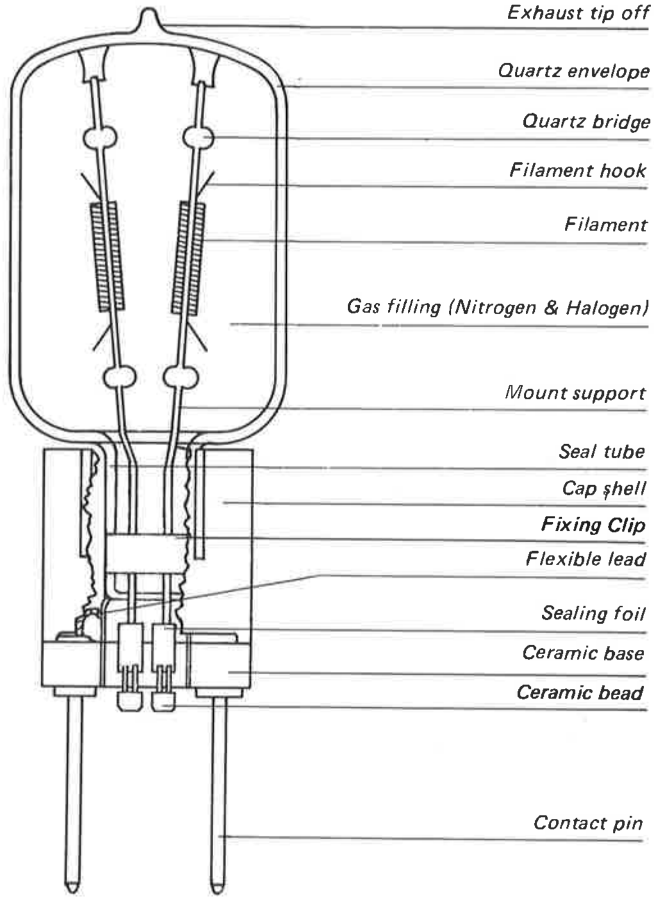


Fig. 1c.
Construction of a typical low wattage theatre class Tungsten Halogen lamp.

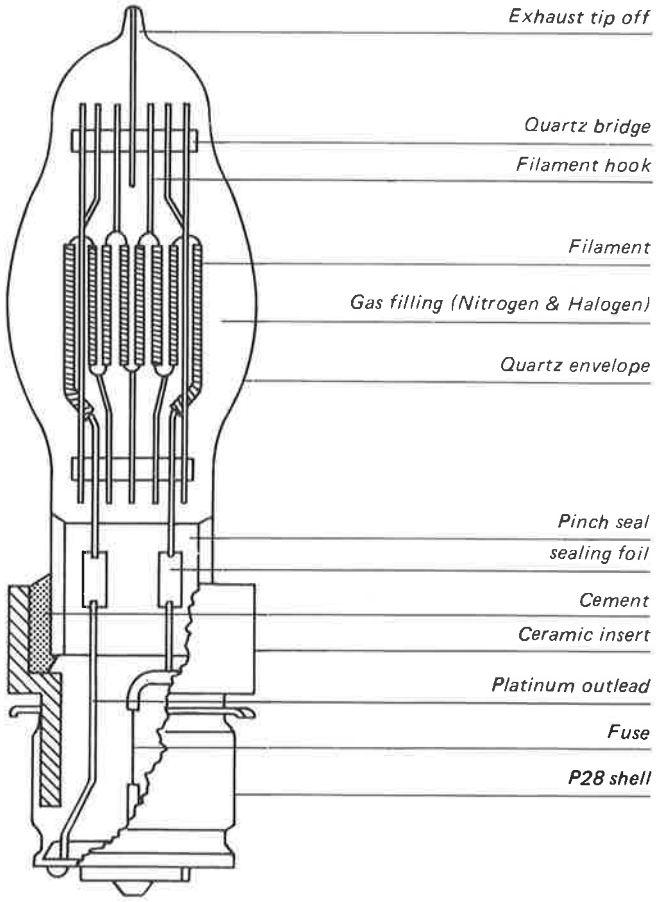


Fig. 1d.
Construction of end section of a typical Quartz Linear Tungsten Halogen Photographic lamp.

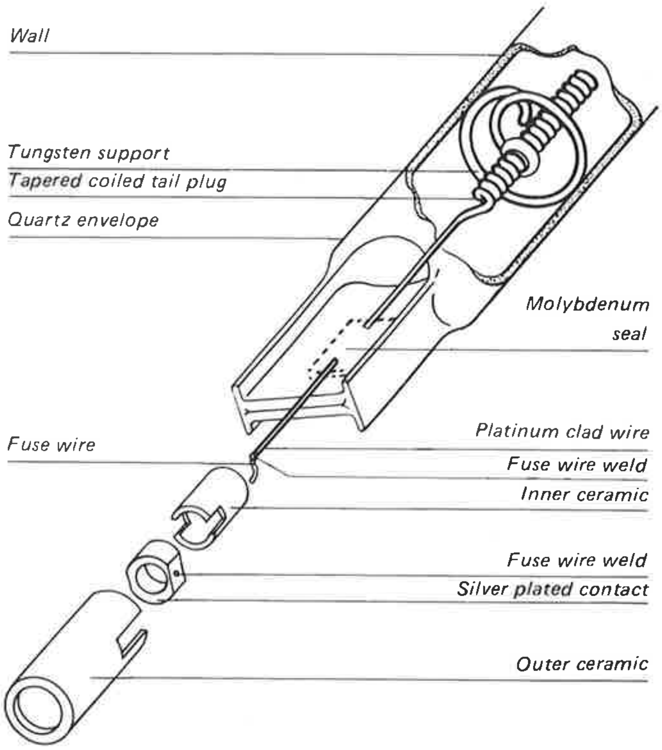


Fig. 2.
Variation of light output and wattage with applied voltage for a typical studio lamp.

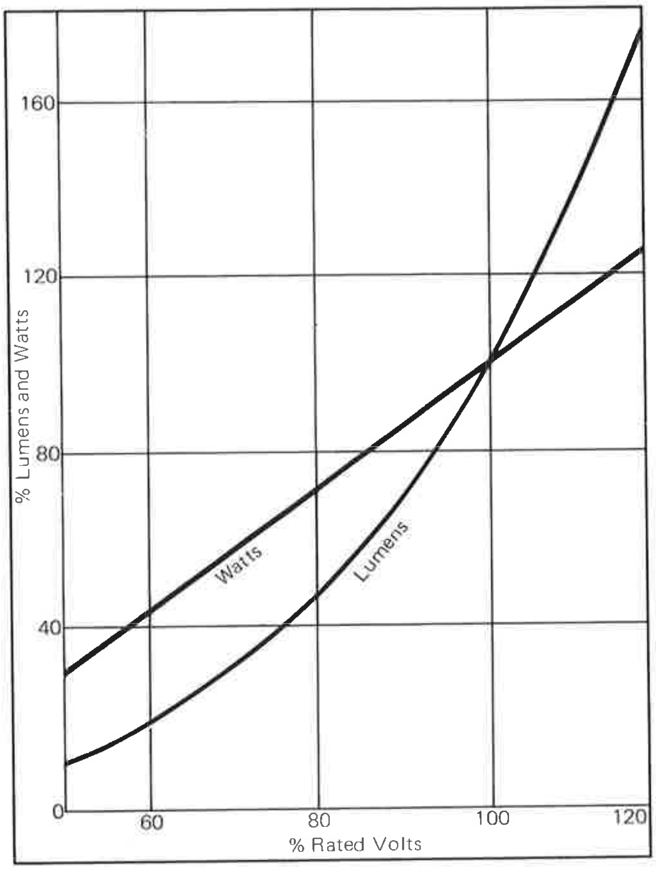


Fig. 3.
Colour temperature variation with voltage for typical studio lamp.

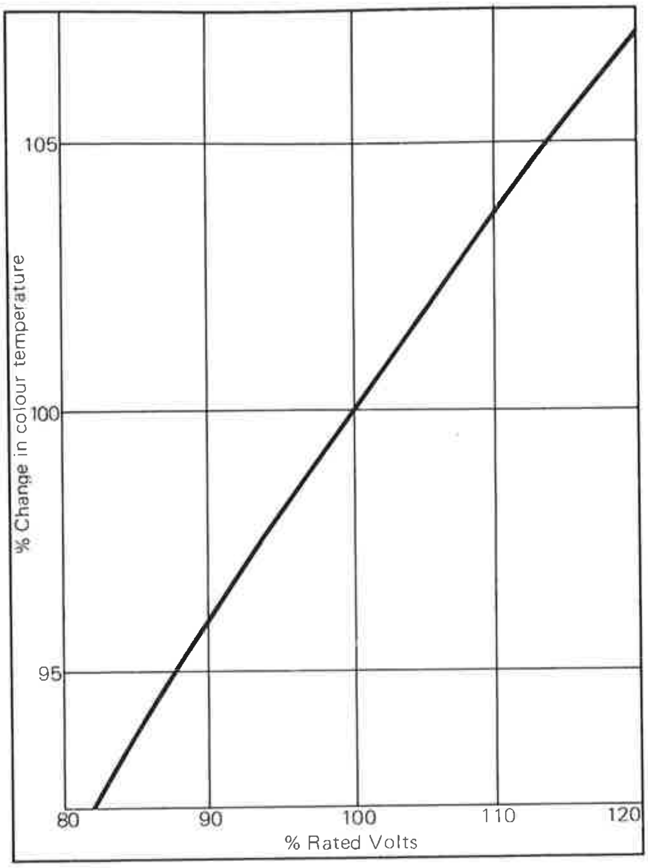


Fig. 4.
Typical life variation against operating voltage.

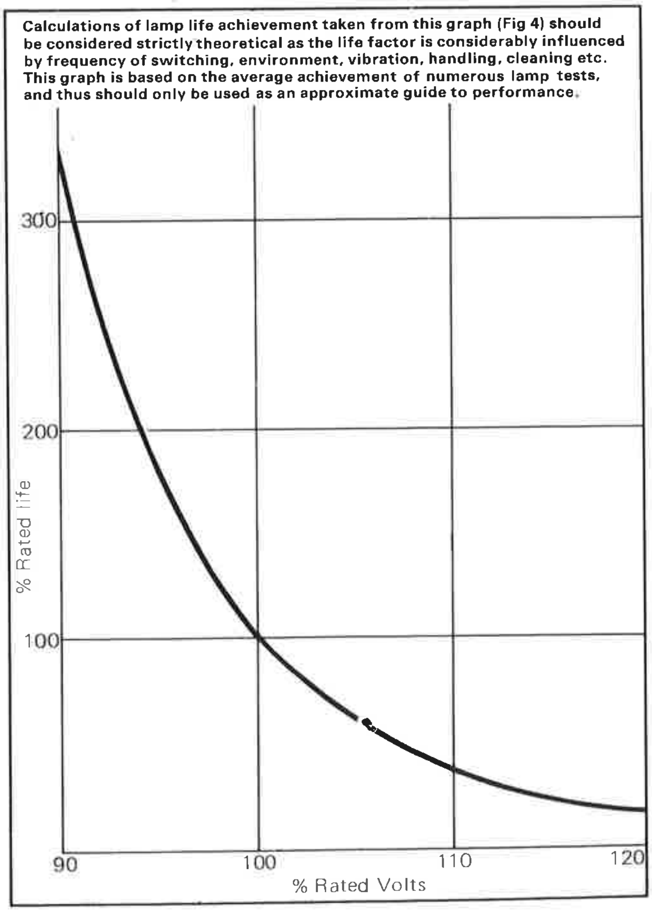


Fig. 5.
Typical power balance of studio lamps.

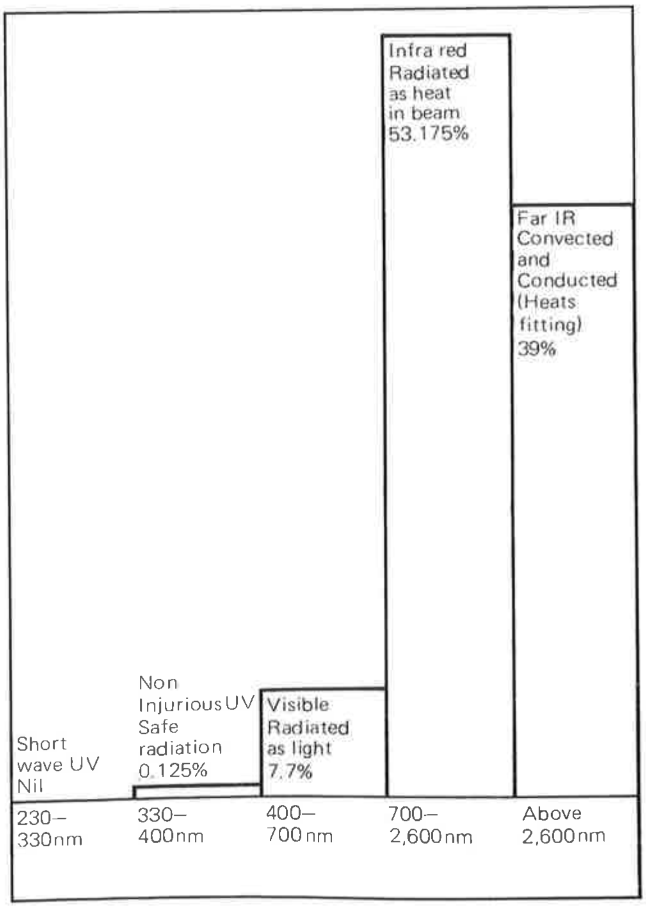
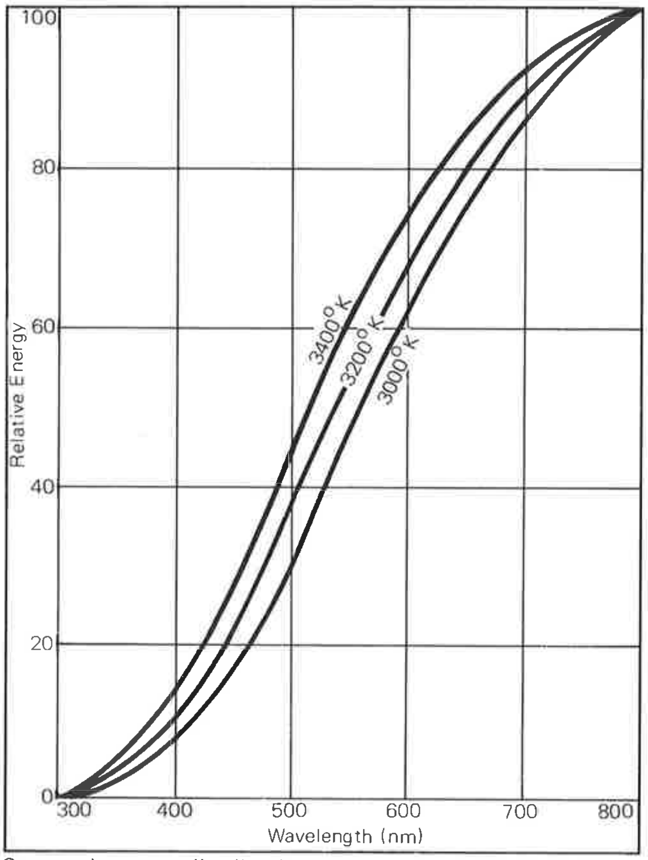
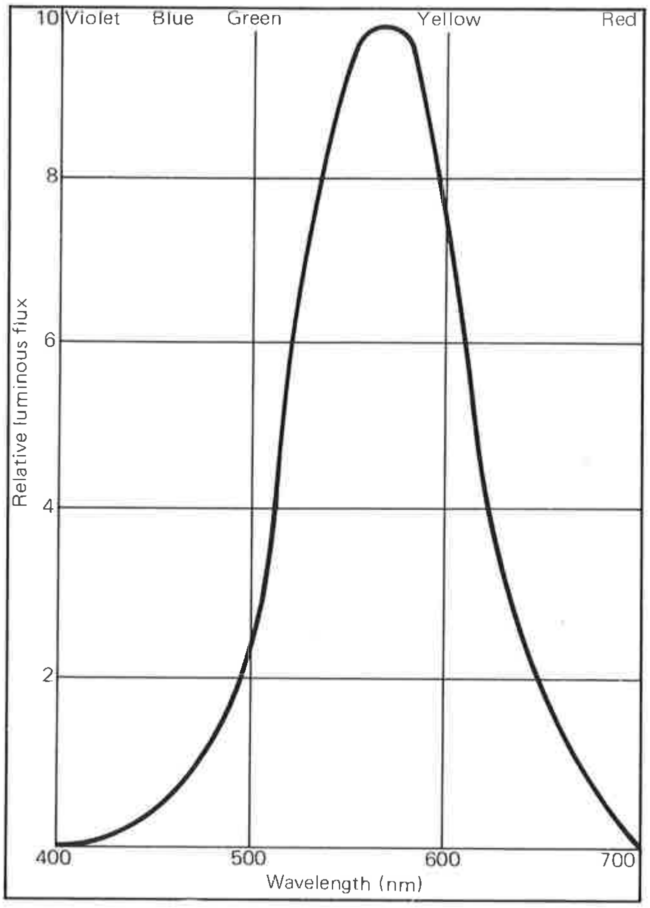


Fig. 6.
Total spectral energy distribution of typical studio lamp.



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. 7).

Fig. 7.
Spectral distribution of luminous flux (Lumens) for typical theatre and studio lamp.



Operating temperatures of tungsten halogen studio lamps

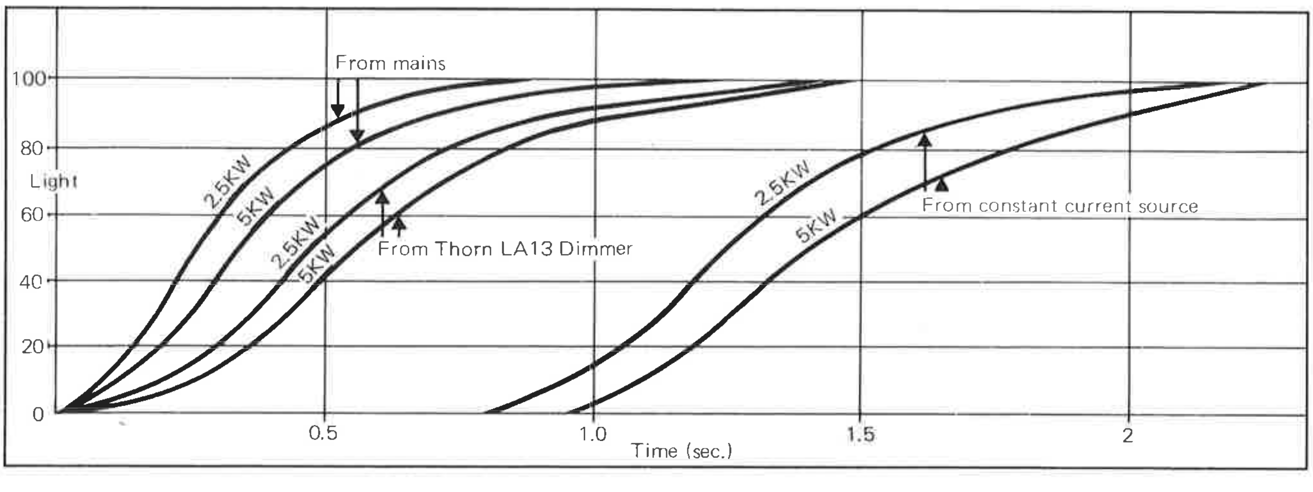
The following maximum and minimum temperatures are suggested for optimum life. Operation outside these figures will not necessarily cause immediate failure but will affect life adversely to an increasing extent.

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. 8
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 $17\sqrt{2}$ 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. & 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. 9 (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. 9 (b) where the angle of incidence is 30° (to the

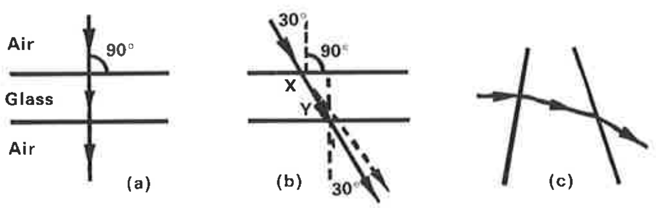


Fig. 9

dotted 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. 9 (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. 10A 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. 10B).

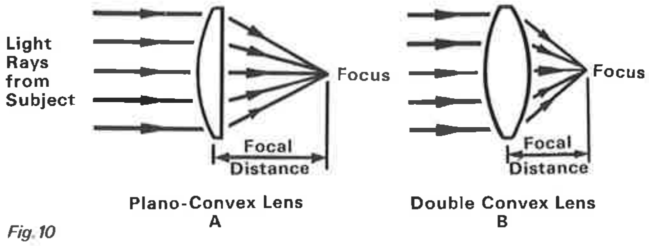


Fig. 10

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. 11).

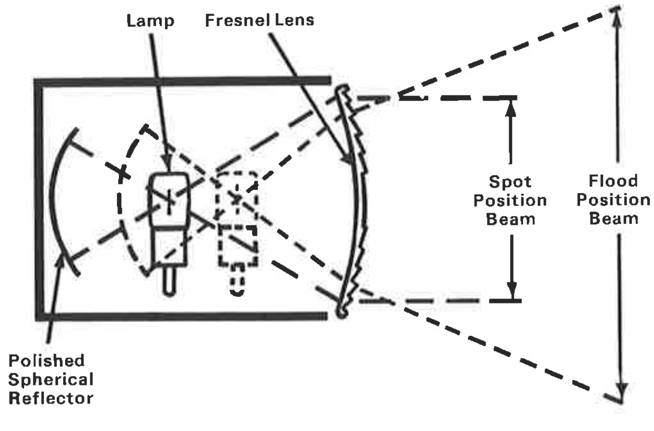


Fig. 11

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. 11 (drawing of Fresnel studio housing).

The reflector behind the lamp in this fitting is a spherical 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. 12). The limit of the beam angle is the points on the curve where the candle power is 50% of the maximum and the field 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 :–

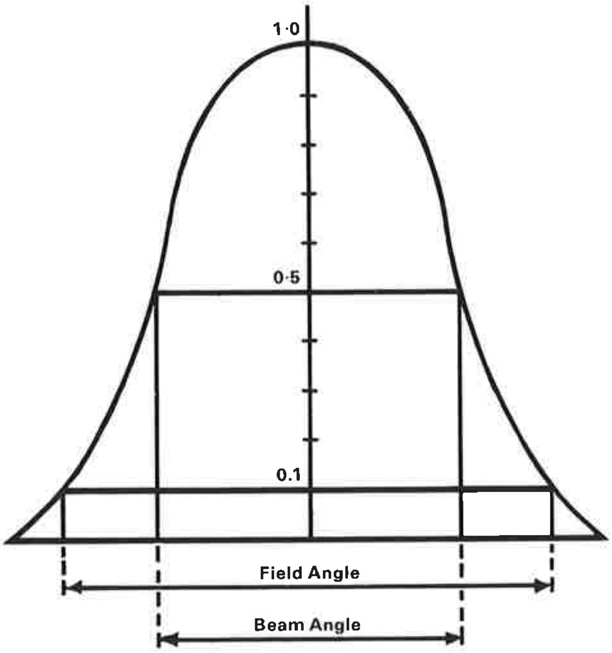


Fig. 12

Fresnel Spotlights (Fig. 13)
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 approximately 0.18 or 18%.

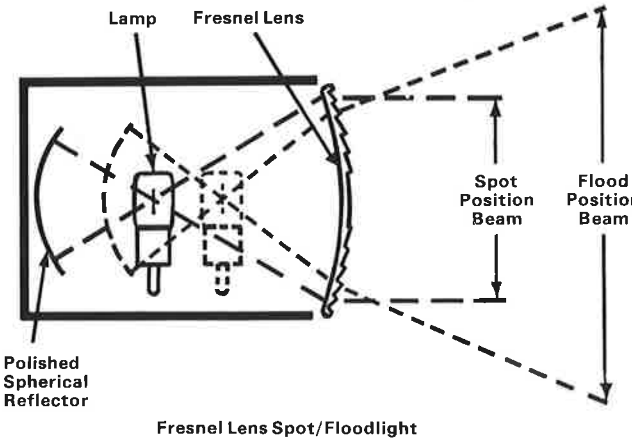


Fig. 13

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%.

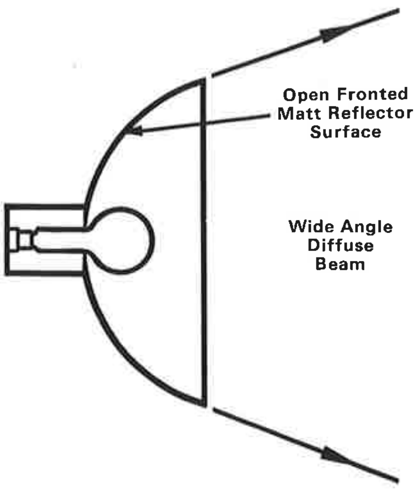


Fig. 14 Scoop Floodlight

Ellipsoidal Spotlights (Fig. 15)
Efficiencies range between 0.28 and 0.40, and for a group of fittings is approximately 0.35 or 35%.

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.

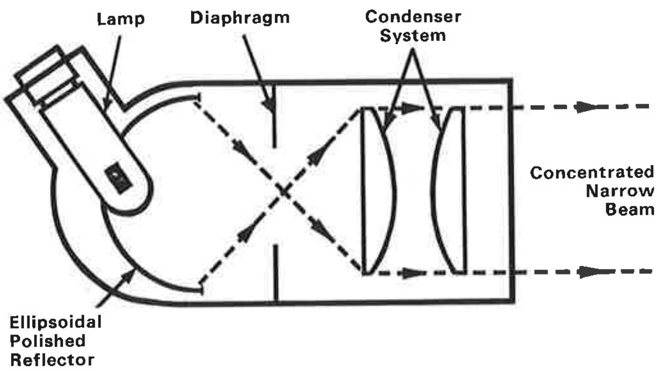


Fig. 15 Ellipsoidal Spotlight

Index by Lamp Code

Tungsten Halogen Incandescent Lamps

ANSI Series	Table
BTL	11
BTM	11
BTN	11
BTP	11
BTR	11
BVT	14
BVV	14
BVW	14
BWA	7
BWF	1
BWG	1
CWZ	14
CXZ	7
CYV	7
DPY	8
DTA	13
DXN	24
DXW	24
DXX	17
DYA	19
DYN	19
EGN	5
EGR	5
EGT	5
EHG	15
EKM	22
EWE	12
EXA	12
EXB	12
EXC	26
EXD	26
EXE	26
EXF	12
FAD	17
FCM	20
FCV	15
FDF	20
FDN	20
FEL	15
FEP	15
FEX	21
FEY	21
FHM	20

'CP' Series	Table
CP2*	10
CP3*	10
CP23	3
CP24	3
CP29	8
CP30	16
CP32	16
CP39	5
CP40	5
CP41	7
CP43	2
CP51	11
CP52	11
CP53	13
CP54	9
CP56	7
CP58	16
CP59	1
CP60	25
CP61	25
CP62	25
CP77	15
CP79	2

'HX' Series	Table
HX14	11
HX16	13
HX25	8
HX26	1
HX27	2
HX37	6
HX48	7
HX53	13
HX56	7
HX81	3
HX82	3
HX86	15

'P2' Series	Table
P2/1*	10
P2/4*	10
P2/6	17
P2/7	22
P2/10	22
P2/11	10
P2/12	22
P2/13	17
P2/14	18
P2/15	20
P2/16	23
P2/17	23
P2/25	23
P2/26	23
P2/27	21
P2/28	20
P2/29	20
P2/30	20
P2/31	20

'T' Series	Table
T1*	10
T11	3
T12	3
T13	11
T14	11
T15	12
T16	13
T17	11
T18	4

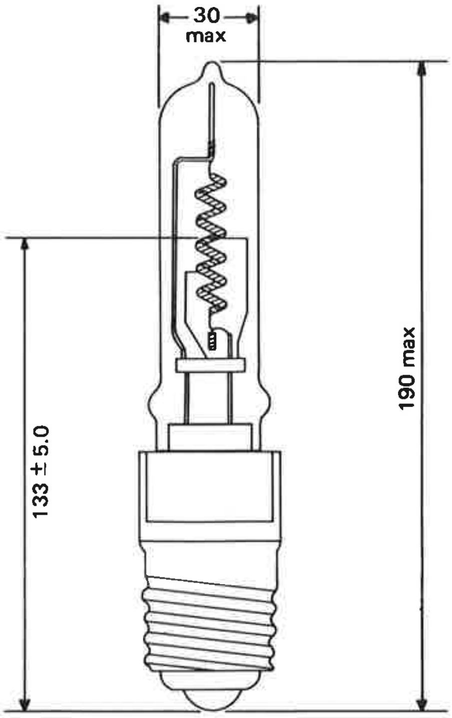
*Non-halogen

Discharge Lamps CSI

CSI Ref.	Table
99-2241	29
99-0201	26
99-0221	27
99-0421	28
99-1222	30
99-1422	31

Discharge Lamps CID

CID Ref.	Table
99-0222	32
99-0422	33
99-1225	35
99-1425	36
99-0431	34



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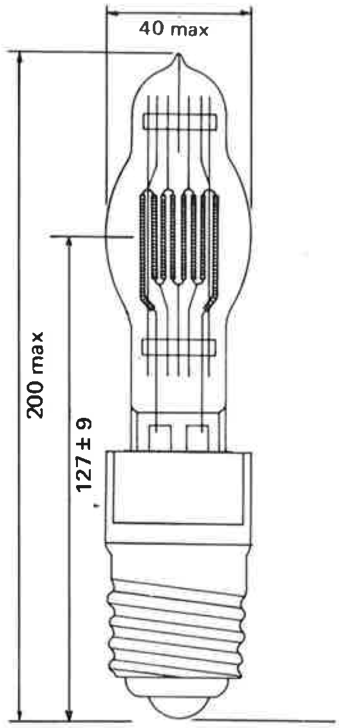
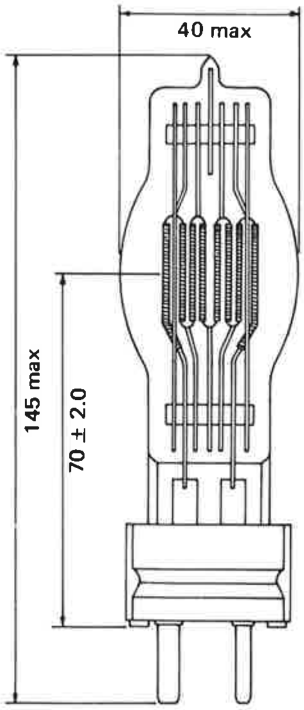


1.2

Table 1 E40 Base (Mogul Screw)

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
2000	**CP59**	220/230, 240	3200	50.0	300	CC	40×7.0	ANY		1.1
2000	BWF	120	3200	59.0	300	CC	40×7.0	ANY	X	1.1
2000	BWG	120	3200	56.0	300	CC	40×7.0	ANY	D, X	1.1
2000	HX26	220, 240	3200	54.0	400	MP	22×22.5	VBD±90	X	1.2
2000	HX26	120	3200	58.0	400	MP	24×21.5	VBD±90	X	1.2



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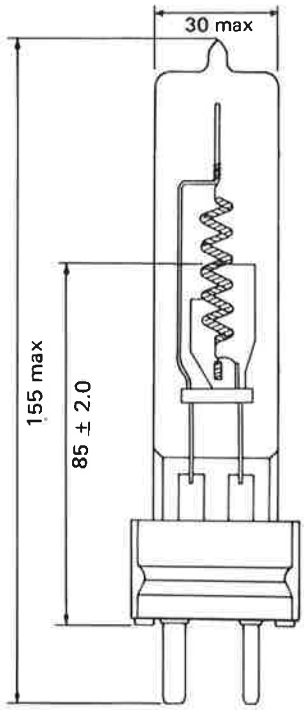
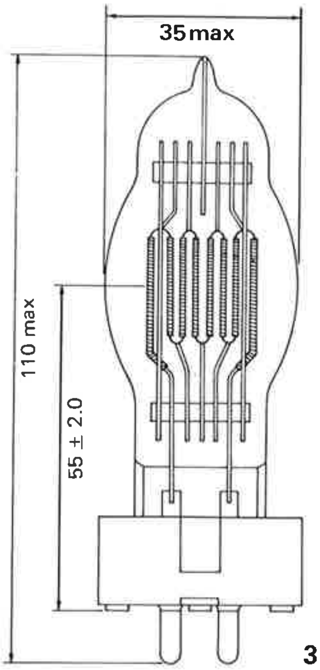


2.2

Table 2 GY16 Base

Watts	Lamp Code	Voltage	Col. Temp.	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	56.0	400	MP	24×21.5	VBD±90		2.1
2000	**CP79**	220, 240	3200	52.0	250	BP	18×16.5	VBD±90	X	2.1
2000	HX27	220/230, 240	3200	52.0	300	CC	40×7	ANY	X	2.2



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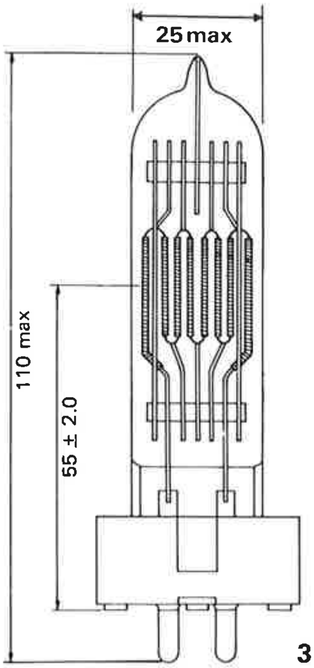

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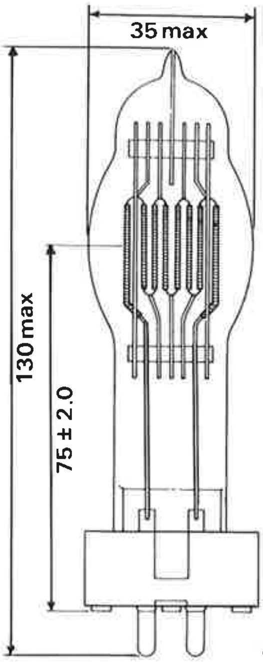
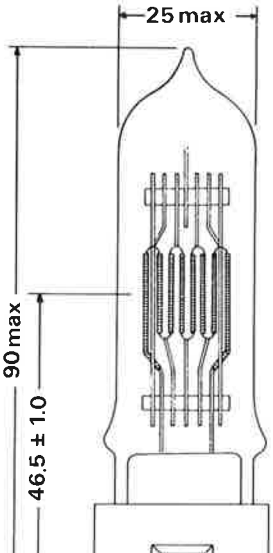


3.3

Table 3 GX 9.5 Base

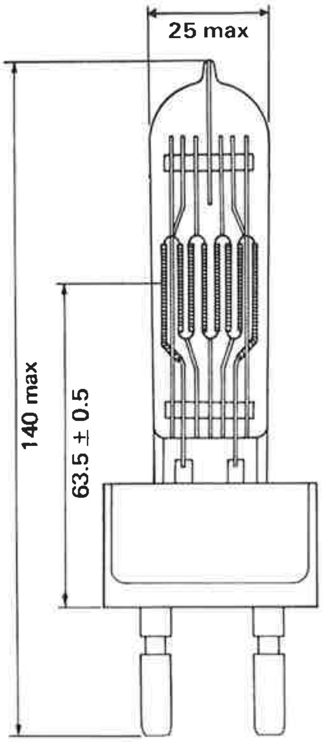
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500	HX82	220, 240	2950	9.5	750	MP	13.5×15	VBD±90	X	3.2
500	HX82	115/120	2950	10.5	750	MP	12×15	VBD±90	X	3.2
650	**T12**	220, 240	3000	13.5	750	MP	15.5×15	VBD±90		3.2
650	**T12**	115/120	3000	13.5	750	MP	15×13.5	VBD±90		3.2
650	**CP23**	220, 240	3200	16.8	100	MP	13.5×15	VBD±90		3.2
650	**CP23**	115/120	3200	17.0	100	MP	15×13.5	VBD±90		3.2
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	18.5×16	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	19×16	VBD±90		3.1
1000	HX81	220, 240	3050	23.0	750	MP	18×17.5	VBD±90	E, X	3.3
1000	HX81	115/120	3050	23.0	750	MP	19×16	VBD±90	E, X	3.3



4

Table 4 GY9.5 Base

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500	**T18**	220, 240	3050	11.0	300	MP	12×13	VBD±90		4



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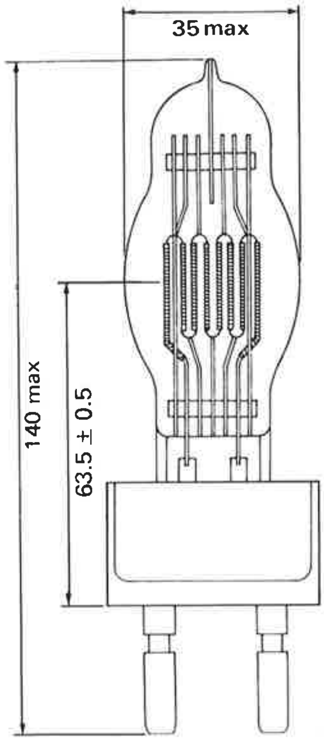
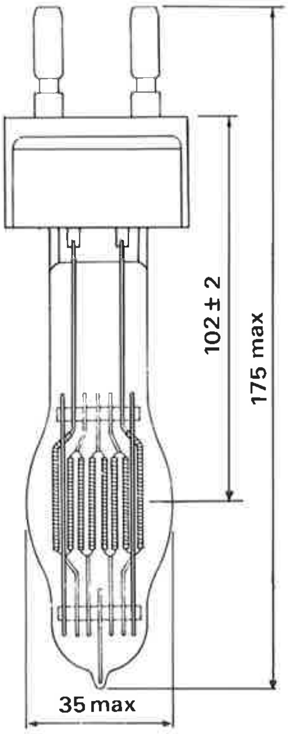


5.2

Table 5 G22 Base (Med. Bipost) 63.5 LCL

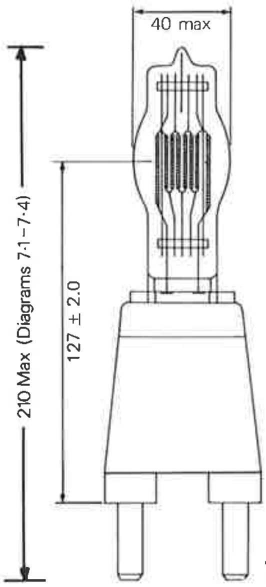
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500	EGN	120	3200	13.0	100	MP	11×11	VBD±90	X	5.1
650	**CP39**	115/120	3200	17.0	100	MP	15×13.5	VBD±90		5.1
650	**CP39**	220, 240	3200	16.8	100	MP	13.5×15	VBD±90		5.1
750	EGR	120	3200	20.5	200	MP	15×13	VBD±90	X	5.2
1000	EGT	120	3200	28.0	250	MP	18.5×16	VBD±90	X	5.2
1000	**CP40**	115/120	3200	27.0	200	MP	18.5×16	VBD±90		5.2
1000	**CP40**	220, 240	3200	26.0	200	MP	18.5×17.5	VBD±90		5.2



6

Table 6 G22 Base (Med. Bipost) 102 LCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
650	HX37	220, 240	3200	16.8	100	MP	13.5×15	VBU±45	E, X	6



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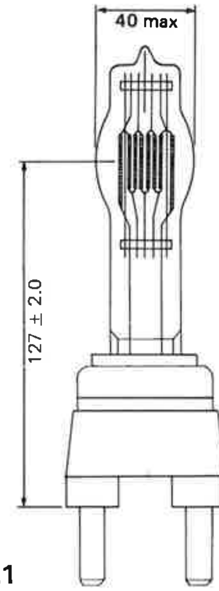

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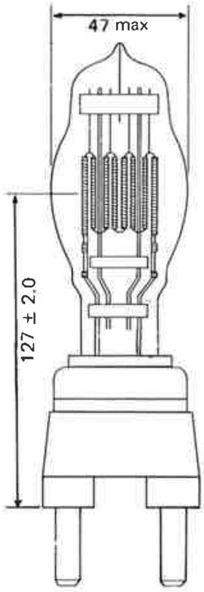

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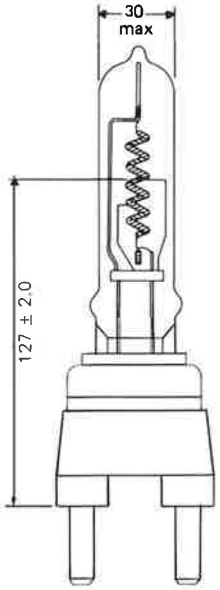

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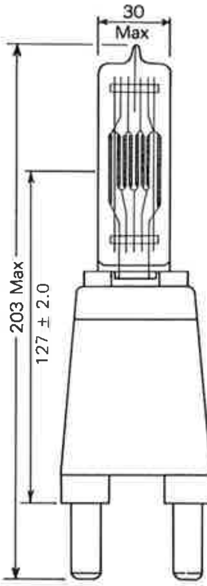
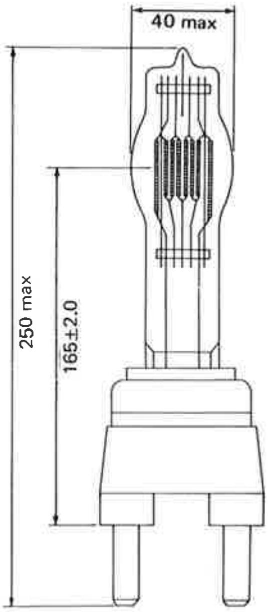


7.5

Table 7 G38 Base (Mogul Bipost) 127 LCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
1000	CYV	120	3200	28	250	MP	17.5×16.0	VBD±90	X	7.5
1500	CXZ	120	3200	41	300	MP	19.0×17.0	VBD±90	X	7.1
2000	CYX	120	3200	58	400	MP	24.0×21.5	VBD±90	X	7.1
2000	**CP41**	115/120	3200	56	400	MP	24.0×21.5	VBD±90	L	7.1
2000	**CP41**	220, 240	3200	54	400	MP	22.0×22.5	VBD±90		7.1
2000	**CP56**	220, 240	3200	54	400	MP	22.0×22.5	VBD±90		7.2
2000	**CP56**	115/120	3200	56	400	MP	24.0×21.5	VBD±90	E	7.2
2000	HX56	120	3200	58	400	MP	24.0×21.5	VBD±90	E, X	7.2
2000	BWA	120	3200	59	300	CC	40.0×7.0	ANY	X	7.4
3000	HX48	110/115, 120	3200	82	400	MP	25.0×25.5	VBD±45	S	7.3
3000	HX48	220, 240	3200	82	400	MP	24.0×27.0	VBD±45	S	7.3



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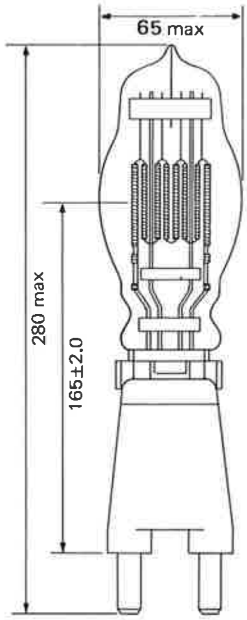
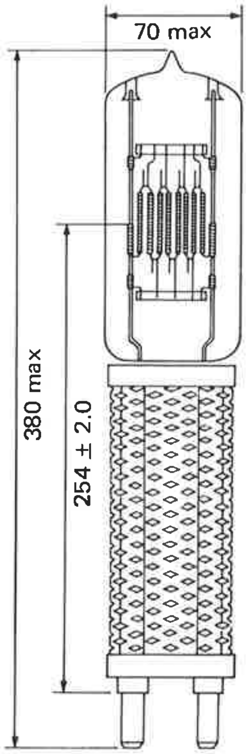


8.2

Table 8 G38 Base (Mogul Bipost) 165 LCL

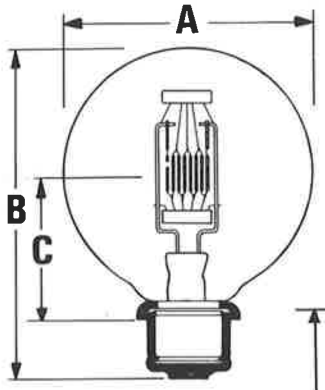
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
2500	HX25	110/115, 115/120	3200	67	400	MP	24×22	VBD±90	S	8.1
2500	HX25	220, 240	3200	65	400	MP	27.5×22.5	VBD±90	S	8.1
5000	**CP29**	115/120	3200	145	500	MP	31×36	VBD±45		8.2
5000	**CP29**	220, 240	3200	135	500	MP	36×35	VBD±45		8.2
5000	DPY	120	3200	145	500	MP	31×36	VBD±45		8.2



9.1

Table 9 G38 Base (Mogul Bipost) 254 LCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
10,000	**CP54**	220, 240	3200	280	400	TF	31×39	VBD±45		9.1



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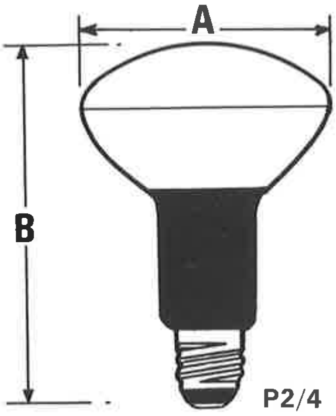
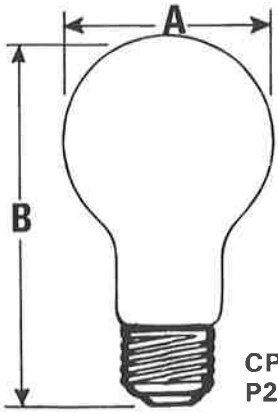
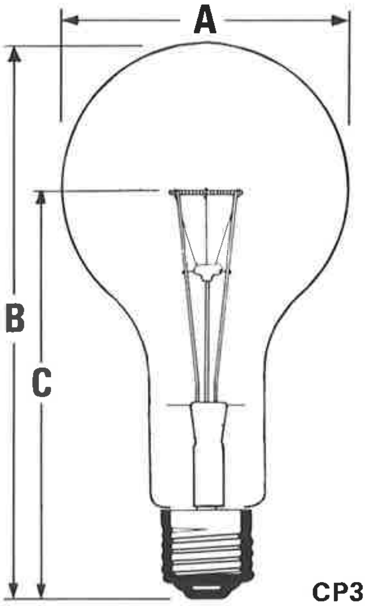


P2/4



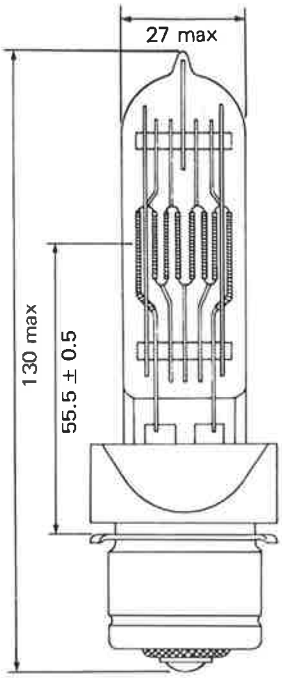
CP2
P2/1



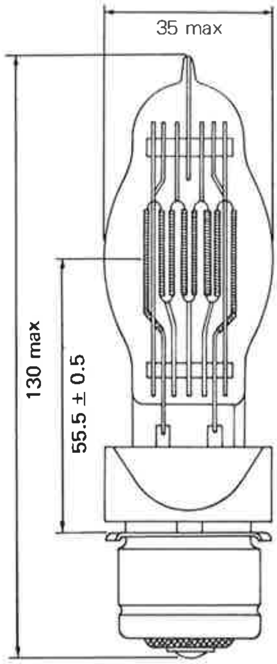
CP3

Table 10 Non Halogen Studio/Theatre/Photo Lamps

Watts	Lamp Code	Volts	Cap	Dimensions (mm) Diameter A	O/L B	LCL C	Nominal Lumens ×1000	Average Life (Hours)	Filament Formation	Burning Position
500	**T1**	220, 240	MPF P28s/25	95±5	180±10	55.5±0.5	9.5	200	Grid	VBD±90
500	**CP2**	240, 250	ES E27/27	80×2	160±6	—	13.75	15	Pearl Bulb	ANY
500	**P2/1**	220/230 240/250	ES 27/27	89	183.5	—	11.0	100	Pearl Bulb	ANY
500	**P2/4**	220/230 240/250	ES 27/27	127.5	182.0	—	7.2	12	Satin Etched Bulb Reflector Photoflood	ANY
1000	**CP3**	240, 250	GES E40/45	130±2	290±10	225±8	26.5	20	—	ANY



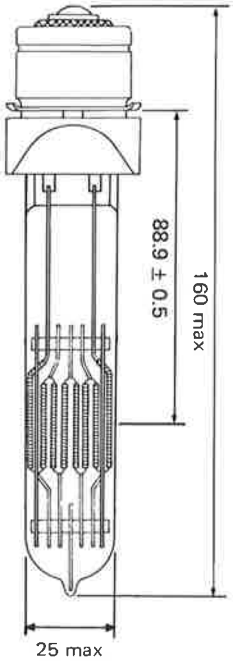
11.1



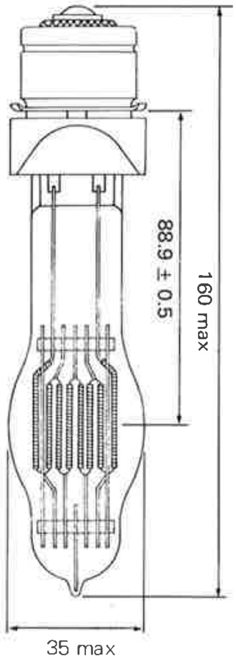
11.2

Table 11 P28 Base (Med. Prefocus) 55.5 LCL

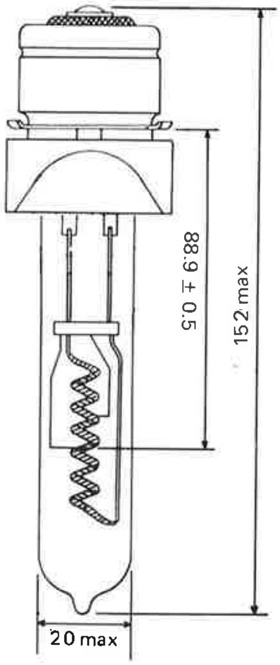
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500	BTL	120	2950	11	750	MP	12×15	VBD±90	X	11.1
500	BTM	120	3200	13	100	MP	11×11	VBD±90	X	11.1
500	**T17**	115/120	2950	11	750	MP	12×15	VBD±90		11.1
500	**T17**	220, 240	2950	10.5	750	MP	13.5×15	VBD±90		11.1
650	**T13**	115/120	3000	13.5	750	MP	15×13.5	VBD±90		11.1
650	**T13**	220, 240	3000	13.5	750	MP	15.5×15	VBD±90		11.1
650	**CP51**	115/120	3200	17	100	MP	15×13.5	VBD±90		11.1
650	**CP51**	220, 240	3200	16.8	100	MP	13.5×15	VBD±90		11.1
750	BTN	120	3000	17	750	MP	15×14	VBD±90	X	11.2
750	BTP	120	3200	20.5	200	MP	15×13.5	VBD±90	X	11.2
1000	BTR	120	3200	28	250	MP	18.5×16.5	VBD±90	X	11.2
1000	HX14	120	3050	24.5	500	MP	19×16	VBD±90	X	11.2
1000	**T14**	115/120	3050	23	750	MP	19×16	VBD±90		11.2
1000	**T14**	220, 240	3050	23	750	MP	18×17.5	VBD±90		11.2
1000	**CP52**	115/120	3200	27	200	MP	17×16	VBD±90		11.2
1000	**CP52**	220, 240	3200	26	200	MP	18.5×17.5	VBD±90		11.2



12.1



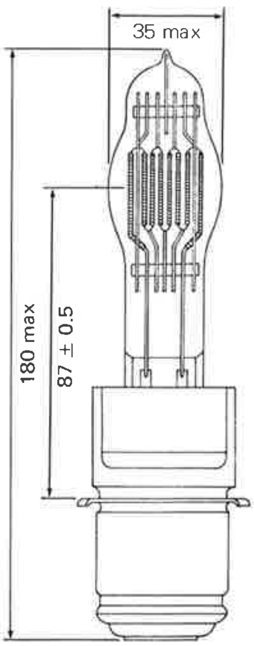
12.2



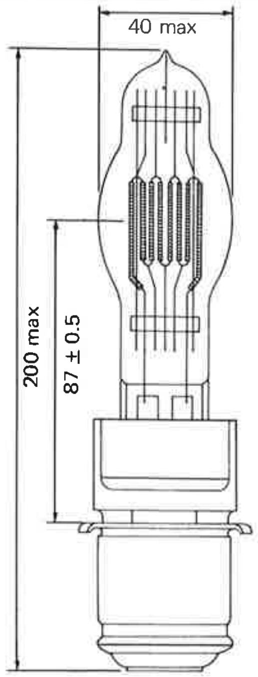
12.3

Table 12 P28 Base (Medium Prefocus) 88.9 LCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
500	EXF	120	2950	10.5	750	MP	12×15	VBU±45	E, X	12.1
750	EXB	120	3000	17	750	MP	15×13.5	VBU±45	E, X	12.2
1000	EXA	120	3050	24.5	750	MP	19×16	ANY	E, X	12.2
1000	**T15**	115/120, 220, 240	3050	23	750	MP	19×16 18×17.5	ANY	E	12.2
1000	EWE	220, 240	3200	26.5	250	CC	24×7	ANY	E, X	12.3



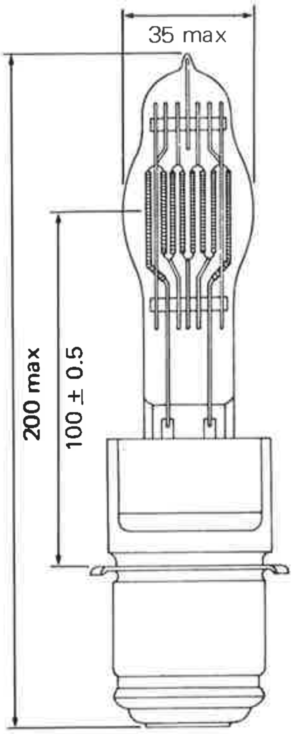
13.1



13.2

Table 13 P40 Base (Mogul Prefocus) 87 LCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
1000	**T16**	115/120 220, 240	3050	23	750	MP	19×16 18×17.5	VBD±90		13.1
1000	HX16	120	3050	24.5	750	MP	19×16	VBD±90	X	13.1
1500	DTA	120	3200	41	300	MP	19×17	VBD±90	X	132
2000	HX53	120	3200	58	400	MP	24×21.5	VBD±90	X	13.2
2000	**CP53**	115/120	3200	56	400	MP	24×21.5	VBD±90		13.2
2000	**CP53**	220, 240	3200	54	400	MP	22×22.5	VBD±90		13.2



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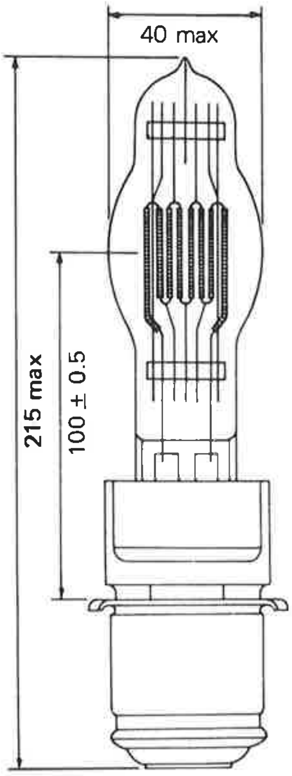
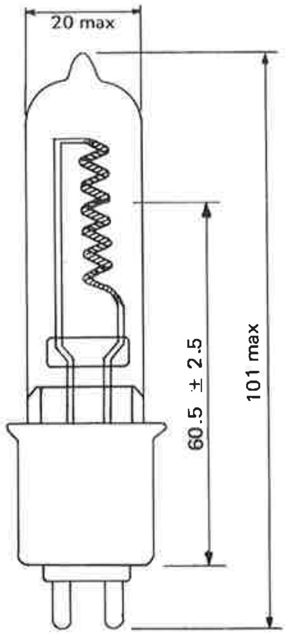


14.2

Table 14 P40 Base (Mogul Prefocus) 100 LCL

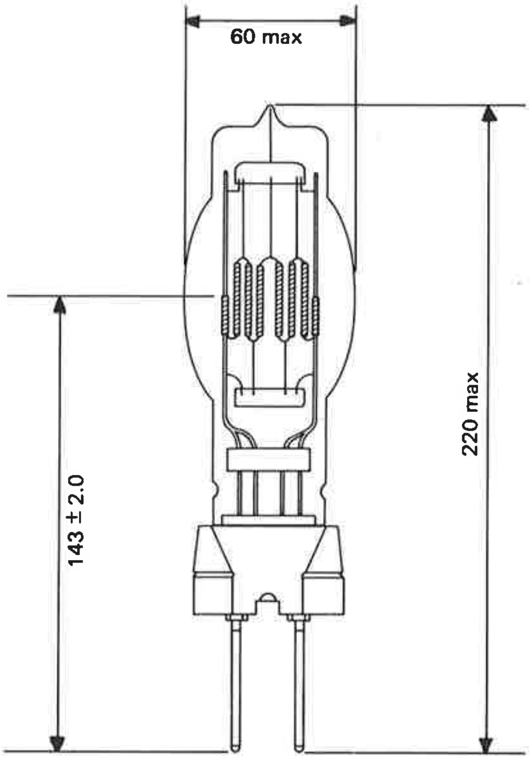
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
1000	BVT	120	3050	24.5	500	MP	19×16	VBD±90	E, X	14.1
1000	BVV	120	3200	28	250	MP	18.5×16	VBD±90	E, X	14.1
1500	CWZ	120	3200	41	300	MP	19×17	VBD±90	E, X	14.2
2000	BVW	120	3200	58	400	MP	24×21.5	VBD±90	E, X	14.2



15.1

Table 15 G9.5 Base (Med. 2 pin)

Watts	Lamp Code	ANSI	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
650	HX86		220, 240	3100	15	300	CC	24×7	ANY	X	15.1
750	—	EHG	120	3000	15	2000	CC	19×7	ANY	X	15.1
1000	**CP77**	FEP	220, 240	3200	26.5	300	CC	24×7	ANY	X	15.1
1000	**CP77**	FEL	120	3200	27.5	300	CC	18×7	ANY	X	15.1
1000	—	FCV	120	3200	26	300	CC	18×7	ANY	XD	15.1



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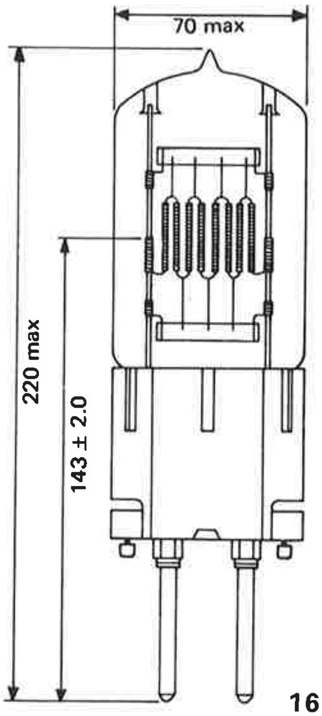
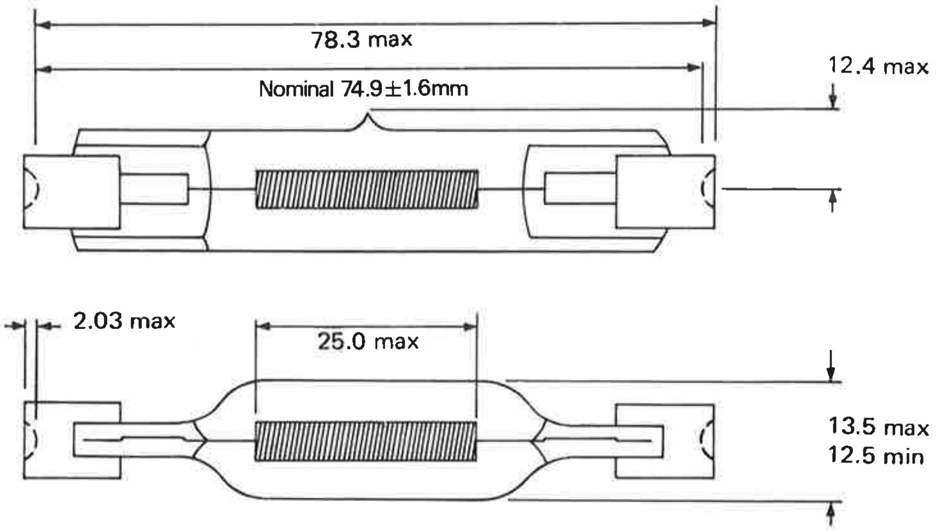


16.2

Table 16 GX38q Base

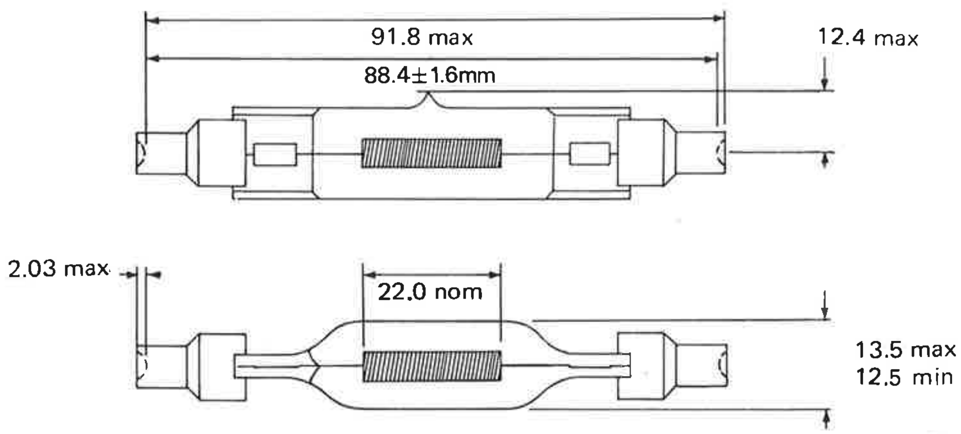
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament H×W	Burning Position	Notes	Fig. No.
1250/1250	**CP30**	220, 240	3200	27/56	300	TF	24×18.5	VBD±45	T	16.1
1250/2500	**CP58**	220, 240	3200	27/59/91	300	TF	27.5×25 25×22	VBD±45	M T	16.1
2500/2500	**CP32**	220, 240	3200	59/127	300	TF	27.5×29	VBD±45	T	16.2



17

Table 17 R7s Base (Recessed Single Contact) 78.3 MCL

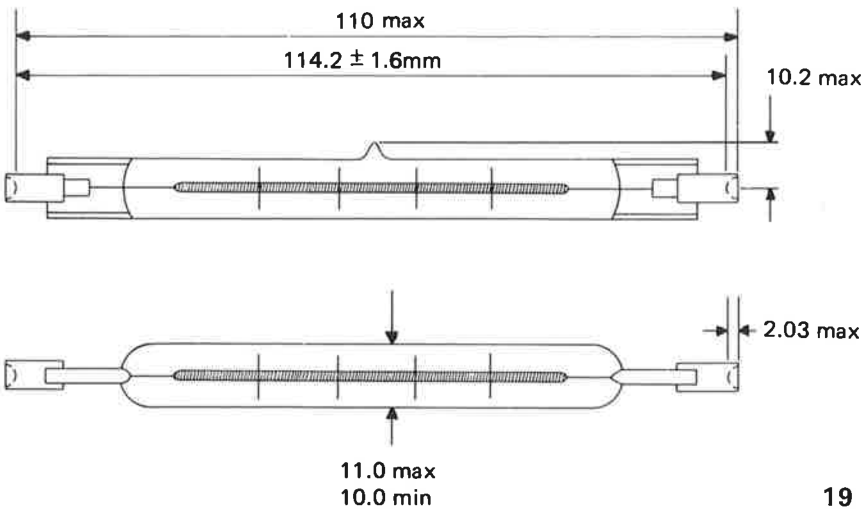
Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
650	**P2/6**	FAD	115/120	3200	17	100	CC	25	ANY		17
800	**P2/13**	DXX	220/230, 240/250	3200	20	75	CC	22	ANY		17



18

Table 18 R7s Base (Recessed Single Contact) 91.8 MCL

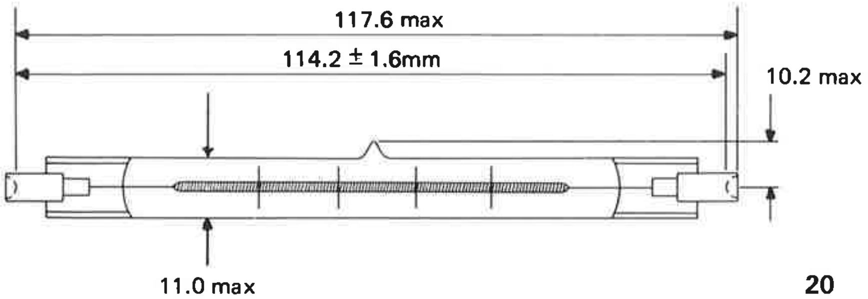
Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
800	**P2/14**		220/230, 240/250	3200	20	50	CC	22	ANY		18



19

Table 19 R7s Base (Recessed Single Contact) 107 MCL

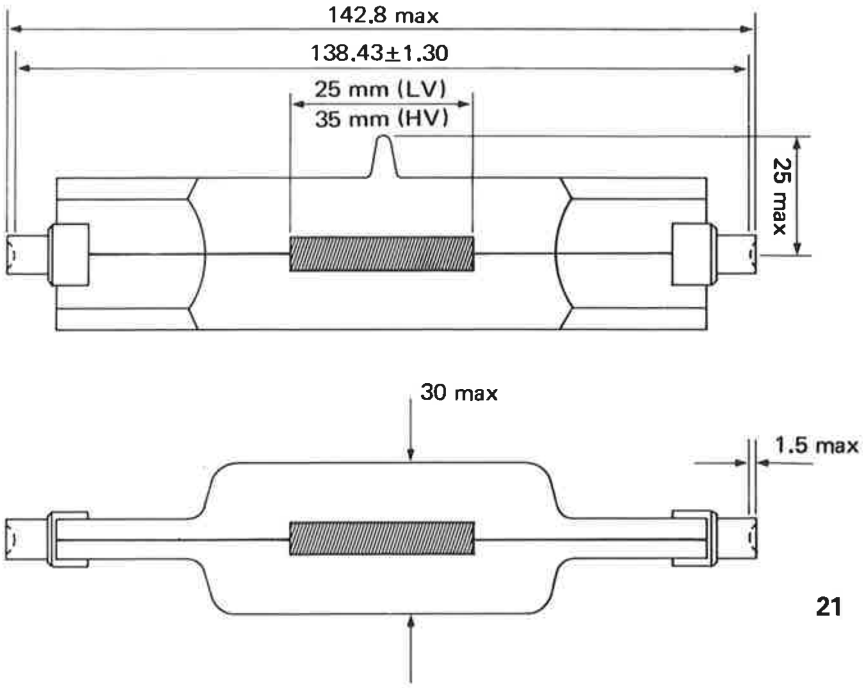
Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
1000		DYA	120	3200	28	150	SC		HOR±4		19
1000		DYN	120	3200	27	150	SC		HOR±4	D	19



20

Table 20 R7s Base (Recessed Single Contact) 117.6 MCL

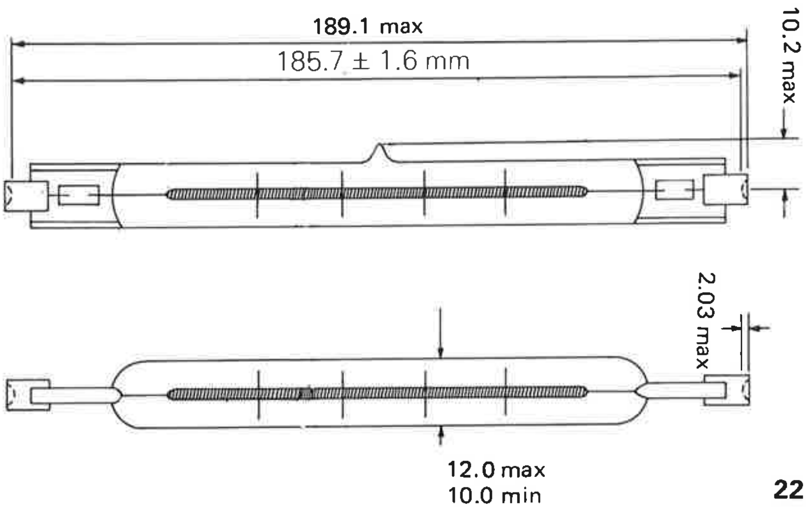
Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
500	**P2/30**	FDF	120	3200	13.25	400	SC	58	HOR±4		20
500	**P2/31**	FDN	120	3200	12.8	400	SC	58	HOR±4	D	20
800	**P2/11**		220/230, 240/250	3200	21.6	150	SC	68	HOR±4		20
1000	**P2/28**	FCM	120	3200	27	300	SC	74	HOR±4		20
1000	**P2/29**	FHM	120	3200	26.5	300	SC	74	HOR±4	D	20



21

Table 21 Rx7s Base (Recessed Single Contact) 141.2 MCL

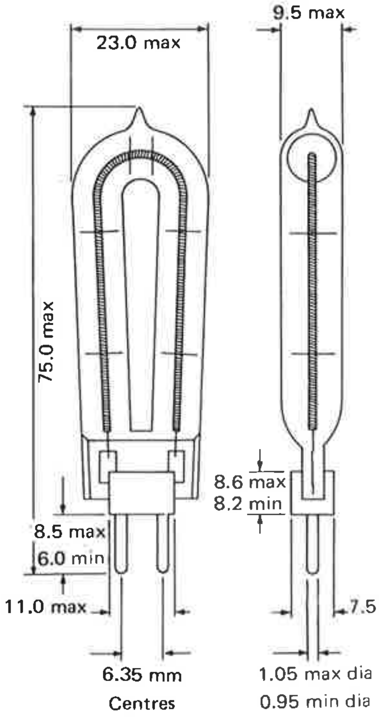
Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Life	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
2000	**P2/27**	FEY	120	3200	56.6	300	CC	25	ANY		21
2000	**P2/27**	FEX	220/230, 240	3200	50	300	CC	35	ANY		21



22

Table 22 R7s Base (Recessed Single Contact) 189.1 MCL

Watts	Lamp Code LIF	ANSI	Voltage	Col. Temp.	Lumens ×1000	Life	Filament Form	Filament Length	Burning Position	Notes	Fig. No.
625	**P2/10**		220/230, 240/250	3200	15.5	200	SC	120	HOR±4		22
1000	**P2/7**	EKM	220/230, 240/250	3200	26	200	SC	120	HOR±4		22
1250	**P2/12**		220/230, 240/250	3200	35	200	SC	120	HOR±4		22



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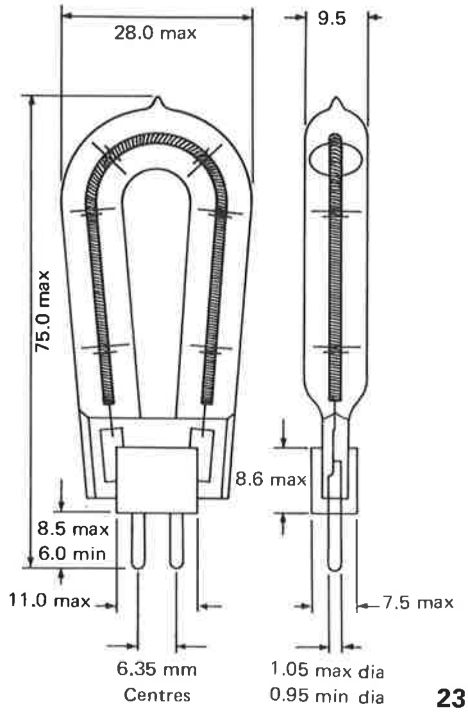
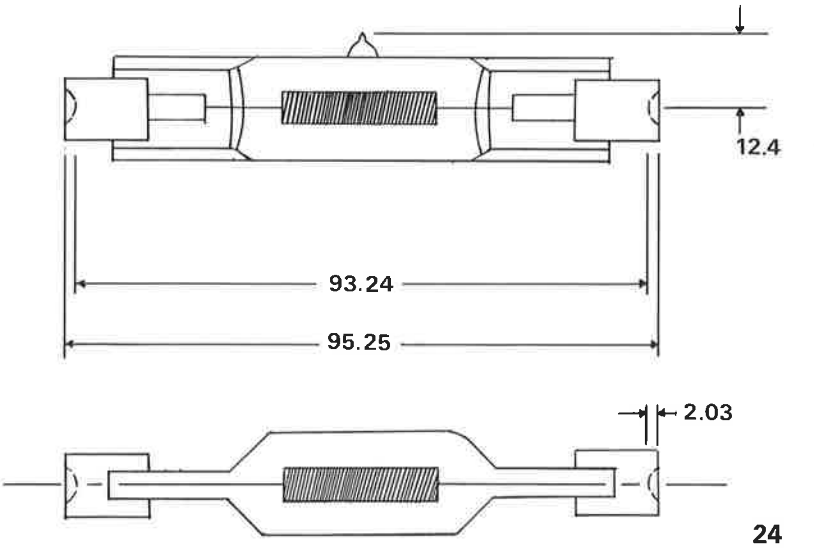


23.2

Table 23 G6.35 Base

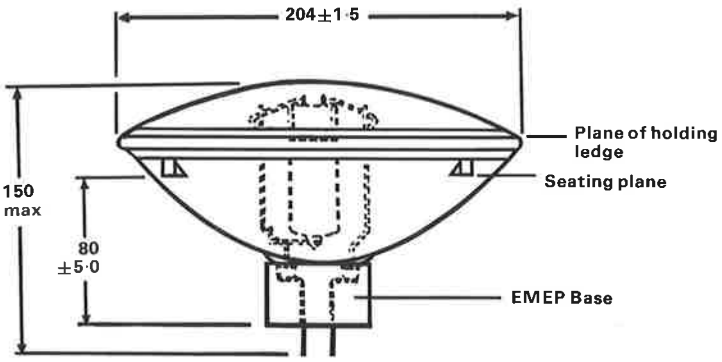
Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament	Burning Position	Notes	Fig. No.
650	**P2/16**	220/230, 240/250	3200	17.5	50	SC	VBD±90		23.1
850	**P2/25**	115/120	3200	23.0	50	SC	VBD±90		23.2
1000	**P2/17**	220/230, 240/250	3200	28.0	50	SC	VBD±90		23.1
1250	**P2/26**	220/230, 240/250	3200	35.0	50	SC	VBD±90		23.2



24

Table 24 R7s Base (Recessed Single Contact) 93.25 MCL

Watts	Lamp Code	Voltage	Col. Temp.	Lumens ×1000	Ave. Life Hrs	Filament Form	Filament Length	Burning Position	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



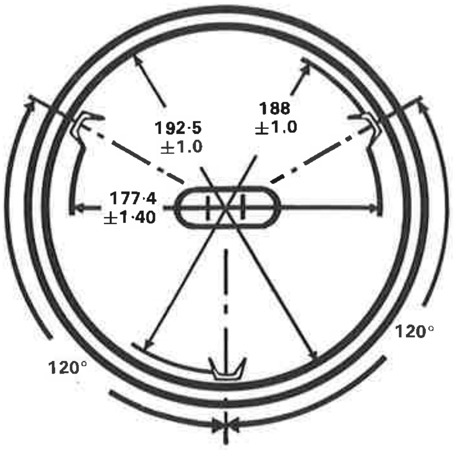


Table 25 Tungsten Halogen Par 64 Sealed Beam Lamp

Applications

For use with fittings designed for studio, theatre and similar applications. Available in three beam patterns.

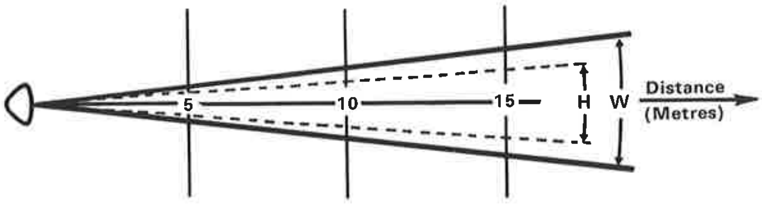
Characteristics

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

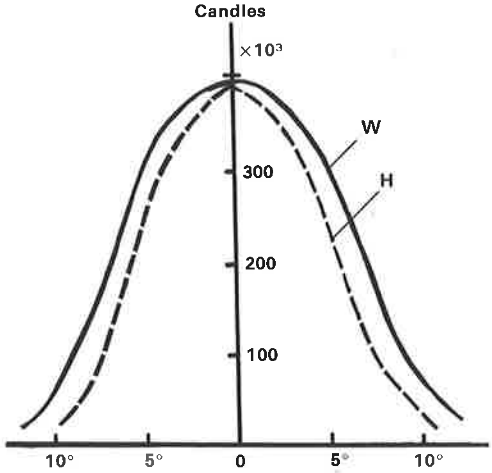
Luminous characteristics

Lamp references	CP60	CP61	CP62
ANSI Reference	EXC	EXD	EXE
	Clear 'Narrow Spot'	Stipple 'Spot'	Lens 'Flood'
Pk. Beam Candlepower	320,000	270,000	125,000
Beam Spread ½ Pk.	9°H×12°W	10°H×14°W	11°H×24°W
Beam Spread 1/10 Pk.	17°H×20°W	20°H×22°W	20°H×38°W

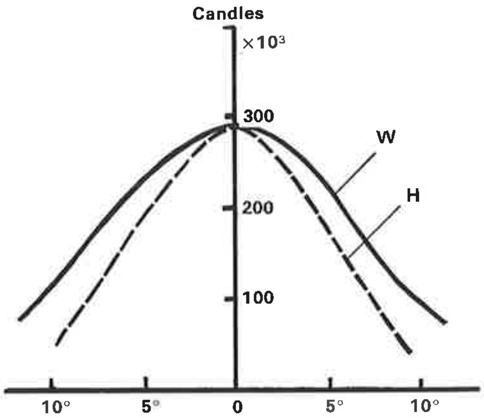
TYPE	FIELD SIZE FOR 50% PEAK (METRES H×W)		
CP60	0.8×1.1	1.6×2.1	2.4×3.2
CP61	0.9×1.3	1.8×2.5	2.6×3.7
CP62	1.0×2.2	2.0×4.5	2.9×6.7



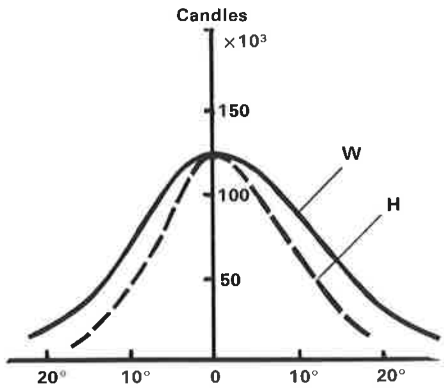
	PEAK ILLUMINATION (LUX)		
CP60	12800	3200	1420
CP61	10800	2700	1200
CP62	5000	1250	533



CP60



CP61



CP62

Halogen Lamp Substitution Guide

Competitors Lamp Requested L.I.F. Codes	T.L.L. Equivalent or Substitute	See Table Number	Notes
CP20	**CP32**	16	A
CP22	**CP30**	16	A
CP26	**CP29**	8	A, C
CP28	**CP53**	13	A
CP33	**CP39**	5	A
CP34	**CP41**	7	A
CP42	**CP41**	7	A
CP44	**CP40**	5	A
CP46	**CP29**	8	A
CP49	**CP51**	11	A
CP50	**CP54**	9	A
CP57	**CP58**	16	A
T9	**T11**	3	B
T10	**T12**	3	B

Osram Codes

50042	**CP51**	11	A
50055	**T4** **T15**	10 12	E A
50252	**CP53**	13	A
51233	**HX37**	6	A, C
51235	**CP39**	5	A
51503	**CP41**	7	A
51703	**CP29**	8	A, C
51805	**CP54**	9	A
64719	**T12**	3	D
64720	**CP23**	3	
64721	**CP39**	5	
64744	**T11**	3	D
64745	**CP24**	3	
64747	**CP40**	5	
64788	**CP43**	2	
64789	**CP41**	7	

Philips Codes

5970P	**CP41**	7	
6362P	**CP23**	3	
6363P	**CP24**	3	
6364P	**CP43**	2	
6376C	**CP51**	11	A
6376P	**CP39**	5	A
6377C	**CP43**	2	A
6377P	**CP41**	7	A
6378P	**CP29**	8	A
6928P	**T11**	3	
6940P	**T12**	3	

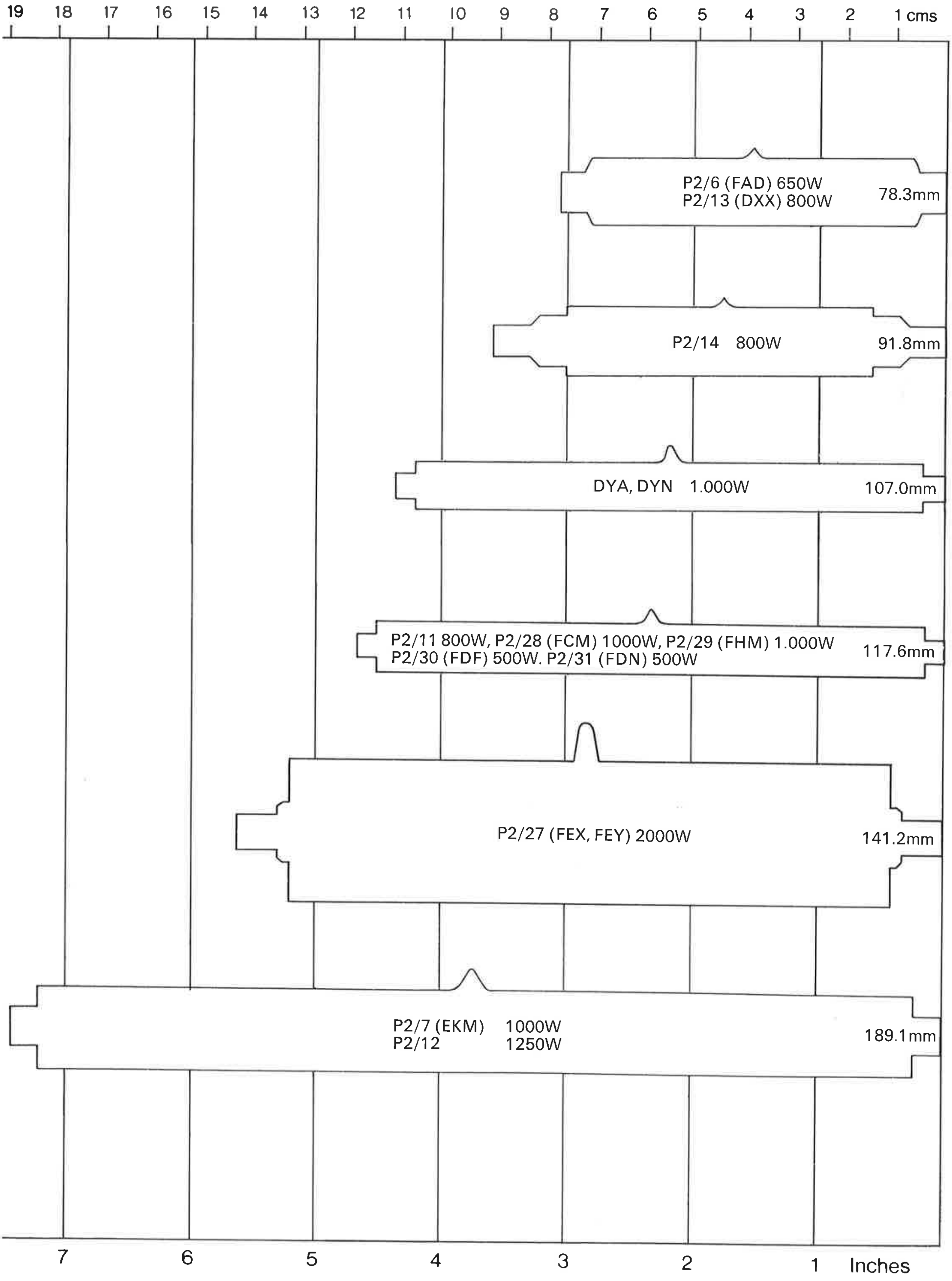
Competitors Lamp Requested Philips Codes cont.	T.L.L. Equivalent or Substitute	See Table Number	Notes
7761P	**CP40**	5	A
7796C	**CP52**	11	A
7801P	**CP39**	5	
7802P	**CP40**	5	
13111P	**CP54**	9	A
6993	**CP23**	3	F
	CP51	11	F
	CP39	5	F
6994	**CP41**	7	F
	HX33	2	D
	HX26	1	F
	CP53	13	F
6995	**CP24**	3	F
	CP40	5	F
6996	**T14**	11	F
	T11	3	F
6997	**T15**	12	F
6998	**T13**	11	F
	T12	3	F

Radium			
H138C	**CP51**	11	A
H165Q	**CP53**	13	B
H360Y	**HX37**	6	D
H361Q	**CP53**	13	D
H365Y	**CP39**	5	A
H374X	**CP41**	7	A
H375X	**CP41**	7	A
H378X	**CP29**	8	A, C
H379X	**CP54**	9	
H933C	**T15**	12	A
RH653P	**CP23**	3	
RH653Y	**CP39**	5	
RH657P	**T12**	3	D
RH1003P	**CP24**	3	
RH1003Y	**CP40**	5	
RH1007P	**T11**	3	D
RH2003P	**CP43**	2	
RH2003X	**CP41**	7	

A – T.L.L. lamp is quartz longer life version of lamp requested.
B – T.L.L. lamp is longer life version of lamp requested.
C – T.L.L. lamp is quartz higher light output version of lamp requested.
D – T.L.L. lamp is higher light output version of lamp requested.
E – T.L.L. lamp is non-halogen version of lamp requested.
F – T.L.L. lamp is monoplane filament higher light output.

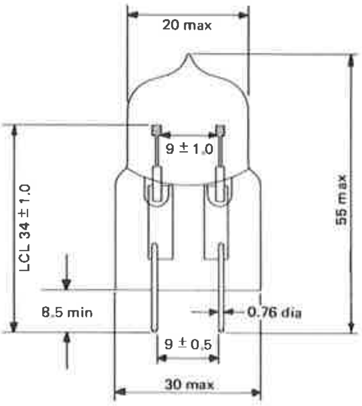
Class P2 Linear Lamps 3200°K

NB. Dimensions indicated on this chart are maximum clearance lengths.



Standard Lamps

99-0201



99-0221

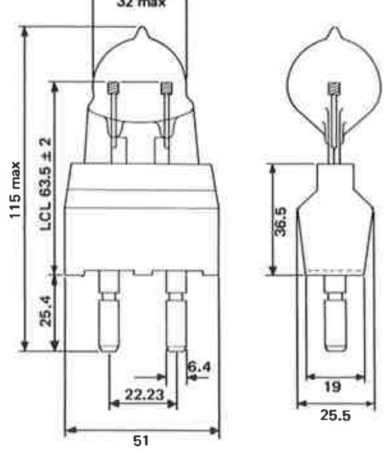


Table 26

Lamp Code	99-0201
Watts	400
Supply Volts Any Between	100-240AC
Arc Volts	100 nom
Cap	2 pin, 9.0mm ±0.5 spacing
Initial Lumens	32,000
Lumen Maintenance	90%
Average life	500 hours
Operating Position	ANY
Arc Length	9.0±1.0mm
Correlated Colour Temperature (K)	3500±400
Chromacity Co-ordinates Centred at	X=.405 Y=.390

Table 27

Lamp Code	99-0221
Watts	1000
Supply Volts Any Between	100-240AC
Arc Volts	77 nom
Cap	G22
Initial Lumens	90,000
Lumen Maintenance	90%
Average life	500 hours
Operating Position	ANY
Arc Length	14-15mm
Correlated Colour Temperature (K)	4100±400
Chromacity Co-ordinates Centred at	X=.376 Y=.374

Hot Restrike

99-0421

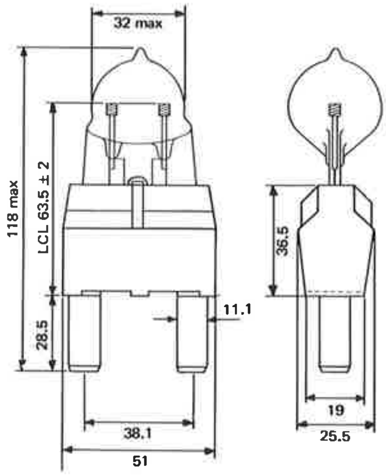


Table 28

Lamp Code	99-0421
Watts	1000
Supply Volts Any Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Lumens	90,000
Lumen Maintenance	90%
Average life	500 hours
Operating Position	ANY
Arc Length	14-15mm
Correlated Colour Temperature (K)	4100±400
Chromacity Co-ordinates Centred at	X=.376 Y=.374

Compact Source Iodide Lamps (C.S.I.)

Small CSI
99–2241

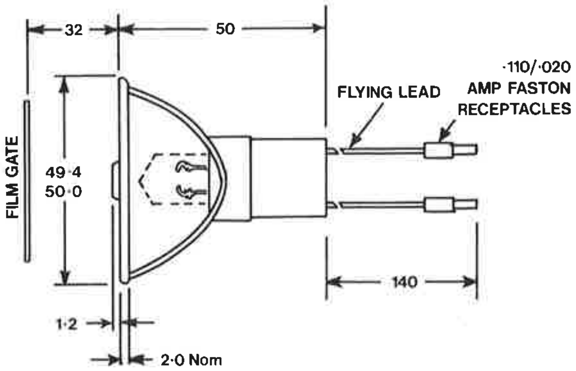


Table 29

Lamp Code	99-2241
Arc Watts	185
Supply Volts	240*
Arc Volts	62 nom
Arc Current	3
Arc Length	2.5
Cap	Flying Leads
Initial Efficacy	70 L/W
Screen Lumens (Open Shutter, Super 8 Gate)	800
Diversity Factor	65%
Life : Nom. Objective	250 hours
Correlated Colour Temperature (K)	4000
Colour Rendering	Good

*H.F. Supply will also operate from 100, 115/120, 120 through 240V ratings.

Par 64 Standard
99-1222

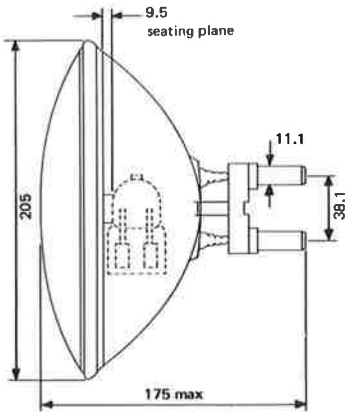


Table 30

Lamp Code	99-1222
Watts	1000
Supply Volts Any Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Beam Candlepower (Peak) Beam Spread $^1/_2$ Peak Beam Spread $^1/_{10}$ Peak	1.5 million Cds 8° 18°
Lumen Maintenance	90%
Average life	1500 hours
Chromacity Co-ordinates Centred at	X=.376 Y=.374
Operating Position	ANY
Correlated Colour Temperature (K)	4100±400

Par 64 Hot Restrike
99-1422

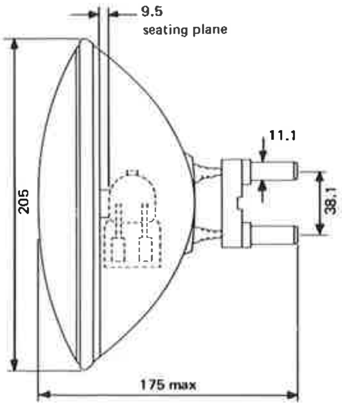


Table 31

Lamp Code	99-1422
Watts	1000
Supply Volts Any Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Beam Candlepower (Peak) Beam Spread $^1/_2$ Peak Beam Spread $^1/_{10}$ Peak	1.5 million Cds 8° 18°
Lumen Maintenance	90%
Average life	1500 hours
Chromacity Co-ordinates Centred at	X=.376 Y=.374
Operating Position	ANY
Correlated Colour Temperature (K)	4100±400

Compact Iodide Daylight (C.I.D.) Bare Lamps

Standard
99-0222

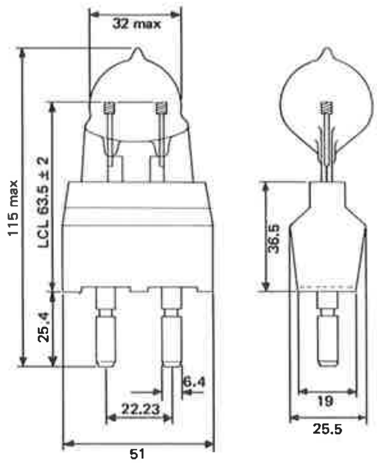


Table 32

Lamp Code	99-0222
Watts	1000
Supply Volts Any, Between	100-240AC
Arc Volts	77 nom
Cap	G22
Initial Lumens	70,000
Lumen Maintenance	90%
Average life	500 hours
Operating position	ANY
Correlated Colour Temperature (K)	5500±400
Colour rendering index Ra	85 Class 1
Chromacity Co-ordinates Centred at	X=0.333 Y=0.341

Hot Restrike
99-0422

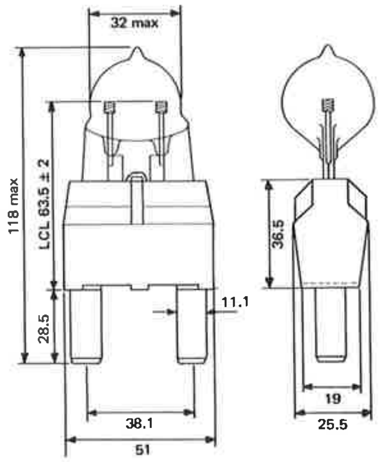


Table 33

Lamp Code	99-0422
Watts	1000
Supply Volts Any, Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Lumens	70,000
Lumen Maintenance	90%
Average life	500 hours
Correlated Colour Temperature (K)	5500±400
General Colour Rendering Index Ra	85 Class 1
Chromacity Co-ordinates Centred at	X=0.333 Y=0.341
Operating Position	ANY
Arc Length	14-15mm

99–0431

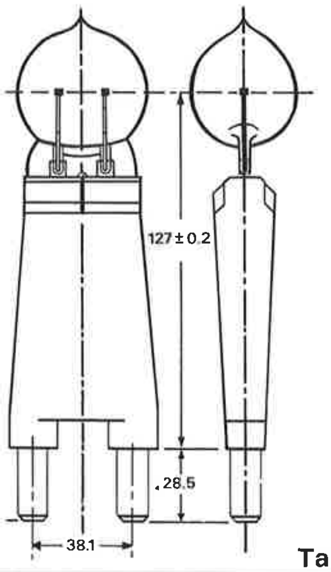


Table 34

Lamp Code	99-0431
Watts	2500
Supply Volts Any Between	100-240AC
Arc Volts	100 nom
Cap	G38
Initial Lumens	200,000
Lumen Maintenance	90%
Average life	350 hours
Correlated Colour Temperature (K)	5500±400
General Colour Rendering Index Ra	85 Class 1
Chromacity Co-ordinates Centred at	X=0.333 Y=0.341
Operating Position	ANY
Arc Length	16mm

Compact Iodide Daylight (C.I.D.) Sealed Beam Lamps

Par 64
99–1225 Standard

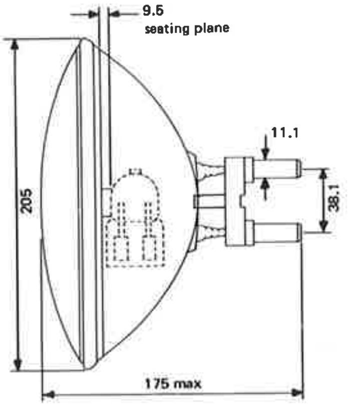


Table 35

Lamp Code	99-1225
Watts	1000
Supply Volts, Any, Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Beam Candlepower (Peak) Beam Spread $^1/_2$ Peak Beam Spread $^1/_{10}$ Peak	850,000 Cds. 8° 18°
Lumen Maintenance	90%
Average Life	1000 hours
Correlated Colour Temperature (K)	5500±400
Colour rendering index Ra	85 Class 1
Chromacity Co-ordinates Centred at	X=0.333 Y=0.341
Operating position	ANY

Par 64
99–1425 Hot Restrike

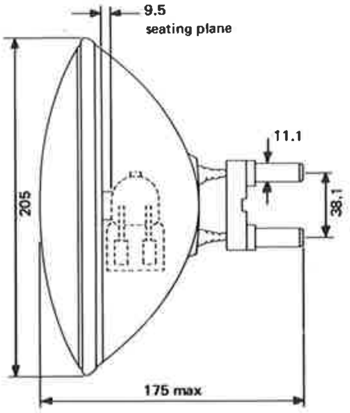
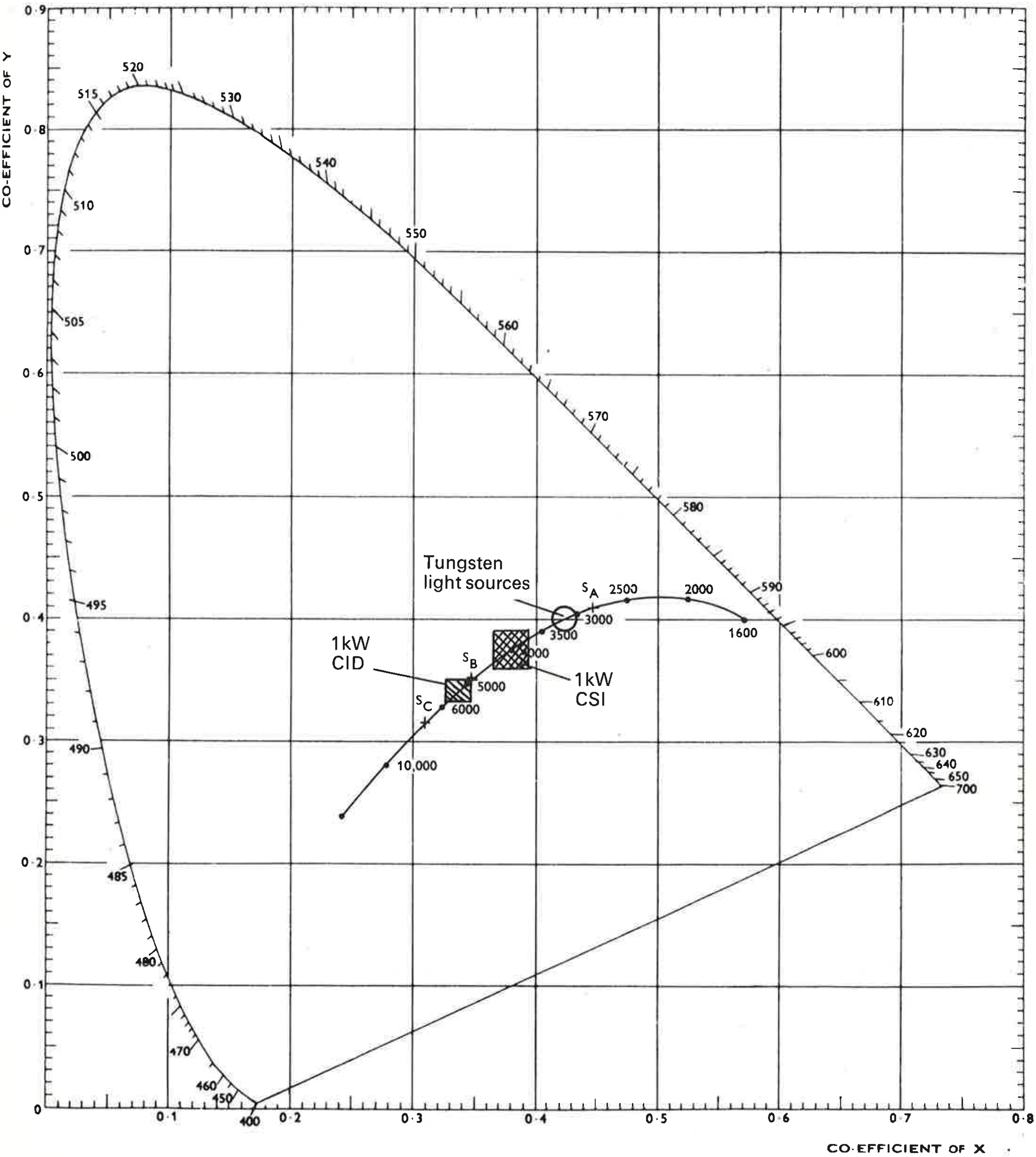


Table 36

Lamp Code	99-1425
Watts	1000
Supply Volts Any, Between	100-240AC
Arc Volts	77 nom
Cap	G38
Initial Beam Candlepower (Peak) Beam Spread $^1/_2$ Peak Beam Spread $^1/_{10}$ Peak	850,000 Cds 8° 18°
Lumen Maintenance	90%
Average life	1000 hours
Correlated Colour Temperature (K)	5500±400
General Colour Rendering Index Ra	85 Class 1
Chromacity Co-ordinates Centred at	X=0.333 Y=0.341
Operating position	ANY

C.I.E. Trichromatic Co-ordinates with Spectrum
Wavelengths in Millimicrons and Standard Illuminants A, B and C



Note : Tolerance of ±400 K at 5500 K is smaller than ±400 K at 4100 K.
Colour temperature curve relates to black body radiators.

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