Catalogue 1986/87

SYLVANIA GTE

Efficient Lighting Solutions

GTE Sylvania Ltd.
Otley Road
Charlestown
Shipley
West Yorkshire BD17 7SN
Tel. 0274 595921
Telex 51 251

Regional Order Points:
Glasgow 041-248 6306
London 01-242 7666

PRINTED IN SWITZERLAND 5121-1/86-UK

SYLVANIA GTE

Table of Contents

In the U.K. Sylvania has been established since 1976 with headquarters at Shipley in West Yorkshire.

A massive investment programme was completed in 1981 with our new factory, office and warehouse complex.

U.K. production, warehousing, distribution, customer services and marketing are all based on this one site.

This investment gives Sylvania the first purpose built lamp factory in the U.K. for more than 20 years, and underlines the company's confidence in and commitment to the British Market.

At Sylvania we apply the same stringent standards to our service as we do to our manufacturing. We take great pains to ensure the quality of our sales, delivery, technical and commercial assistance. On-line computers help our staff provide instant information about stocking, invoicing, delivery — literally any question customers might have about their dealings with the company.

Our policy of only supplying our products through the electrical wholesale channel ensures the best possible local service for contractors, retailers and industrial and commercial users of light.

Our technical sales engineers are always available to advise you on technical as well as commercial aspects in lighting including a lighting design service.

For every kind of lighting problem, big or small, more and more people are turning to Sylvania, your supplier when capability and service count.

GTE Sylvania Ltd., Shipley, West Yorkshire.

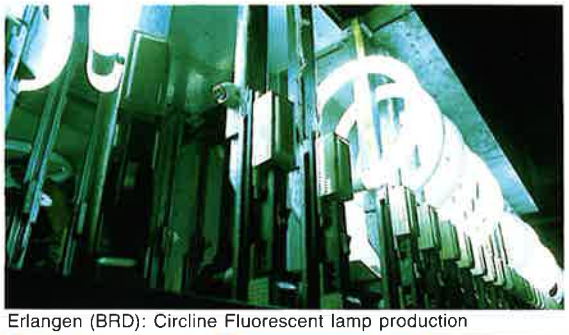
SYLVANIA GTE

Efficient Lighting Solutions

GTE Sylvania
European Manufacturing Plants

Tienen (Belgium): Incandescent lamps, Photo flashlamps

Lyon (France): Deko lamps, Incandescent lamps



Erlangen (BRD): Circline Fluorescent lamp production

Erlangen (BRD): Fluo lamps, Halogen-, Projector lamps, Projectors

La Fouillouse (France): Lighting Fittings

Reims (France): HID lamps

Inspection of current production in Erlangen

Shipley, West Yorkshire (England): Lynx Compact Fluorescent, Sodium Arc Tube, plus T5 and T8 Special Fluorescent lamp production

Quality control in Tienen

GTE Corp.

One of the world's leading telecommunication and electronics companies.

Sylvania is backed by the full resources of one of the world's largest industrial organizations, the General Telephone & Electronics Group. That's the GTE in GTE'Sylvania – which represents over 200,000 employees, 150 research, manufacturing and service facilities with an annual turnover of $ 13 billions.

GTE at a Glance

GTE Telephone Operating Group

Telephone Companies

19 companies in the US and Canada provide local telephone service and sell or lease phones and terminals.

GTE Directories

Sells Yellow Pages advertising and publishes hundreds of types of telephone directories.

GTE Mobilnet

Provides cellular mobile radio telephone service.

GTE Diversified Products and Services Group

Communications Products

GTE Communication Systems

Supplies complete line of communications equipment, systems, and support services, including digital switching and PABX systems, transmission equipment and residential and business telephone products.

Sylvania Systems Group

Reconnaissance systems, command, control and communications systems, tactical telephone switching networks, laser and electro-optical devices, lithium battery power systems, and satellite earth stations.

GTE Sprint

Operates third largest long-distance telephone system in United States.

GTE Telenet

Operates nationwide data communications network utilizing "packet-switching", also provides Telemail service and markets medical and financial information services.

GTE Lighting Products

Manufactures more than 6000 types of Sylvania lamps. Also produces photographic lighting products, lamp fixtures and related products.

GTE Precision Materials

Manufactures metal, plastic and ceramic materials, parts and components, specialty and refractory metals, high-purity chemicals and electronic and electrical assemblies.

Lighting Fittings

SYLVANIA GTE

The technical information contained in this literature is given for guidance only and is subject to change without notice.

Fluorescent Lamps
Starters

Technical Notes

Product Information

Incandescent Lamps

Tungsten Halogen Lamps

2.40.1	**Hi-Light ES** Tungsten Halogen Floodlight Lamps	**225 V, 245 V;** 450 W, 900 W, 1250 W, 1750 W
2.41.1	Standard Tungsten Halogen Floodlight Lamps	**225 V;** 250 W, 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W
2.41.2	Standard Tungsten Halogen Floodlight Lamps	**245 V;** 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W
2.41.3	Standard Tungsten Halogen Floodlight Lamps	**120 V;** 300 W, 500 W
2.42.1	Single-ended High Voltage Tungsten Halogen Lamps	**225 V, 245 V;** 250 W Mini-can, 250 W E14, 250 W E27
2.43.1	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps without reflector	**12 V;** 20 W/G4, 50 W/GY 6.35, 100 W/GY 6.35, 50 W/GY 6.35 for traffic signals
2.43.2	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps with 48 mm dia. metal reflector	**12 V;** 20 W 10° Spot/G4, 20 W 15° Flood/G4
2.43.3	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps with 70 mm dia. metal reflector	**12 V;** 20 W 10° Spot/BA15d; 30° Flood/BA15d **12 V;** 50 W 10° Spot/BA15d; 30° Flood/BA15d
2.44.1a	**Hi-Light Tru-Aim** Low Voltage Tungsten Halogen Lamps with 50 mm dia. dichroic reflector	
2.44.1b	ENL Data	12 V 50 W 30° Narrow Flood
2.44.2b	EXN Data	12 V 50 W 38° Flood
2.44.3b	ESX Data	12 V 20 W 12° Narrow Spot
2.44.4b	EYR Data	12 V 42 W 12° Narrow Spot
2.44.5b	EXT Data	12 V 50 W 13° Narrow Spot
2.44.6b	EYF Data	12 V 75 W 14° Narrow Spot
2.44.7b	EXZ Data	12 V 50 W 24° Spot
2.44.8b	BAB Data	12 V 20 W 36° Flood
2.44.9b	EYC Data	12 V 75 W 38° Flood
2.45.1	**Hi-Light Tru-Aim** Low Voltage Tungsten Halogen Lamps with 50 mm dia. coloured dichroic reflector	**12 V;** 50 W 13° Spot in red, yellow, green, blue

High Intensity Discharge Lamps

Technical Notes

Fluorescent Lamps
Starters

SYLVANIA GTE

Efficient Lighting Solutions

PRINTED IN SWITZERLAND 2011 96

Technical Notes

Light Colour and Lamp Applications

Light and Colour

"White light" is a popular expression which summarizes our perceptions of the differing values of light from blue through to deep red when seen together. Daylight varies across the same range of White light, depending on latitude, season, weather and time of day, moreover it is uncontrollable. An electric light source such as fluorescent can be engineered to give white light suitable to the visual task and is controllable. This in a sense is a benefit compared with natural sunlight.

The colouration of an object is perceived from the reflected or transmitted light from that object, other colours are absorbed.

An understanding of the interaction of the light colour with objects and the ambient environment perceived when illuminated by a fluorescent light source, enables us to create satisfactory colour rendition appropriate to the visual needs.

The following pages contain a number of diagrams which describe the colour characteristics of the various fluorescent lamp colours available today.

A brief study of the relative amounts of light emitted in the blue region (380-480 nm), the yellow-green (550-660 nm), and the red region (600-720 nm) gives a good indication of the colour-tone emphasis a particular lamp type can give.

A quick-reference table to facilitate the correct lamp colour choice for a given application is given below.

In order to better understand the characteristics of each lamp colour and why they are recommended for certain applications a brief description of their respective colour performance is given:

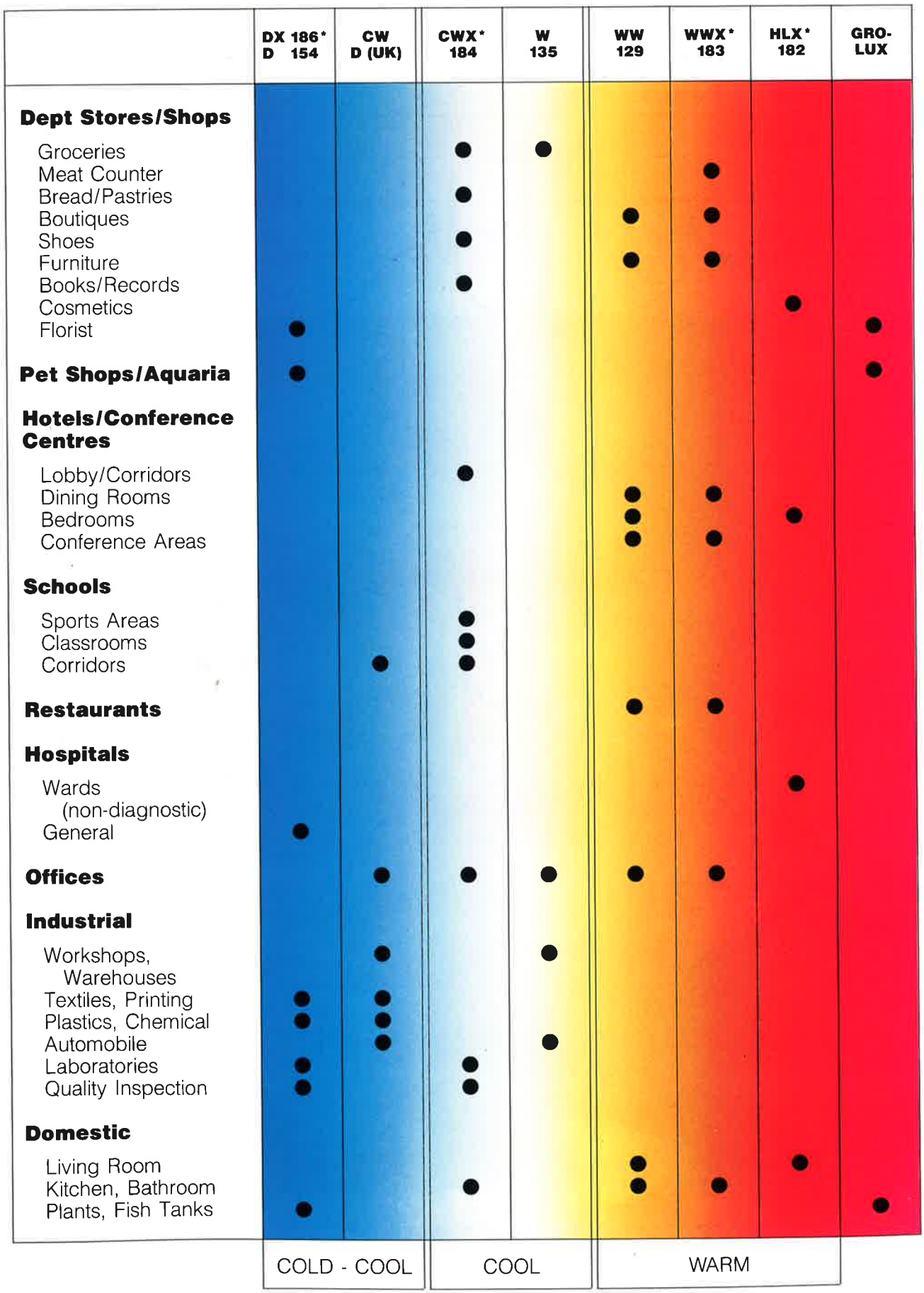
Lamp Colour	**Light Source Colour Appearance**	**Colour Rendering Properties**	**Comments**
DX - 186 D - 154	Cold colour Appearance	Very good	Favoured for industrial processes involving colour judgements
CW - 133 (DAYLIGHT - UK) W - 135	Cool colour Appearance	Fair	General purpose lamps for industrial use
Natural UW - 125	Cool colour Appearance	Very good	For offices and general commercial use
CWX - 184	Cool colour Appearance	Excellent	Department stores and prestige office applications
WW - 129	Warm colour Appearance	Fair	A general purpose lamp where a 'warm' light colour is preferred
WWX - 183 HLX - 182	Warm incandescent-like colour appearance	Excellent	Preferred for high 'people density' applications — good rendition of skin tones

Colour description (1)	Approx. correlated colour temperature (k)	Approximate colour appearance (x & y coordinates) x	y	**Sylvania** abbreviation	Philips code (2)	Thorn code (2)	GEC Osram*	Wotan
Homelight de Luxe 182	2700	0.464	0.411	HLX **182**	—	—	—	Maxilux Interna
Warm White de Luxe 183	3000	0.435	0.405	WWX **183**	83	Polylux 3000	—	Maxilux Warm White
Warm White	3000	0.435	0.405	WW	29	Warm White	Warm White	Low-Watt Warm White
White	3500	0.410	0.400	W	35	White	White	Low-Watt Warm White
Natural	4000	0.378	0.365	N	25	Natural	Natural	—
Cool White de Luxe 184	4000	0.382	0.382	CWX **184**	84	Polylux 4000	—	Maxilux Daylight
Cool White	4300	0.372	0.380	CW	33	Cool White	Cool White	Low-Watt Cool White
Daylight de Luxe 186	6000	0.318	0.334	DX **186**	86	—	—	—
Northlight/Colour Matching	6500	0.317	0.324	CM	55	Northlight	Colour Matching	—

(1) Selection of popular types; information on other colours available on request.
(2) Nearest equivalent.

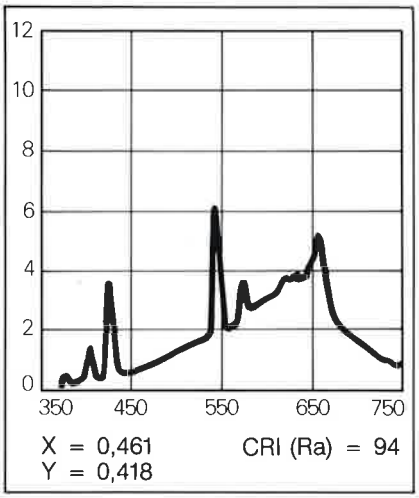
Applications and lamp colours

Note: Triphosphor types (*) are to be considered highly for their excellent combination of light output and colour. (see sections — LUXLINE-ES)

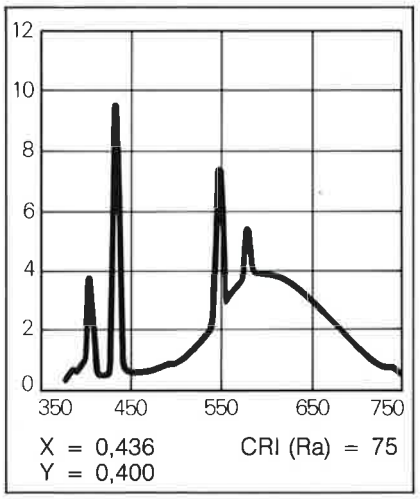


Spectral Power Distribution Data

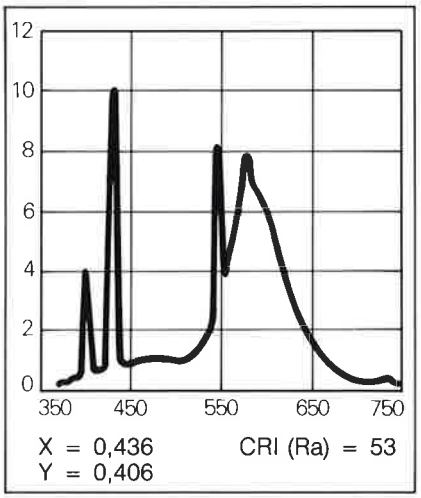
Standard and de Luxe Colours



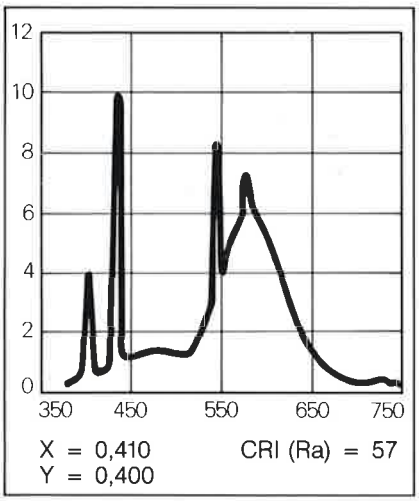
Incandescent fluorescent



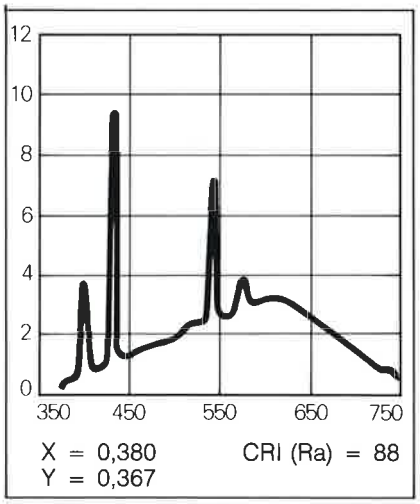
Warmwhite de Luxe



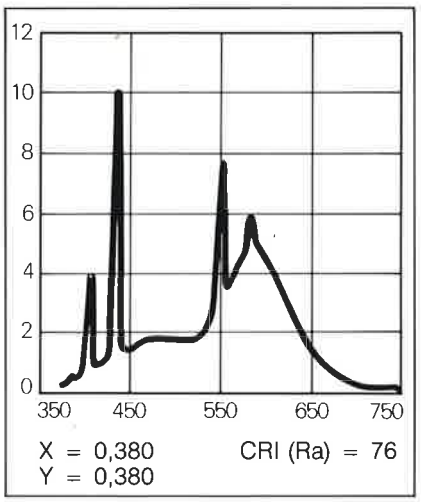
Warmwhite



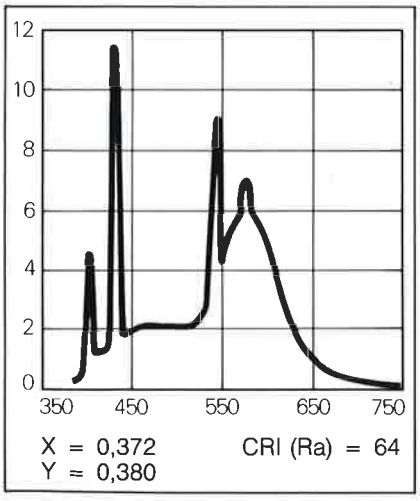
White



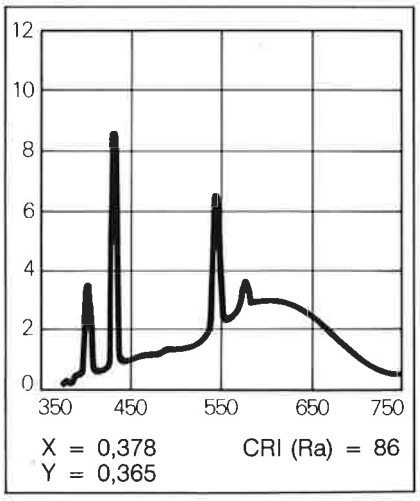
Coolwhite de Luxe



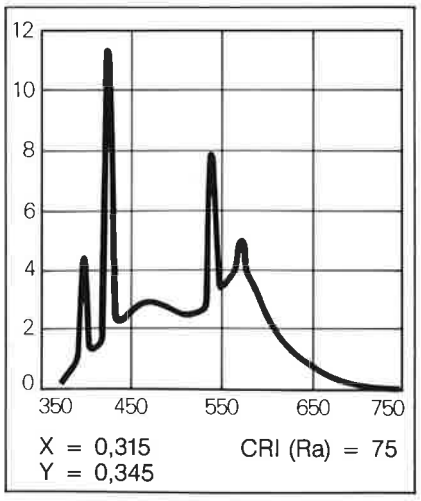
Universal white



Coolwhite (Daylight UK)



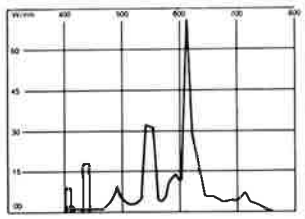
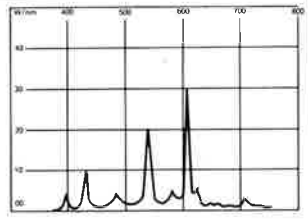
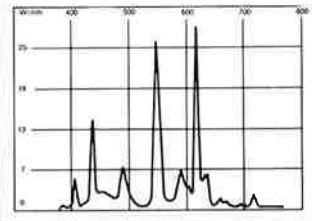
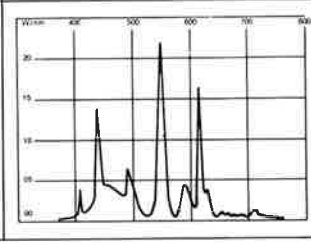
Natural

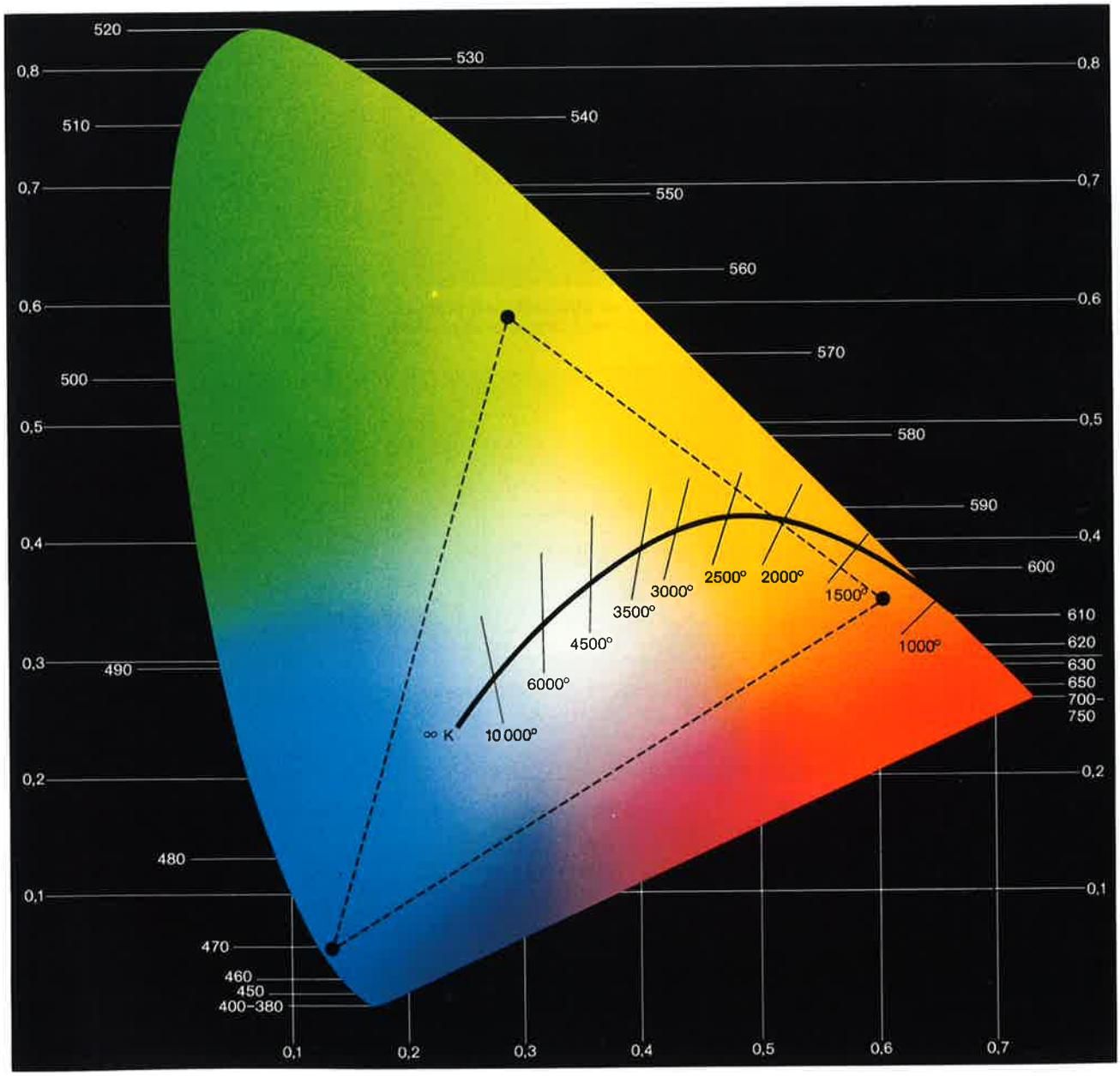


Daylight

Multiply vertical scales with 0.01 for Watt/nm.

LUXLINE-ES Triphosphor Colours

HLX 182	WWX 183	CWX 184	DX 186
2700 K	3000 K	4000 K	6000 K
85 Ra	85 Ra	85 Ra	85 Ra
X = 0.464	X = 0.435	X = 0.382	X = 0.318
Y = 0.411	Y = 0.405	Y = 0.382	Y = 0.334
			



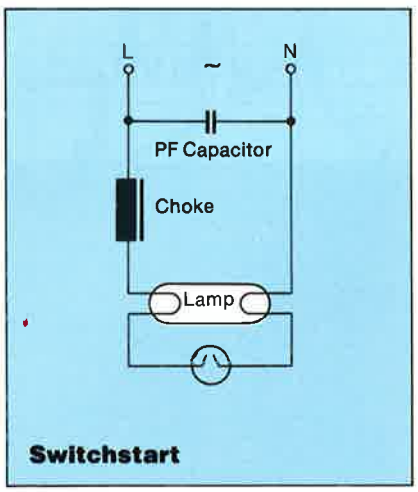
The CIE Chromaticity Chart shows the X-Y location of these 3 phosphors. Basically, depending on the proportions used in the phosphor mix, any lamp colour can be made within the triangle between the 3 single phosphors.

Operating Circuits

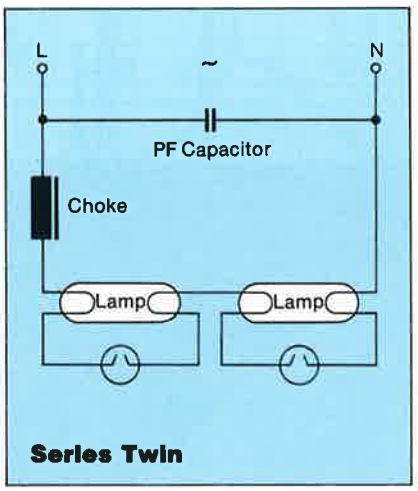
The Switch Start — The most common circuit using a choke and a glow starter, which effects electrode pre-heating. When the starter contacts open the choke supplies the starting voltage. Reliable starting is from +5°C to +50°C.

The Series Twin — A circuit used for most lamps up to 20 W. Two fluorescent lamps are run in series on one choke but with individual starters operating as above.

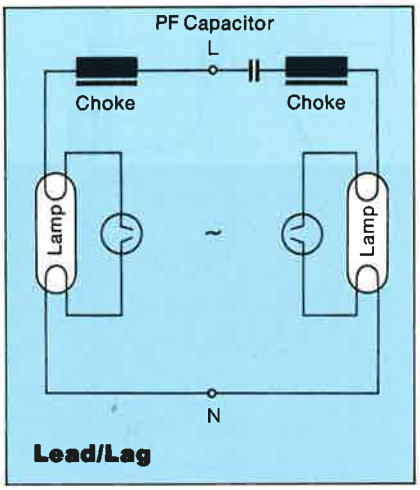
The Lead/Lag — A common circuit combination for twin-lamp fixtures, with high power factor and less likelihood of flicker.



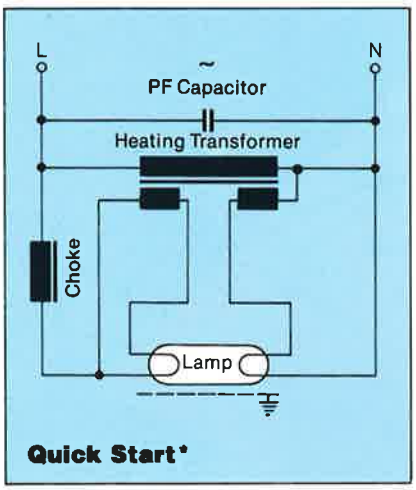
Switchstart



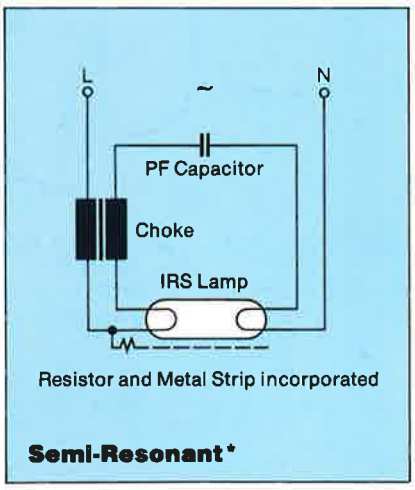
Series Twin



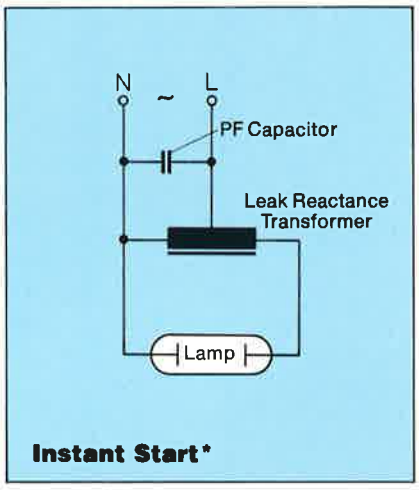
Lead/Lag



Quick Start*



Semi-Resonant*



Instant Start*

The Quick Start — A circuit giving flicker-free instant starting and thus increased lamp life. The lamp is operated in series with a standard choke; the electrode pre-heating voltage is provided by a separate transformer. Reliable starting is from +10°C to +40°C.

The Semi-Resonant Start — A circuit with flicker-free instant start and electrode pre-heating. An electrical resonance occurs between the secondary winding of the choke and the capacitor, amplifying the mains voltage for starting the IRS metal striped lamp. The resonance stops after starting and the capacitor assumes a power factor correction function. Reliable starting is from 0°C to +50°C.

The Instant Start — An instant starting circuit without electrode pre-heating using cold cathode single pin fluorescent lamps. A leak reactance transformer amplifies the mains to a reliable starting voltage and then acts as a choke. Reliable starting is from —5°C to +50°C.

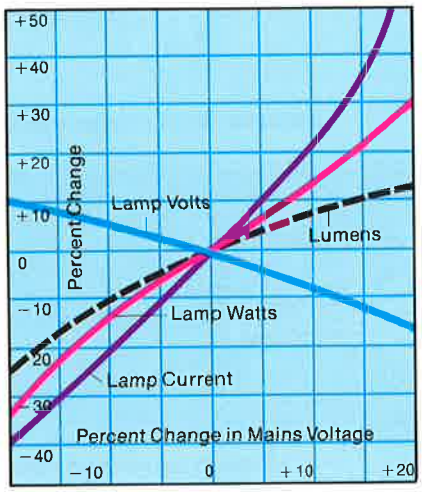
* This circuit not suitable for 26 mm ES fluorescent lamps.

Lamp Operating Characteristics — T12 Lamps 20 W - 125 W

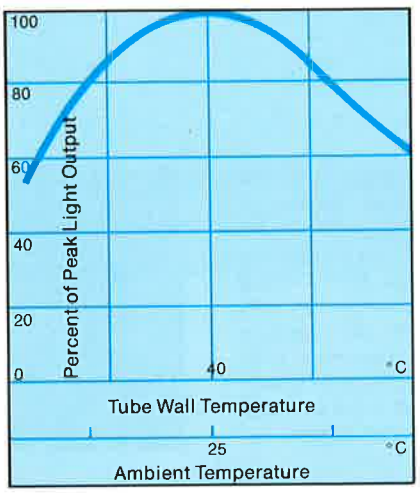
The effect of mains voltage variations on the operating characteristics of Sylvania fluorescent lamps is indicated in the graph. Increases in the mains voltage can influence lamp life in proportion to the increases in the lamp current.

The typical relationship between temperature and lumen output of a fluorescent lamp is illustrated in the diagram. As can be seen, the optimum light output occurs when the bulb wall temperature is approximately 40°C.

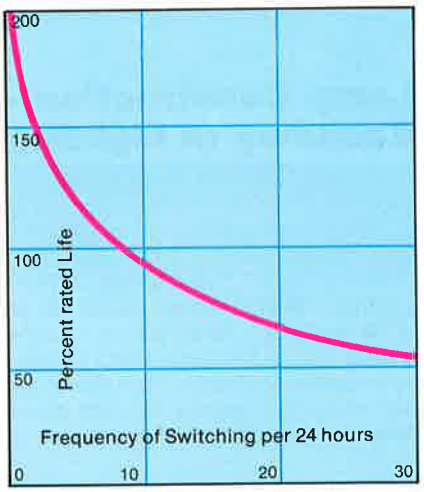
The life of a fluorescent lamp is dependent to a certain degree on the frequency of switching on and off. A lamp which is switched infrequently will last considerably longer. The typical effect of this is illustrated in the graph.



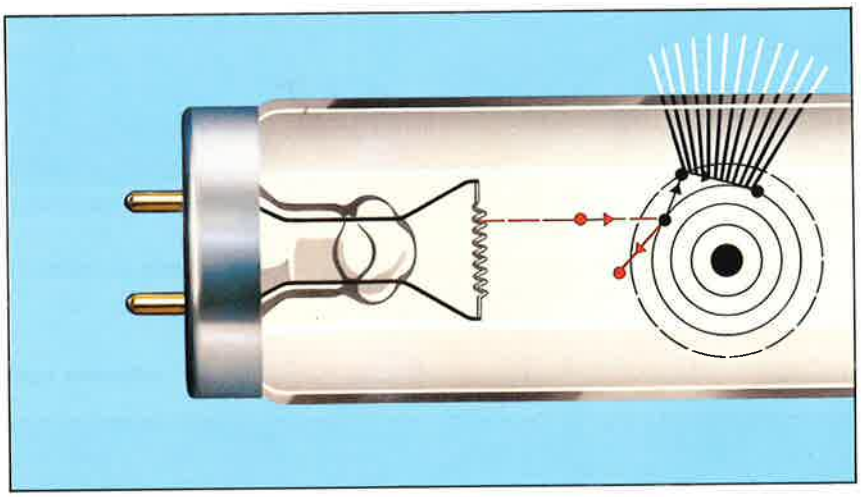
Lamp Performance



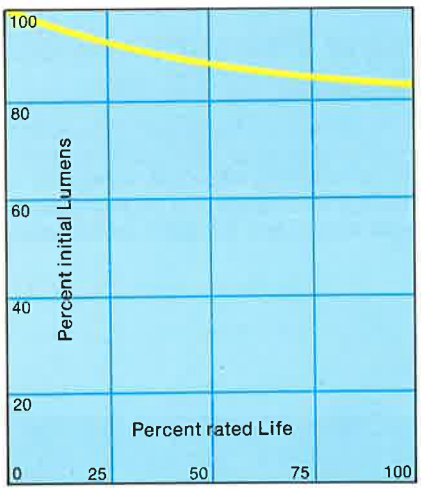
Typical Relationship between Temperature and Lumen Output



Typical Effect on Life of Switching



How Fluorescent Lamps convert Electrical Energy into Light



Typical Lumen Maintenance Curve

How Fluorescent Lamps convert Electrical Energy into Light

The fluorescent lamp is an electrical discharge source which makes use of ultra-violet energy generated by passing electric current through low pressure mercury vapour to activate a coating of phosphor on the inner surface of a glass tube. Phosphors have the property of absorbing the ultra-violet energy and re-radiating it at longer wavelengths in the visible spectrum. The wavelength or colour of the light produced by a fluorescent lamp depends upon the chemical composition of the phosphor used.

Excellent lumen maintenance is a key feature of Sylvania fluorescent lamps. Efficient gas filling ensures the lamps continue to deliver their high light output throughout their rated lives, making the most use of the electricity consumed.

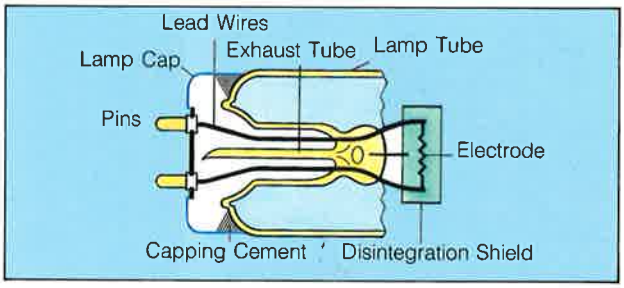
Energy Saver 26 mm ∅ Fluorescent Lamps

Introduction

About 40 years ago the familiar ∅ 38 mm fluorescent lamps became commercially available and had an important influence on the development of commercial, industrial and public lighting. Today as a response to energy conservation and the search for better and more economical lighting, the lamp industry is in the process of changing to the new generation ∅ 26 mm lamps. To the benefit of the user SYLVANIA ENERGY SAVER lamps save electrical energy and cut operating costs of lighting installations. 40% reduced storage volume and 25% less weight have a favourable influence on transport and handling cost. And more so, new fluorescent powders and coating techniques give better light, thus, improved working and living conditions.

Lamp Construction — Economy of Lighting

The new ∅ 26 mm (T8) ENERGY SAVER lamps show the same principle of construction as ∅ 38 mm lamps except for the slimmer lamp tube, new highly efficient SYLVANIA stick coil electrodes, and instead of the conventional low pressure Argon gasfill a new Krypton gas mix to make ENERGY SAVER lamps electrically interchangeable with ∅ 38 mm lamps. All lamps are equipped with disintegration shields to avoid excessive end blackening. The result is an optimized lamp design which allows a more efficient conversion of electrical energy into light, expressed in the substantially increased lumen/Watt data vs. ∅ 38 mm lamps.



New Phosphor Coatings — Quality of Light

New fluorescent powders and coating techniques help to convert the ultra-violet radiation from the lamp discharge more efficiently into light. ENERGY SAVER lamps of the LUXLINE-ES range offer additional advantages with increased light output and excellent colour rendering properties.

ENERGY SAVER lamps are available in two ranges:

- The ES Standard with a standard halo-phosphor coating
- The LUXLINE-ES with a high performance triphosphor coating

For given applications the new choice permits an optimum selection for light quality or economy.

Energy Saving

The use of SYLVANIA ENERGY SAVER lamps will reduce your electricity bill which is the most important factor in operating costs. Savings will not only come from a lower power consumption but also from a reduced power demand.

The new lamp generation is designed to consume 10% less effective lamp power which leads to the new wattage range.

The same effective wattage saving is usually seen on inductive lamp circuits, while on capacitive/overcompensated ballasts the saving can be reduced.

∅ 38 mm Lamps	20 W	40 W	65 W
ENERGY SAVER ES	18 W	36 W	58 W
Wattage Saving	2 W	4 W	7 W

Example:
Twin lamp fixture,
2 × F36W/184
inductive ballasts,
wattage saving: 2 × 4 W = 8 W

Power Factor

The reignition of the discharge in a fluorescent lamp, after each half cycle, happens with a slight delay which brings the lamp current out of phase with the lamp voltage curve. ∅ 38 mm lamps have a power factor of about 0.9 and ∅ 26 mm lamps of about 0.81. As both lamp types operate with the same current and voltage the difference in effectively absorbed power comes from applying these power factors.

The change on the circuit is much less because of the dominating inductive properties of the choke. The following tables show typical changes of Power Factor.

Examples:
1. F40W:
   0.43 A × 103 V × 0.9 = 40 W
2. F36W:
   0.43 A × 103 V × 0.81 = 36 W

Uncompensated circuits

Rating	F18W	F20W	F36W	F40W	F58W	F65W
Inductive Ballast power factor	0.340	0.362	0.480	0.506	0.492	0.515
Capacitive Ballast power factor	0.362	0.380	0.481	0.514	0.484	0.513

Compensated circuits

Nominal design compensation	Power Factor 0.800	Power Factor 0.850	Power Factor 0.900	Power Factor 0.950
F18W F20W	0.756 0.800	0.820 0.850	0.870 0.900	0.930 0.950
F36W F40W	0.770 0.800	0.825 0.850	0.875 0.900	0.935 0.950
F58W F65W	0.780 0.800	0.830 0.850	0.880 0.900	0.940 0.950

Duo circuits

Rating	F18W	F20W	F36W	F40W	F58W	F65W
Power Factor (overall)	0.967	0.978	0.970	0.980	0.950	0.972

As can be seen from these data the effective changes are negligible. Furthermore the lighting installation represents only part of the total power consumption (5-40%) in a commercial, industrial or public enterprise. With many installations operating on central variable compensation systems there is therefore no concern about power factor changes.

Ballast requirements

Because of the required voltage spike for starting (800 V min.) ENERGY SAVER lamps are only recommended for starter ballasts and cannot be used on normal Rapid Start (RS), Semi-Resonant (SRS), and Quick Start (QS) ballasts. Standard T12 lamps are available for these ballasts.

Temperature influence on performance

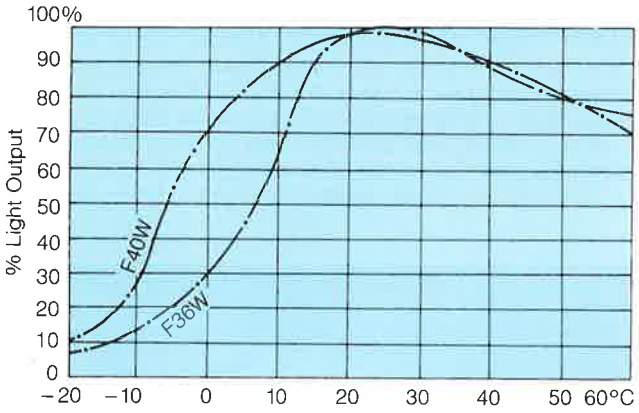
Lamp Starting

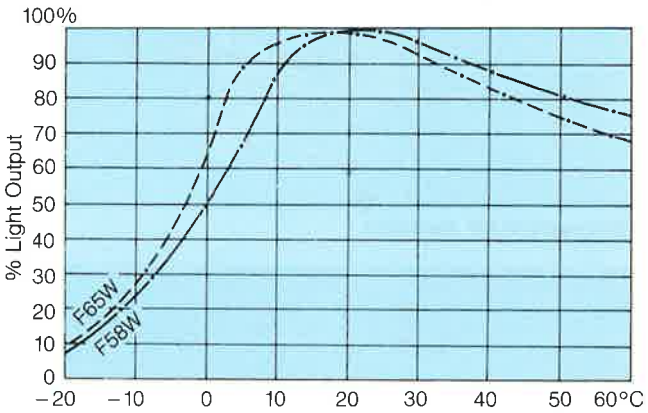
ENERGY SAVER lamps require, at room temperature, a higher voltage spike for starting than ∅ 38 mm lamps and should be used with SYLVANIA FS-11 starters. At low temperatures down to —20°C ES lamps will effectively start with lower supply voltage than ∅ 38 mm lamps.

Light Output

The following light output curves show that ES lamps perform almost identically to ∅ 38 mm lamps at high temperatures, but show a faster decline towards low temperatures. Setting the light output drop to an acceptable 70% limit means therefore that ES lamps should not be used at below +5% (F58W) or +10°C (F36W) ambient temperature in open fixtures. For lower temperatures please refer to the standard T12 range.

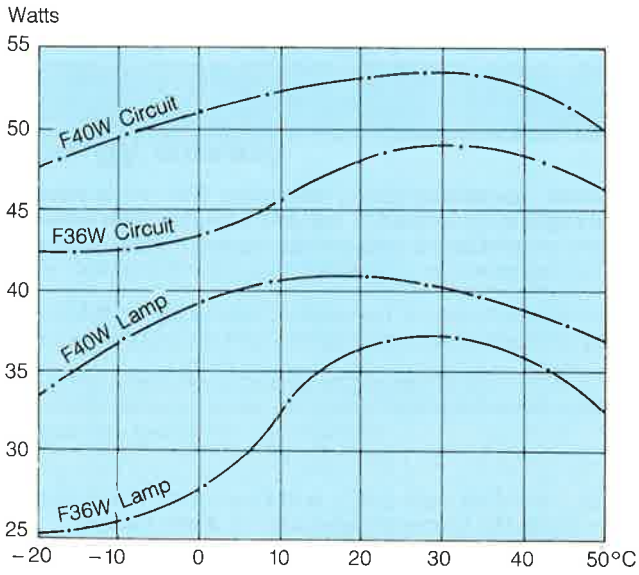
Closed fixtures, as in street lighting, usually develop a temperature difference (outside/inside) of about 20°C after stabilization and will thus provide ample thermal protection for ENERGY SAVER lamps to be used in outside temperatures down to —15°C (F58W) or —10°C (F36W).

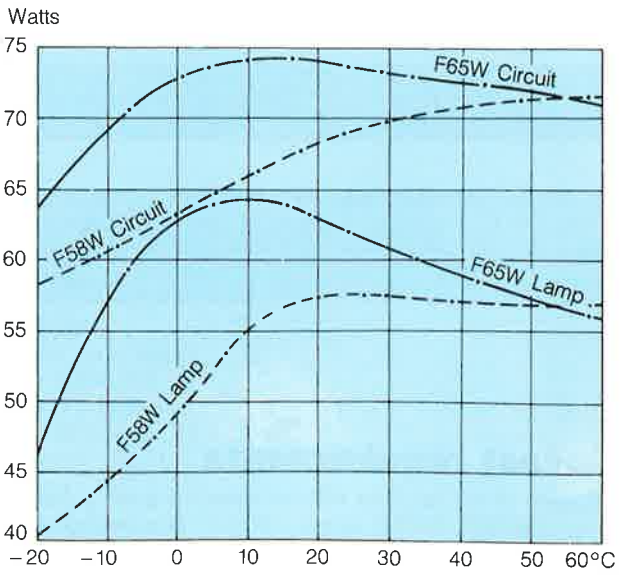




Lamp Wattage

Similar temperature profiles for the lamp wattage are shown in the following diagrams.



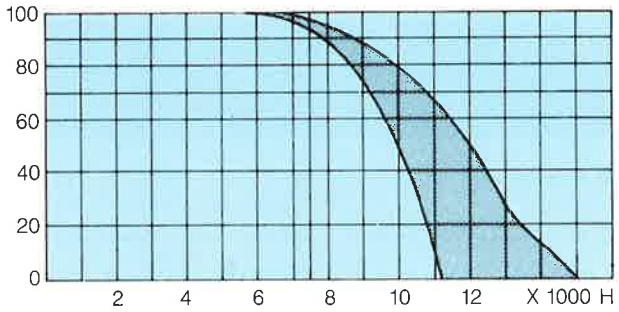


Lamp Mortality/Lumen Maintenance

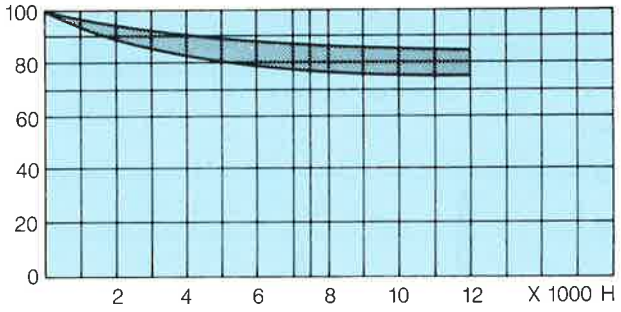
Life rack and installation tests have shown so far that ENERGY SAVER lamps perform equivalently compared to ∅ 38 mm lamps.

LUXLINE-ES range lamps tend to provide improved lumen maintenance typically in the upper area of the tolerance field.

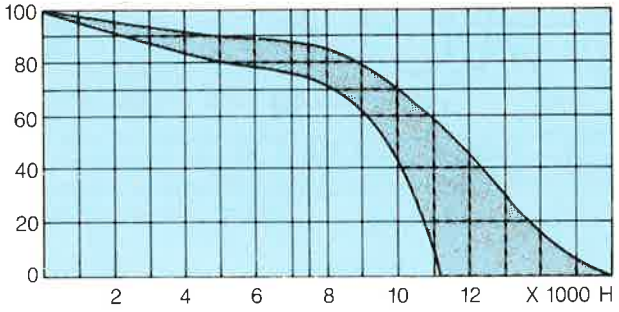
(% lamps surviving)



(% of initial light output)



Installation Performance (% of initial lux)



NB. no allowance for fixture deterioration effects

Electrical measurements

All electrical measurements on lamp or circuit voltage, amperage and wattage have to be made with instruments of the TRUE RMS type allowing for crest factors of up to 2,5. Comparative measurements have to be made on the same choke, at equal circuit input voltage, and lamp should be given 15 minutes for stabilization.

All SYLVANIA lamp data refer usually to lamps aged for 2000 hours.

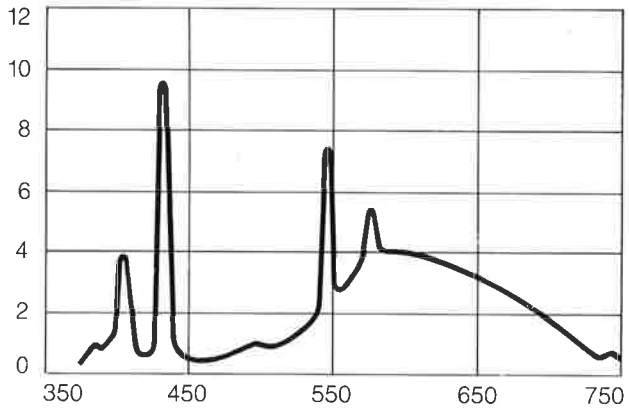
"LUXLINE-ES" 26 mm ∅ Triphosphor Lamps

Introduction

Light and colour are a fascinating phenomena and although they are most important factors in our life, we tend to take them for granted and ignore the complicated interaction between light (sources) and the way we see, subjectively, our environment.

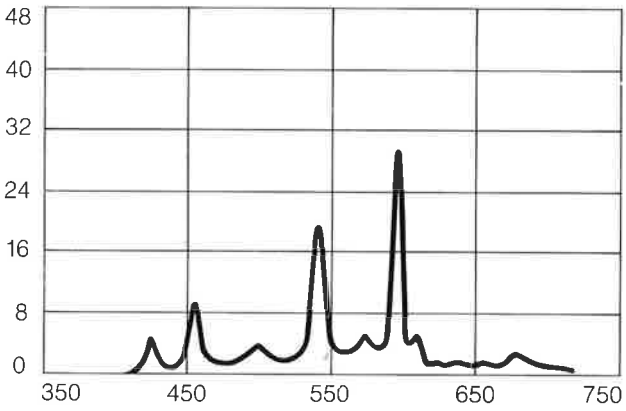
It is at times of changes that we notice differences. The introduction of a new generation of ∅ 26 mm fluorescent lamps, such as the SYLVANIA "LUXLINE-ES" range, have brought up some questions. Instead of the halo-type phosphors with a continuous spectrum, the new triphosphor lamps use rare earth activated phosphors with strong, narrow band spectral emissions in the blue, green and red.

The advantage of the LUXLINE-ES range over conventional ∅ mm lamps is that their light combines high colour rendering properties and high luminous efficacy with the energy saving, new lamp concept.



X = 0,436 CRI (Ra) = 75
Y = 0,400

Warmwhite de Luxe



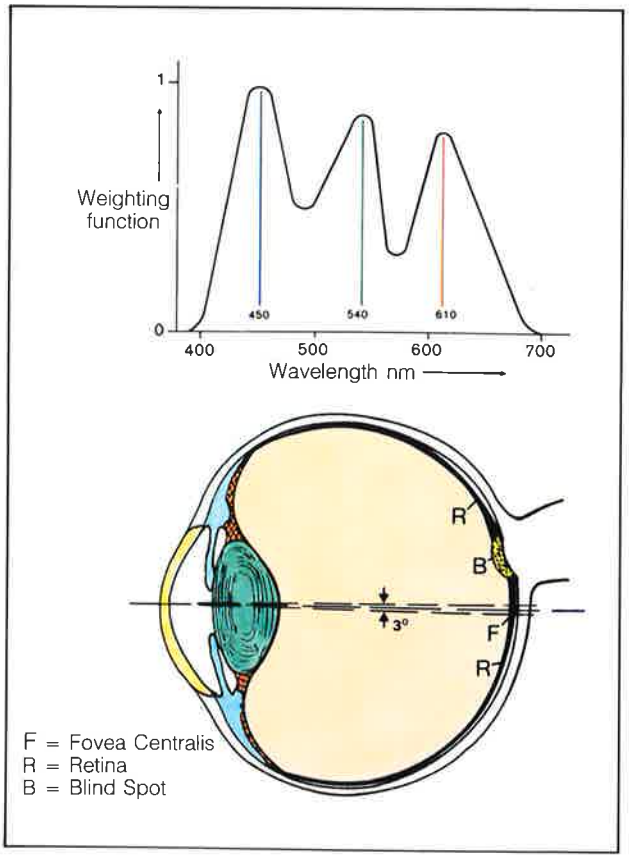
X = 0,435 CRI (Ra) = 85
Y = 0,405

Warmwhite de Luxe 183

Colour perception

Under normal lighting conditions during the day, we mainly see with a rather small zone of the retina which is called the *Fovea Centralis*. With this zone we can focus sharply at a very narrow angle (3° only) on to an object. The extremely fine, coneshaped, light sensitive nerves in this spot have a selected response to a colour spectrum, either in the blue, green or red. The maximum sensitivities (max. colour response) are at 450 nanometer wavelength for blue, 540 nm for green and 610 nm for red.

When we look at a red object then the red sensitive cones are stimulated and convert the sensation into electric signals which are led to the brain. The same is true for green and blue objects. However, most colours which we see are composed of various colours of the spectrum. Brown may be a mix of red and green. Purple, a mix of blue and red. The colour sensitive cones just see their part of the spectrum and the signals are then mixed in the brain to the "total impression", brown, purple, etc... The new fluorescent powders used in triphosphor lamps suit this brain-eye-colour mechanism very well because their output peaks being close to the cone sensitivity.

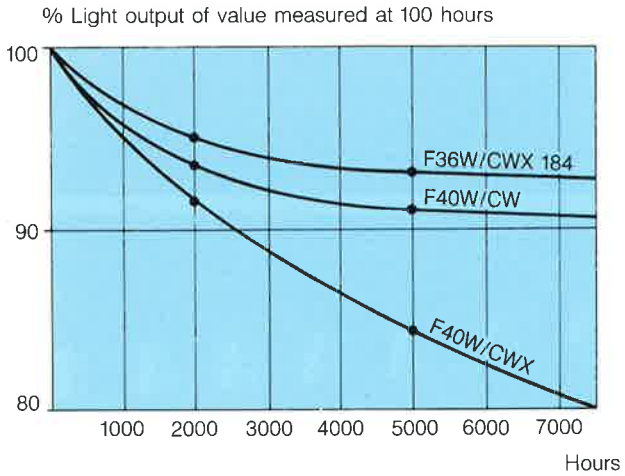


New phosphors

With the research for new phosphors, the components for the todays' triphosphor coatings became available in the mid-70's. They have the advantage of high luminous efficacy, having a narrow band output, peaking close to the maximum sensitivity of colour response and showed excellent lumen maintenance over lamp life.

The three components used today in LUXLINE-ES lamps are the following:

Matrix	Activator	Peak Emission	Colour
(BAM) Mg_2 $Al_{16}O_{27}$	Ba. Eu	450 nm	Blue
(CAT) Mg $Al_{11}O_{19}$	Ce. Tb	543 nm	Green
(Yt) Y_2O_3	Eu	611 nm	Orange-Red



White Light

The choice of the components in the phosphor mix determines the tone of white. Phosphor coatings with dominating green-blue components will give a blueish white of high correlated colour temperature e.g. Daylight lamp, (6000-6500K). When the yellow-red components are strong, we obtain a Warmwhite lamp (3000K) and with a balanced mix, a "Neutral White or Coolwhite" lamp (4000°K).

The tones of white are chosen with respect to the environment depending on what atmosphere (ambiance) we want to create or that to which we are accustomed. A "Neutral white" creates a fresh atmosphere in offices and schools. Warmtone lamps underline a warm and hospitable atmosphere in a hotel reception and Daylight lamps give an exhibition of refrigerators a clean and cool aspect.

But also the natural, climatical conditions have an influence on preferences. Warmtone lamps are preferred in the north of Europe, whereas Daylight lamps are very common in the south for general lighting.

Triphosphor Lamps and their applications

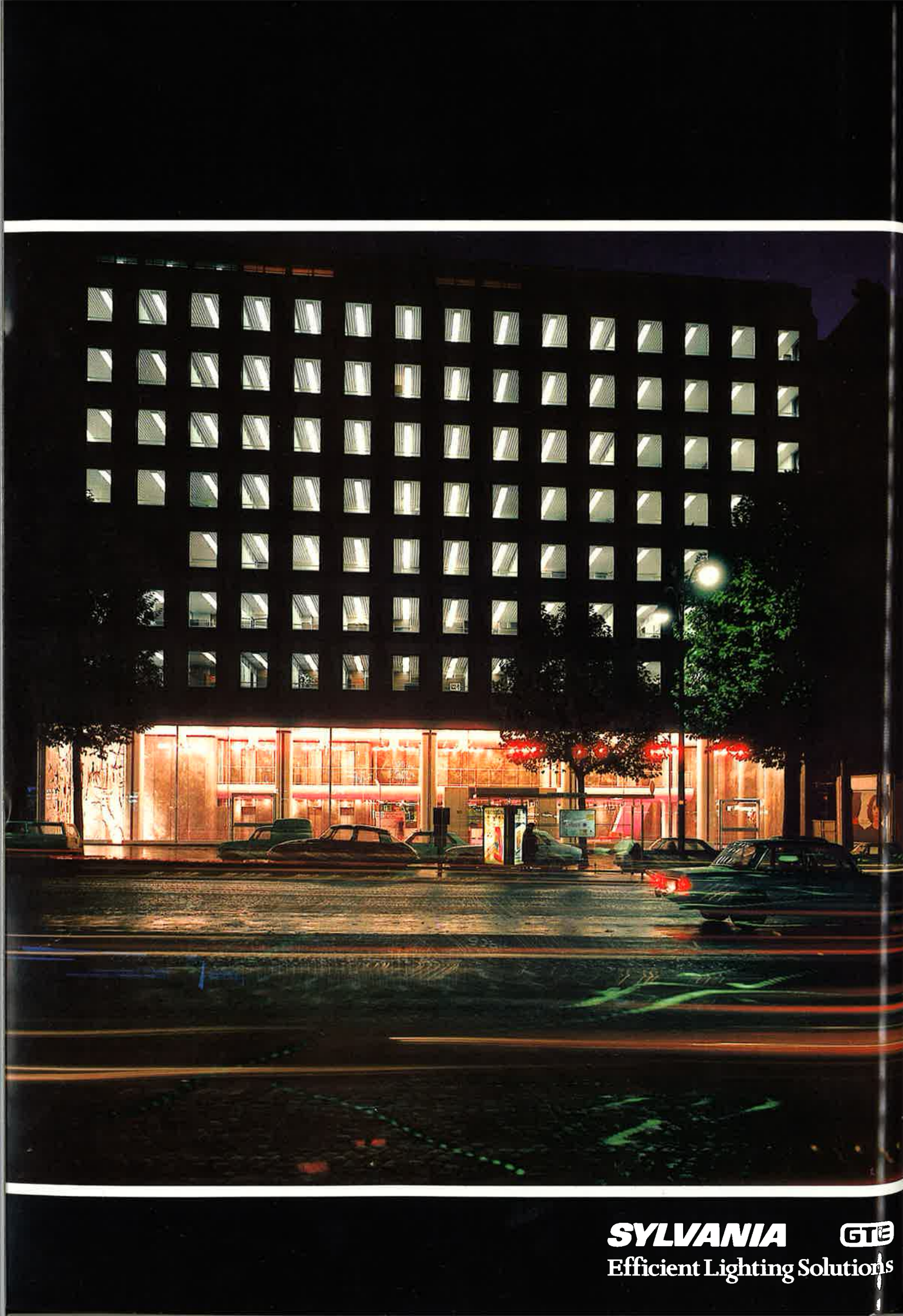
Every comparison of LUXLINE-ES range lamps vs. their equivalent types of same colour temperature shows their superior colorimetric and photometric performance. With their spectral emission within the maximum sensitivity for colours and the high luminous efficacy they make colours look bright and flattering.

Recognizing a general trend in Europe to more economical and better lighting, triphosphor lamps, the SYLVANIA LUXLINE-ES range will certainly play an important role in the future.

Certain colour matching problems involving colourants using far-spectrum blues and reds can easily be resolved by installing in critical areas additional Incandescent and/or Daylight fluorescent lamps. This would be a recommendation to shops selling cloth, curtains, carpets, paints and other colour critical goods.

Summary of LUXLINE-ES "de Luxe" lamp range advantages

- High light output (photometric performance)
- High lumen/Watt efficacy
- Fixture efficiency increased by 5-10% (utilization factor)
- Excellent lumen maintenance
- High colour rendering properties, Ra 85
- Phosphor components have their maximum output at identical wavelenghts at peak response for colours (blue, green, red) of the human eye. Colours look bright and flattering
- Reduction of electricity consumption
- Equal operating cost vs. ∅ 38 mm lamps of standard colour, but additional advantages
- 35% reduced operating costs vs. ∅ 38 mm lamps of Deluxe colours (NAT, WWX) and additional advantages.



SYLVANIA GTE

Efficient Lighting Solutions

Fluorescent Lamps / Starters

Product Information

Lynx Compact Fluorescent Lamps 1.6.2.

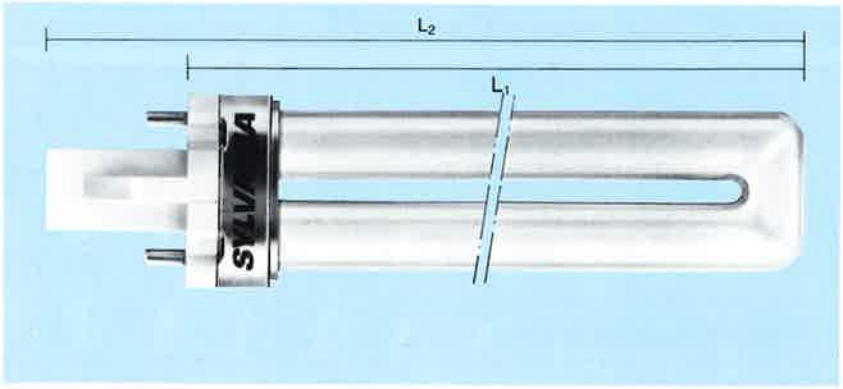
The new Lynx compact fluorescent lamps provide a new opportunity in designing fixtures for domestic and commercial use. They replace the conventional energy-expensive incandescent lamp in a wide variety of applications.

Due to the soft and warm light colour, the Lynx is ideal for hotels, offices, restaurants and in the home.

Lynx lamps are incredibly compact and powerful — 400 lumens from a 7W lamp and up to 900 lumens from an 11W lamp.

With a 5000 hour life thats massive energy and cost savings when compared to standard 40W or 75W incandescent lamps, which last 1000 hours.

The new G23 Bi-Pin lamp base incorporates the specially designed starting device which leaves only a simple connection to a compact low-loss ballast.



Wattage W	Type description	Code No.	Standard packing quantity	Dimensions d	L1	L2	100 hr lumens	Efficacy (lm/W)	Colour temperature (K)	Equivalent GLS (W)
5	Lynx 250	25206	10	27	82	105	250	50	2700	25
7	Lynx 400	25200	10	27	112	135	400	57	2700	40
9	Lynx 600	25201	10	27	144	167	600	67	2700	60
11	Lynx 900	25202	10	27	212	235	900	82	2700	75

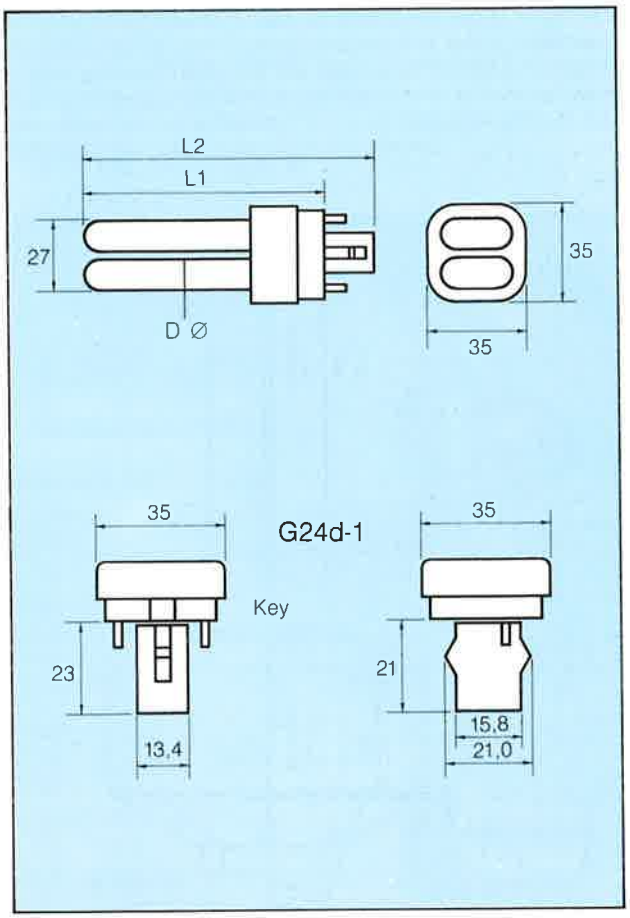
LYNX CF-D Compact Fluorescent Lamps

LYNX CF-D Compact Fluorescent lamps are for use in fixtures and applications where symmetrical light output properties, compact dimensions and high light output really count.

The lamps have two U-shaped discharge tubes which are joined together and mounted onto a G24 base. LYNX CF-D 10 W and LYNX CF-D 13 W are provided with an integral starter.

The lamps meet DIN 5035 Class I colour rendering requirements and are rated at 5000 hrs life.

Lamp Construction (mm)



Note: These dimensions are provisional and subject to change. All dimensions are max.

Electrical Data

TYPE	CF-D 10W	CF-D 13W
Lamp Power	10W	13W
Lamp Volts	60V	90V
Lamp Current	190 mA	175 mA
Base	G24d-1	G24d-1
Starter	Integrated	Integrated
Ballast	13W	13W

Mechanical Data

TYPE	10W	13W
Base	G24d-1	G24d-1
Burning Pos.	Univ	Univ

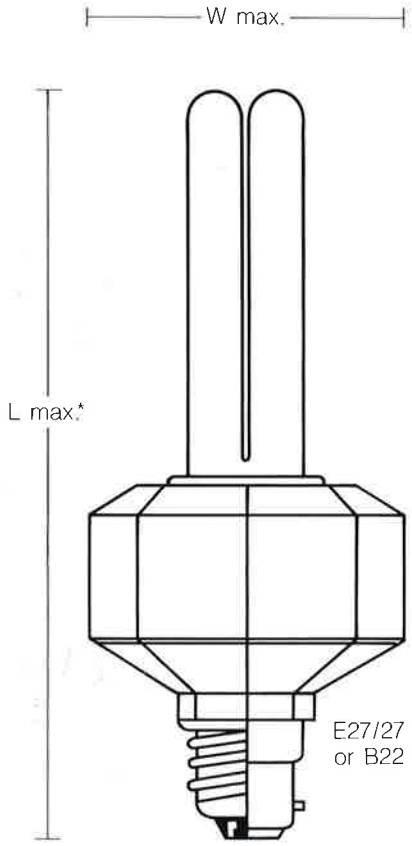
Colour Data

Colour Rendering Index: 85
(DIN 5035, Class I)

WATTAGE	PRODUCT DESCRIPTION	CODE NO	DIMENSIONS (mm) D	L1	L2	LIGHT OUTPUT LM	EFFICACY (lm/W)	COLOUR TEMP (K)
10W	CF-D 10W	25210	12,5	93	116	600 lm	66	2700
13W	CF-D 13W	25211	12,5	127	150	900 lm	69	2700
18W	CF-D 18W	— NOT YET AVAILABLE —						
26W	CF-D 26W	— NOT YET AVAILABLE —						

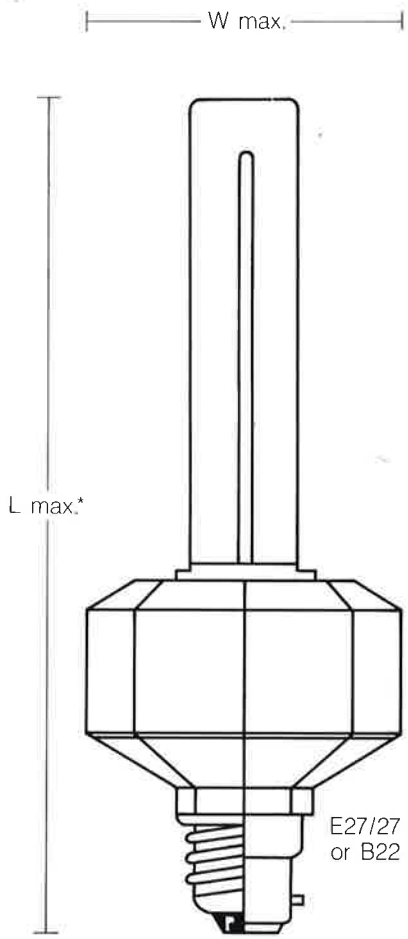
The new Lynx-Diamant Compact Fluorescent System

Lynx-Diamant "D"



Max. Net Weight: 460 g

Lynx-Diamant "S"



Max. Net Weight: 450 g

Lamp rating	Lynx-Diamant "D"		Lynx-Diamant "S"		System power
	L max. (mm)	100 hr lumens	L max. (mm)	100 hr lumens	
10W	153,0	600	—	—	15W
13W	187,0	900	—	—	17W
5W	—	—	145,0	250	10W
7W	—	—	175,0	400	11W
9W	—	—	207,0	600	13W
11W	—	—	276,0	900	15W

Lumen values are nominal. W_{max} = 72 mm + 1,0 mm *All dimensions ± 1 mm Lumens and wattage ratings for base-up configuration

Sylvania reserves the right to change data without notice.

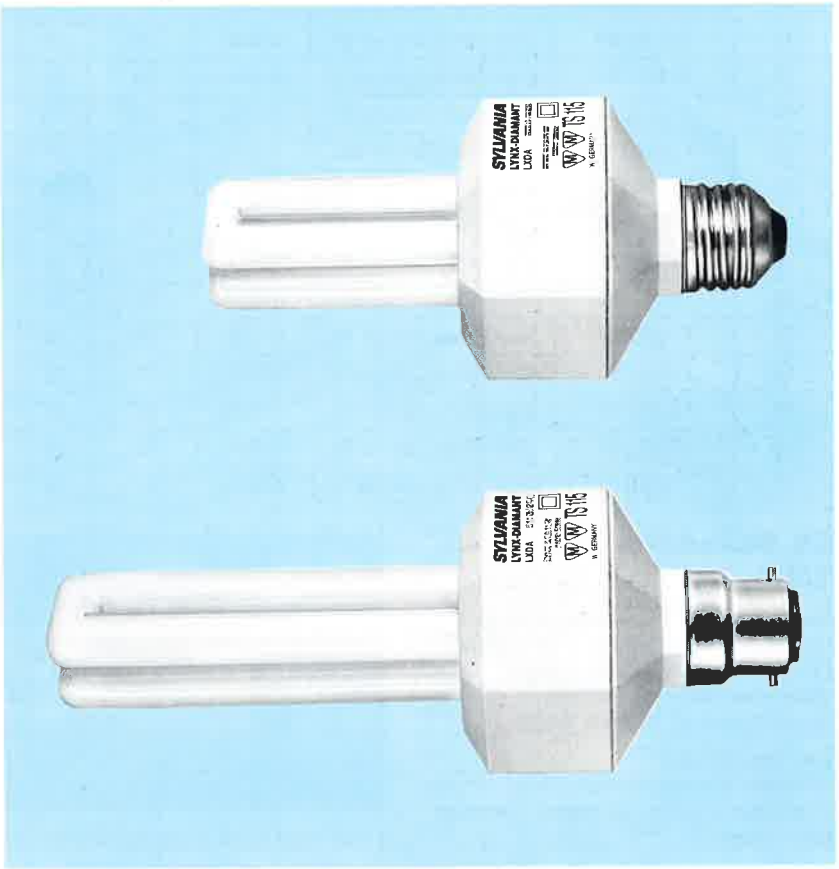
The new Lynx-Diamant Compact Fluorescent System

Lynx-Diamant combines all the advantages of the new generation compact fluorescent lamps with the convenience of easy retrofitting existing lamp sockets.

The long-life diamond shaped converter is designed to last up to ten lamp lives, each with an average life of 5.000 hours. It is rated for 50.000 hours and comes with a five-year guarantee.

Lynx-Diamant not only saves energy and makes maintenance easier, it is also a highly efficient lighting solution that saves money because you pay only once for the converter:

A 15 Watt, 900 lumen Lynx-Diamant gives you the same amount of light as a 75 Watt incandescent lamp. At today's electricity costs Lynx-Diamant recovers its initial investment cost in approximately half the lifetime of the first Lynx lamp. And by making it possible to change the lamp while re-using the converter, Lynx-Diamant is more economical than any other fluo-compact system on the market.



Ordering Information

	DIAMANT KIT DESCRIPTION	CODE-NUMBER	LAMP TYPE	VOLTAGE/ CAP/ FREQUENCY	PACK QTY
«D» SERIES	LXD 10D/240/B22	25302	LYNX-D 10W	240V/B22/50 Hz	10
	LXD 10D/240/E27	25312	LYNX-D 10W	240V/E27/50 Hz	10
	LXD 13D/240/B22	25303	LYNX-D 13W	240V/B22/50 Hz	10
	LXD 13D/240/E27	25313	LYNX-D 13W	240V/E27/50 Hz	10
«S» SERIES	LXD 5S/240/B22	25308	LYNX-S 5W	240V/B22/50 Hz	10
	LXD 5S/240/E27	25314	LYNX-S 5W	240V/E27/50 Hz	10
	LXD 7S/240/B22	25309	LYNX-S 7W	240V/B22/50 Hz	10
	LXD 7S/240/E27	25315	LYNX-S 7W	240V/E27/50 Hz	10
	LXD 9S/240/B22	25310	LYNX-S 9W	240V/B22/50 Hz	10
	LXD 9S/240/E27	25316	LYNX-S 9W	240V/E27/50 Hz	10
	LXD 11S/240/B22	25311	LYNX-S 11W	240V/B22/50 Hz	10
	LXD 11S/240/E27	25317	LYNX-S 11W	240V/E27/50 Hz	10

Tri-Phosphor Lamps LUXLINE-ES — 1.1.3.

The high lumen/Watt efficacy of LUXLINE-ES lamps is a most important factor in lighting economy. It opens up new possibilities to use "de Luxe" CRI 85 lighting without paying heavily for energy cost.

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)	Colour rendering index CRI
18	F18W/186	Daylight Deluxe 86	01502	25	26	590	G13	1235	68	85
18	F18W/184	Cool White Deluxe 84	01500	25	26	590	G13	1325	73	85
18	F18W/183	Warm White Deluxe 83	01501	25	26	590	G13	1325	73	85
18	F18W/182	Homelight Deluxe 82	01505	25	26	590	G13	1275	70	85
36	F36W/186	Daylight Deluxe 86	01512	25	26	1200	G13	2970	82	85
36	F36W/184	Cool White Deluxe 84	01510	25	26	1200	G13	3200	89	85
36	F36W/183	Warm White Deluxe 83	01511	25	26	1200	G13	3200	89	85
36	F36W/182	Homelight Deluxe 82	01514	25	26	1200	G13	3150	87	85
58	F58W/186	Daylight Deluxe 86	01532	25	26	1500	G13	4720	81	85
58	F58W/184	Cool White Deluxe 84	01530	25	26	1500	G13	5100	88	85
58	F58W/183	Warm White Deluxe 83	01531	25	26	1500	G13	5100	88	85
58	F58W/182	Homelight Deluxe 82	01535	25	26	1500	G13	4900	84	85
70	F70W/184	Cool White Deluxe 84	01094	25	26	1800	G13	6300	90	85
70	F70W/183	Warm White Deluxe 83	01093	25	26	1800	G13	6300	90	85

ES Standard Lamps — 1.1.1.

These lamps are comparable to the photometric performance of standard Ø 38 mm tubes and therefore are recommended to be used as retrofits for conventional Ø 38 mm lamps.

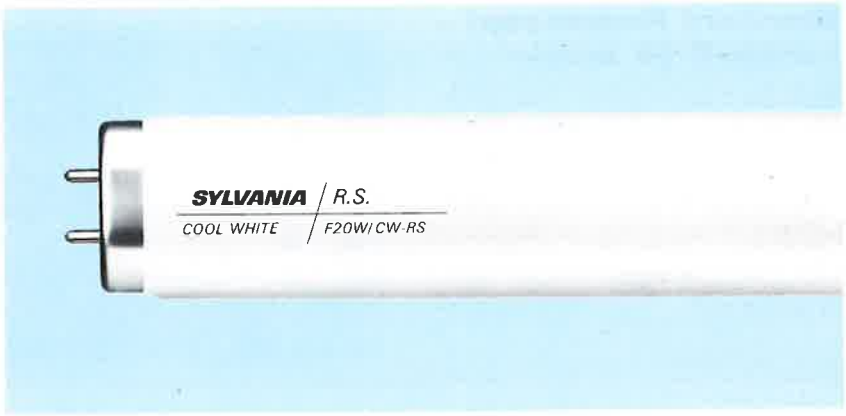
The benefits are:
10% less energy consumption, reduced storage volume, savings in transportation costs.

* These tubes are not suitable for Rapid-Start circuits, or at below 5°C ambient temperature in open fixtures.

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)	Colour rendering index CRI
18	F18W/133-ST	Cool White	01406	25	26	590	G13	1050	58	65
18	F18W/135-ST	White	01408	25	26	590	G13	1100	61	56
18	F18W/129-ST	Warm White	01409	25	26	590	G13	1100	61	53
36	F36W/133-ST	Cool White	01416	25	26	1200	G13	2650	73	65
36	F36W/135-ST	White	01418	25	26	1200	G13	2800	77	56
36	F36W/129-ST	Warm White	01419	25	26	1200	G13	2700	75	53
58	F58W/133-ST	Cool White	01436	25	26	1500	G13	4400	75	65
58	F58W/135-ST	White	01438	25	26	1500	G13	4700	81	56
58	F58W/129-ST	Warm White	01439	25	26	1500	G13	4550	78	53
70	F70W/133-ST	Cool White	01090	25	26	1800	G13	5400	78	65
70	F70W/135-ST	White	01091	25	26	1800	G13	5700	82	56
70	F70W/129-ST	Warm White	01092	25	26	1800	G13	5600	80	53

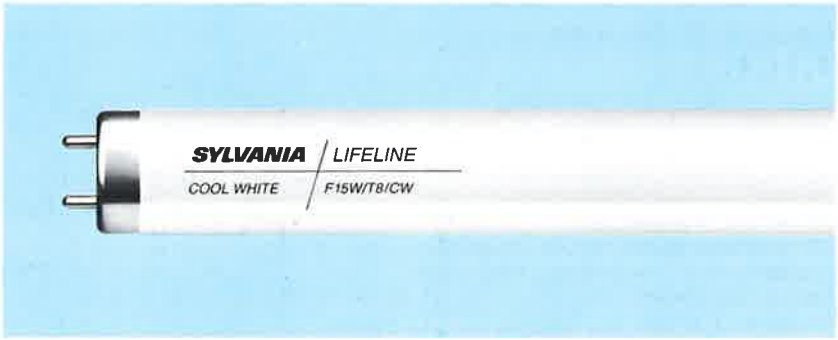
Standard Fluorescent Lamps ø 38 mm — 1.11.1.

These lamps are recommended for RS circuits (Rapid-Start according specification IEC 81, cathode preheat voltage 3,6 V) but are also perfectly suitable on standard starter-circuits including applications of low ambient temperature.



Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
20	F20W/W-RS	White	01562	25	38	590	G13	1100	55
20	F20W/CW-RS	Cool White	01549	25	38	590	G13	1050	52
20	F20W/WW-RS	Warm White	01551	25	38	590	G13	1100	55
30	F30W/W-RS	White	00166	25	38	900	G13	1850	61
30	F30W/CW-RS	Cool White	00949	25	38	900	G13	1750	58
30	F30W/WW-RS	Warm White	00169	25	38	900	G13	1850	61
40	F40W/W-RS	White	01563	25	38	1200	G13	2800	70
40	F40W/CW-RS	Cool White	01565	25	38	1200	G13	2700	67
40	F40W/WW-RS	Warm White	01554	25	38	1200	G13	2650	66
40	F40W/W-RS/2FT	White	00963	25	38	590	G13	1700	42
40	F40W/CW-RS/2FT	Cool White	00966	25	38	590	G13	1600	40
40	F40W/WW-RS/2FT	Warm White	00964	25	38	590	G13	1700	42
65	F65W/W-RS	White	00444	25	38	1500	G13	4700	72
65	F65W/CW-RS	Cool White	00991	25	38	1500	G13	4450	68
65	F65W/WW-RS	Warm White	00446	25	38	1500	G13	4600	70
65	F65W/N-RS	Natural	00992	25	38	1500	G13	3400	52
65	F65W/CM-RS	Northlight	00993	25	38	1500	G13	2700	41
75	F75W/W-RS	White	01008	25	38	1800	G13	6250	83
75	F75W/CW-RS	Cool White	01011	25	38	1800	G13	5800	77
75	F75W/WW-RS	Warm White	01009	25	38	1800	G13	6100	81
85	F85W/W-RS	White	01018	20	38	2400	G13	6850	80
85	F85W/CW-RS	Cool White	01021	20	38	2400	G13	6500	76
85	F85W/WW-RS	Warm White	01019	20	38	2400	G13	6750	79
100	F100W/W-RS	White	01028	20	38	2400	G13	8100	81
100	F100W/CW-RS	Cool White	01027	20	38	2400	G13	7600	76
100	F100W/WW-RS	Warm White	01029	20	38	2400	G13	7900	79
125	F125W/W-RS	White	01038	20	38	2400	G13	8900	71
125	F125W/CW-RS	Cool White	01041	20	38	2400	G13	8500	68
125	F125W/WW-RS	Warm White	01039	20	38	2400	G13	8800	70
125	F125W/N-RS	Natural	01042	20	38	2400	G13	6500	52

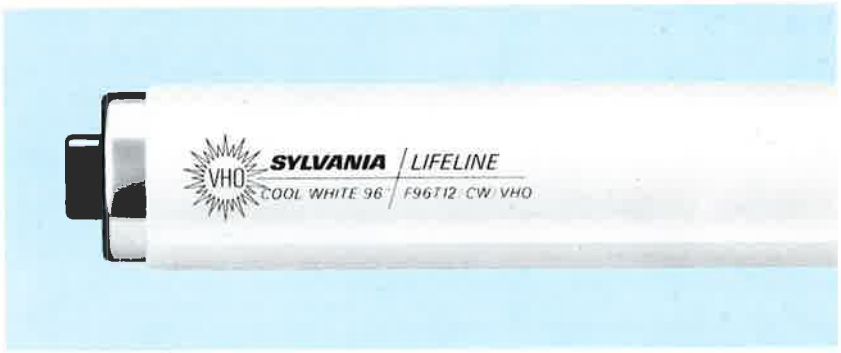
Standard Fluorescent Lamps Ø 26 mm — 1.4.1.

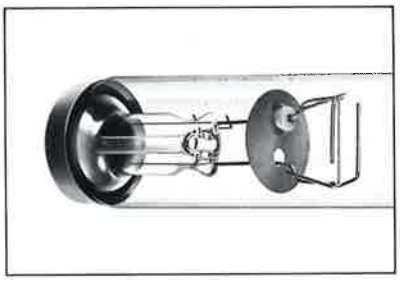


Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
15	F15W/T8/W	White	00063	25	26	450	G13	800	53
15	F15W/T8/WW	Warm White	00065	25	26	450	G13	800	53
15	F15W/T8/CW	Cool White	00064	25	26	450	G13	750	50
15	F15W/T8/N	Natural	00070	25	26	450	G13	600	40
30	F30W/T8/W	White	00143	25	26	900	G13	2150	71
30	F30W/T8/WW	Warm White	00145	25	26	900	G13	2150	71
30	F30W/T8/CW	Cool White	00144	25	26	900	G13	2050	68

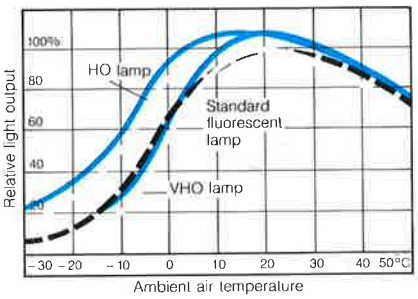
Very High Output (VHO) Lamps — 1.13.1.

Sylvania HO and VHO high performance lamps are characterized by higher power loading and consequently higher light output than same size standard lamps. Special pressure control centers at each end of the lamp maintain efficient operating conditions in the lamp. As the respective diagrams are showing, HO and VHO lamps reach their maximum light output already at lower ambient temperatures than standard lamps which makes them particularly efficient light sources in localities with low average ambient temperatures.





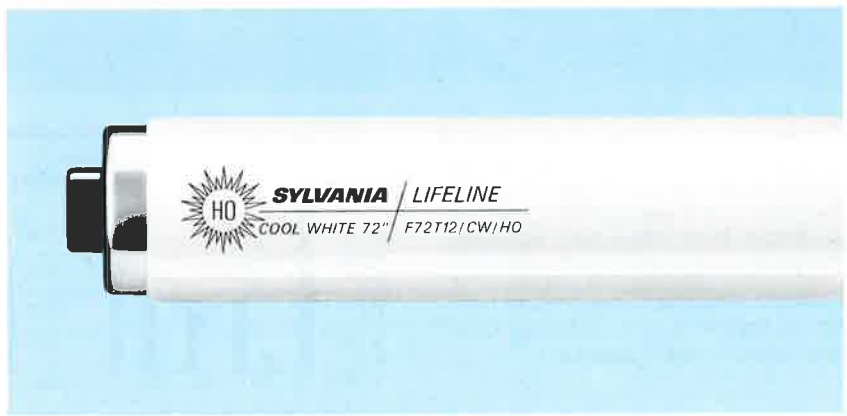
The Pressure Control Centre of HO and VHO lamps



Relative Light Output Versus Ambient Temperature

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions ∅	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
115	F48T12/CW/VHO	Cool White	00224	24	38	1200	R17d	5600	48
160	F72T12/CW/VHO	Cool White	00269	12	38	1800	R17d	9100	56
215	F96T12/CW/VHO	Cool White	00307	12	38	2400	R17d	12500	58

High Output (HO) Lamps — 1.14.1.



Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions ∅	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
60	F48T12/CW/HO	Cool White	00218	24	38	1200	R17d	3600	60
85	F72T12/CW/HO	Cool White	00263	12	38	1800	R17d	5500	64
110	F96T12/CW/HO	Cool White	00300	12	38	2400	R17d	7700	70

Miniature Lamps — 1.5.1.

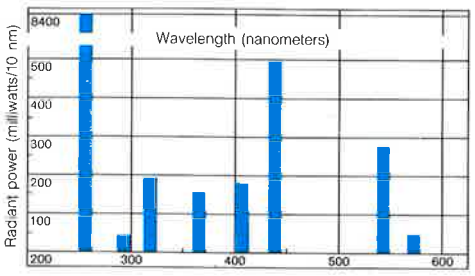
Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
4	F4W/W	White	00002	25	16	150	G5	100	25
6	F6W/W	White	00012	25	16	225	G5	250	41
6	F6W/CW	Cool White	00013	25	16	225	G5	240	40
6	F6W/WW	Warm White	00014	25	16	225	G5	250	41
8	F8W/W	White	00020	25	16	300	G5	420	52
8	F8W/CW	Cool White	00021	25	16	300	G5	360	45
8	F8W/WW	Warm White	00382	25	16	300	G5	420	52
13	F13W/W	White	00030	25	16	525	G5	750	57
13	F13W/CW	Cool White	00031	25	16	525	G5	700	53
13	F13W/WW	Warm White	00032	25	16	525	G5	750	57

Germicidal Lamps — 1.16.3.

Sylvania germicidal lamps radiate more than 85% of their energy at a wavelength of 253.7 nm in the ultraviolet spectrum, a radiation which kills bacteria and other micro-organism. Little radiation is emitted at 184.9 nm producing small amounts of ozone which is deodorant and, in the presence of water vapour is bactericidal and fungicidal.

Sylvania germicidal lamps are used for sterilization (and desodorization) of air, gases, liquids and surfaces of solids as for i.e. in air conditioning systems, hospitals, food processing industries, breweries, etc.

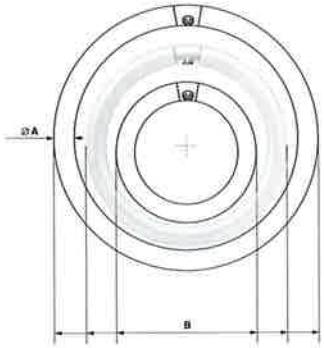
Safety Precautions: The emitted radiation is harmful to skin and eyes. Direct exposure must be avoided.

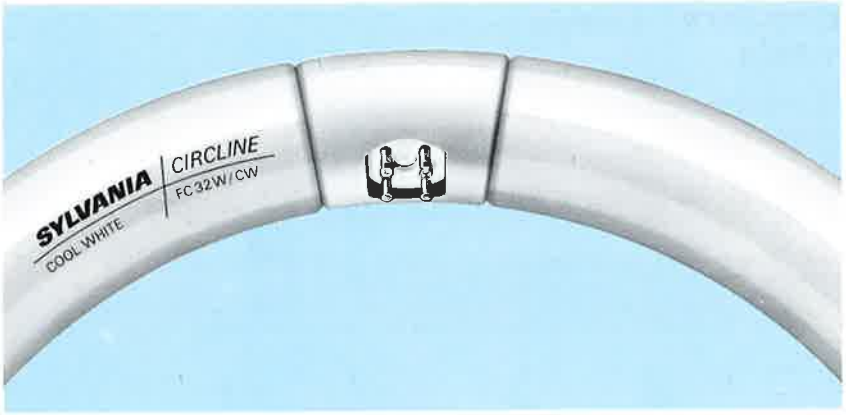


Typical Radiant Power Distribution of A G30T8 Lamp

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Output at 253.7 nm (W)
8	G8T5	Germicidal	00501	24	16	300	G5	1,4
15	G15T8	Germicidal	00502	24	26	450	G13	3,3
30	G30T8	Germicidal	00503	24	26	900	G13	8,4

Circline Lamps — 1.7.1.





Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions ØA	ØB	Cap	Light output (2000 hr) lm	Efficacy (lm/W)
22	FC22W/WW	Warm White	00475	12	29	200	G10q	840	38
32	FC32W/WW	Warm White	00485	12	32	300	G10q	1620	52
40	FC40W/WW	Warm White	00494	12	32	400	G10q	2480	62
60	FC60W/WW	Warm White	01065	12	32	400	G10q	3400	56

Coloured Lamps — 1.11.4.

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	L	Cap
20	F20W/GO	Gold	00114	6	38	600	G13
20	F20W/B	Blue	00113	6	38	600	G13
20	F20W/G	Green	00116	6	38	600	G13
20	F20W/PK	Pink	00115	6	38	600	G13
20	F20W/R	Red	00117	6	38	600	G13
40	F40W/GO	Gold	00181	6	38	1200	G13
40	F40W/B	Blue	00180	6	38	1200	G13
40	F40W/G	Green	00183	6	38	1200	G13
40	F40W/PK	Pink	00182	6	38	1200	G13
40	F40W/R	Red	00184	6	38	1200	G13

GRO-LUX® Lamps — 1.16.1.

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap	Light output (2000 hr) lm
8	F8W/GRO	GRO	00026	25	16	300	G5	100
13	F13W/GRO	GRO	00370	25	16	525	G5	180
15	F15W/T8/GRO	GRO	00069	25	26	450	G13	200
20	F20W/GRO	GRO	00462	25	38	600	G13	340
30	F30W/T8/GRO	GRO	00150	25	26	900	G13	530
40	F40W/GRO	GRO	00463	25	38	1200	G13	810

GRO-LUX® Fluorescent Lamps

The Original Plant Growth Lamps for Indoor Gardening and Aquariums

Importance of Light

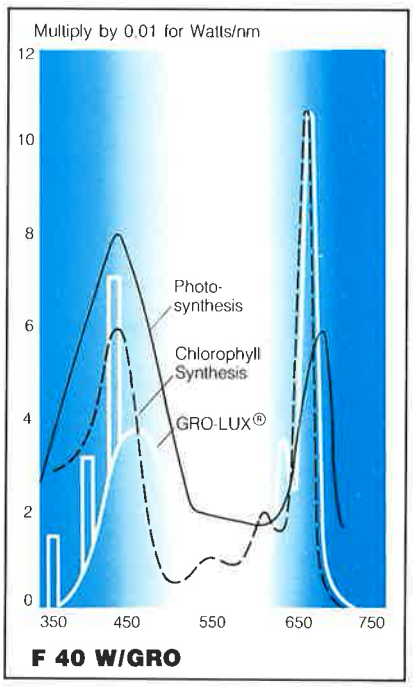
Light is the energy that is needed by plants to produce food and other substances required for growth and flowering. Plants are unique in that they are the only organisms that can convert light into food, upon which they and all other living organisms depend.

The process of converting light into food is called photosynthesis. Very simply stated, the green plant takes carbon dioxide from the air, and water and inorganic materials from the soil to manufacture food in the presence of light.

GRO-LUX® is a Plant Growth Lamp

It produces not only a proper balance of blue and red energy, but it also has its major output in these two regions. It is designed to provide this energy for plants and for no other purpose. In addition, it combines in one source, rather than in two or more sources the energy needs of plants.

GRO-LUX® fluorescent lamps will fit most commonly found fluorescent-strip fixtures.



Comparison of the spectral energy distribution of the GRO-LUX® fluorescent lamp with the energy requirement for chlorophyll synthesis (dotted line).

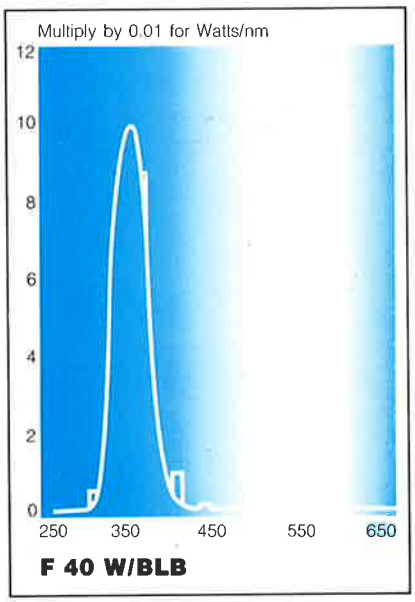
Blacklight-Blue Lamps — 1.16.2.

Wattage (W)	Type description	Colour	Code No.	Standard packing quantity	Dimensions Ø	Dimensions L	Cap
4	F4W/BLB	Blacklight-Blue	00008	24	16	150	G5
6	F6W/BLB	Blacklight-Blue	00018	24	16	225	G5
8	F8W/BLB	Blacklight-Blue	00024	24	16	300	G5
15	F15W/T8/BLB	Blacklight-Blue	00077	6	26	450	G13
20	F20W/BLB	Blacklight-Blue	00358	6	38	600	G13
40	F40W/BLB	Blacklight-Blue	00186	6	38	1200	G13

Blacklight Radiant Energy

Blacklight-Blue fluorescent lamps are made with a special dark blue "woods glass" filter, which absorbes pratically all the visible light but freely transmits the ultra-violet radiation (peaking at 356.0 nm).

They are used to create dramatic lighting effects in bars, night clubs and discotheques, and also in industry and commerce for detection/tracing work.



Starters — 1.9.1.

Type	Code No.	Wattage (W)	Circuit	Standard packing quantity
FS11	24454	4 to 80	Single	100
FS11	24456	4 to 80	Single	1000
FS22	24455	4 to 80	Series Twin	100

Although insignificant in appearance and apparently simple in design, the quality of the starter can greatly influence the life of a fluorescent lamp and the reliability of a lighting installation.

In Sylvania's high-quality starters, great attention is given to careful timing of the switching delay, ensuring reliable starting and maximum lamp life.

Incandescent Lamps
Display Lamps

SYLVANIA GTE

Efficient Lighting Solutions

Incandescent Lamps

SYLVANIA GTE

DOUBLE PLUS – the BRIGHTER Double Life Bulb. 2000 hour life with no loss of brightness.

Mushroom Pearl DOUBLE PLUS

BC/B22

240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	10000	50	86	25	100
60	10100	50	86	25	100

Mushroom Pearl DOUBLE PLUS

BC/B22

240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
100	10200	60	94	25	100

Round Opal DOUBLE PLUS

SES/E14

240 V

Watt	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	10950	45	74	25	25

Round Opal DOUBLE PLUS

BC/B22

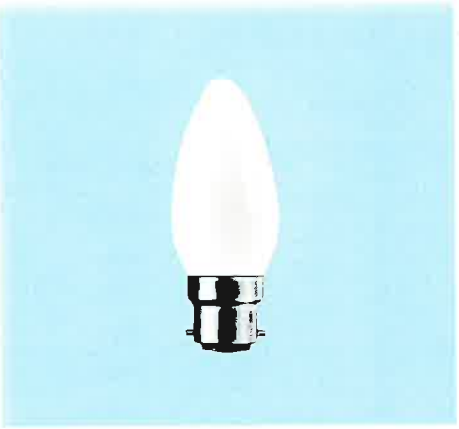
240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	10900	45	74	25	25
40	10951	45	74	25	25

SYLVANIA GTE

DOUBLE PLUS – the BRIGHTER Double Life Bulb. 2000 hour life with no loss of brightness.

Plain Candle Opal DOUBLE PLUS — BC/B22



240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	11000	35	96	25	25
40	11052	35	96	25	25
60	11100	35	96	25	25

Plain Candle Opal DOUBLE PLUS — SBC/B15

240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	11050	35	96	25	25

Plain Candle Clear DOUBLE PLUS — BC/B22

240 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	11001	35	96	25	25
40	11053	35	96	25	25
60	11101	35	96	25	25

Plain Candle Clear DOUBLE PLUS – 2.20.1 — SBC/B15

240/250 V

Watt	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	11051	35	96	25	25

SYLVANIA GTE

GLS Coiled Coil Pearl – 2.10.1 — BC/B22

240 V

Watts	Code No. Pack inner 25 outer 100	Dimen. mm Ø	L
25	03312	60	105
40	03424	60	105
60	03629	60	105
75	03834	60	105
100	04024	60	105
150	04226	68	125

GLS Coiled Coil Pearl – 2.10.1 — BC/B22

250 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
25	03225	60	105	25	100
40	03421	60	105	25	100
60	03630	60	105	25	100
100	04026	60	105	25	100
150	04227	68	125	25	25

GLS Coiled Coil Clear – 2.10.2 — BC/B22

240 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
25	03311	60	105	25	100
40	03420	60	105	25	100
60	03627	60	105	25	100
100	04023	60	105	25	100
150	04224	68	125	25	100

GLS Coiled Coil Pearl – 2.10.1 — ES/E27

240 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
40	03422	60	105	25	100
60	03633	60	105	25	100
100	04028	60	105	25	100
150	04230	68	125	25	100

GLS Single Coil Pearl – 2.10.3

BC/B22

	240 V	250 V				
Watts	Code No.	Code No.	Dimen. mm Ø	L	Pack inner	outer
15	03035	–	60	105	25	100
200	04420	04421	80	160	50	50

GLS Single Coil Pearl – 2.10.3

ES/E27

240 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
200	04424	80	160	50	50

GLS Single Coil High Wattage Clear – 2.10.5

GES/E40

240 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
300	09476	110	233	12	12
500	09516	110	233	12	12
1000	09590	150	300	6	6

Mushroom Whitelight – 2.10.7

BC/B22

240 V

Watts	Code No. Pack inner 25 outer 100	Code No. Pack inner 10 outer 100	Dimen. mm Ø	L
40	04589	04635	60	106
60	04700	04746	60	106
100	04921	04958	60	106

Fireglow – 2.10.8 BC/B22

200/250 V

Watts	Code No. Pack inner 25 outer 100	Dimen. mm Ø	L
60	08165	60	105

Fireglow – 2.10.8 3 pin/B22-3

200/250 V

Watts	Code No. Pack inner 25 outer 100	Dimen. mm Ø	L
60	08166	60	105

Nightlight Pearl – 2.10.9 BC/B22

200/250 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
5/8	08218	60	105	25	25

Plain Candle Opal – 2.20.2

BC/B22

240/250 V

Watts	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
25	06303	35	96	25	25
40	06472	35	96	25	25
60	06642	35	96	25	25

Plain Candle Opal – 2.20.2

SBC/B15

240/250 V

Watts	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
25	06302	35	96	25	25
40	06471	35	96	25	25
60	06650	35	96	25	25

Plain Candle Clear – 2.20.1

BC/B22

240/250 V

Watts	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
25	06313	35	96	25	25
40	06473	35	96	25	25
60	06651	35	96	25	25

Plain Candle Clear – 2.20.1

SBC/B15

240/250 V

Watt	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
25	06314	35	96	25	25
40	06474	35	96	25	25
60	06652	35	96	25	25

Decorative Lamps

Plain Candle Clear – 2.20.3

SES/E14

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	06467	35	96	25	25

Plain Candle Opal – 2.20.4

SES/E14

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	06300	35	96	25	25
40	06475	35	96	25	25

Twisted Candle Clear – 2.20.5

BC/B22

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	07091	35	100	25	25
60	07262	35	100	25	25

Twisted Candle Pearl – 2.20.8

SBC/B15

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	07095	35	100	25	25
60	07265	35	100	25	25

Twisted Candle Clear – 2.20.7 — SBC/B15

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	07092	35	100	25	25
60	07263	35	100	25	25

Twisted Candle Pearl – 2.20.6 — BC/B22

240/250 V

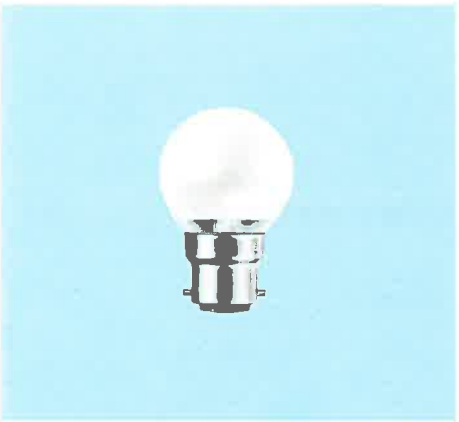
Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	06971	35	100	25	25
40	07121	35	100	25	25
60	07282	35	100	25	25

Twisted Candle Pearl — SES/E14

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
60	07264	35	100	25	25

Round Opal – 2.21.1 — BC/B22



240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	05615	45	74	25	25
40	05793	45	74	25	25

Round Opal – 2.21.1 — SBC/B15

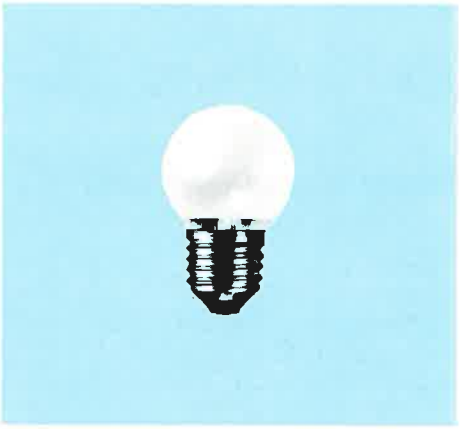
240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	05789	45	74	25	25

SYLVANIA GTE

Round Opal – 2.21.1

ES/E27



240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	05790	45	74	25	25

Round Opal – 2.21.1

SES/E14

240/250 V

Watt	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	05780	45	74	25	25

Round Clear – 2.21.2

BC/B22

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	05791	45	74	25	25

Round Clear – 2.21.3

SBC/B15

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	05792	45	74	25	25

SYLVANIA GTE

Coloured GLS – 2.22.1

BC/B22

240/250 V

Watts	Red	Yellow	Green	Blue	Orange	Pink	Dimen. mm		Pack	
	Code No.	Code No.	Code No.	Code No.	Code No.	Code No.	∅	L	inner	outer
15	08298	08299	08300	08301	08302	08303	60	105	25	100
25	08432	08431	08429	08428	08427	08430	60	105	25	100
40*	08512	08511	08509	08508	08507	08510	60	105	25	100
60*	08544	08543	08541	08540	08539	08542	60	105	25	100

*Not suitable for outdoor use unless protected against rain

Striplite Double-Ended Clear – 2.23.1

S15s

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
30	07550	25	221	10	50
30	07553	25	284	10	50
60	07599	25	221	10	50
60	07597	25	284	10	50

Striplite Double-Ended Opal – 2.23.2

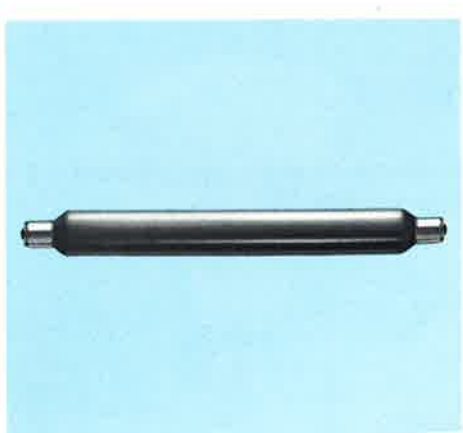
S15s

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
30	07551	25	221	10	50
30	07552	25	284	10	50
60	07598	25	221	10	50
60	07596	25	284	10	50

Striplite Double-Ended Amber – 2.23.3

S15s



240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
60	07600	25	284	10	50

Display Lamps

Crown Silvered Clear – 2.30.1 — SES/E14

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
40	17624	45	78	25	100

Crown Silvered Clear – 2.30.2 — BC/B22

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
60	17655	60	105	25	100
100	17722	68	125	25	100

Crown Silvered Clear – 2.30.2 — ES/E27

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
60	17654	60	105	25	100
100	17723	68	125	25	100

Reflector 50 mm Light Diffused – 2.31.1 — SES/E14
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
25	15932	50	84	25	100
40	15941	50	84	25	100

SYLVANIA GTE

Reflector 64 mm Light Diffused – 2.32.1 **BC/B22**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
60	16023	64	103	25	100

Reflector 64 mm Light Diffused – 2.32.1 **ES/E27**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
40	15982	64	103	25	100
60	16022	64	103	25	100

Reflector 64 mm Clear Coloured – 2.32.2 **ES/E27**

240/250 V

Watts	Red	Yellow	Green	Blue	Dimen. mm		Pack	
	Code No.	Code No.	Code No.	Code No.	∅	L	inner	outer
40	16710	16712	16711	16709	64	103	25	100
60	16751	16753	16752	16750	64	103	25	100

Reflector 80 mm Pearl – 2.33.1 **BC/B22**
Beam angle: 80°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
40	16007	80	111	10	10
60	16045	80	111	10	10
75	16083	80	111	10	10
100	16121	80	111	10	10

Display Lamps

Reflector 80 mm Pearl – 2.33.1
Beam angle: 80°

ES/E27

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
40	16008	80	111	10	10
60	16046	80	111	10	10
75	16084	80	111	10	10
100	16122	80	111	10	10

Reflector 80 mm Clear Coloured – 2.33.2

BC/B22

240/250 V

Watts	Red	Yellow	Green	Blue	Amber	Dimen. mm		Pack	
	Code No.	Code No.	Code No.	Code No.	Code No.	∅	L	inner	outer
40	16821	16824	16823	16822	16825	80	111	10	10
60	16889	16892	16891	16890	16893	80	111	10	10
75	16947	16950	16949	16948	16951	80	111	10	10

Reflector 80 mm Clear Coloured – 2.33.3

ES/E27

240/250 V

Watts	Red	Yellow	Green	Blue	Amber	Dimen. mm		Pack	
	Code No.	Code No.	Code No.	Code No.	Code No.	∅	L	inner	outer
40	16826	16829	16828	16827	16830	80	111	10	10
60	16894	16897	16896	16895	16898	80	111	10	10
75	16952	16955	16954	16953	16956	80	111	10	10

Reflector 95 mm Pearl – 2.34.1
Beam angle: 35°

BC/B22

240/250 V

Watts	Order No.	Dimen. mm		Pack	
		∅	L	inner	outer
75	16279	95	135	10	10
100	16316	95	135	10	10

SYLVANIA GTE

Display Lamps

Reflector 95 mm Pearl – 2.34.2 **ES/E27**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
75	16280	95	135	10	10
100	16317	95	135	10	10

Reflector 95 mm Clear Coloured – 2.34.3 **BC/B22**

240/250 V

Watts	Red Code No.	Yellow Code No.	Green Code No.	Blue Code No.	Amber Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
100	17339	17341	17340	17338	17342	95	135	10	10

Reflector 95 mm Clear Coloured – 2.34.4 **ES/E27**

240/250 V

Watts	Red Code No.	Yellow Code No.	Green Code No.	Blue Code No.	Amber Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
100	17334	17336	17335	17333	17337	95	135	10	10

Ellipsoidal Reflector Pearl – 2.36.1 **BC/B22**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
50	16239	95	135	10	10
75	16240	95	135	10	10

Display Lamps

Ellipsoidal Reflector Pearl – 2.36.1 **ES/E27**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		Ø	L	inner	outer
50	16236	95	135	10	10
75	16237	95	135	10	10

Grolux Spot – 2.37.1 **ES/E27**

240 V

Watts	Code No.	Dimen. mm		Pack	
		Ø	L	inner	outer
75	16970	95	135	10	10

Reflector 125 mm Pearl – 2.35.1 **BC/B22**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		Ø	L	inner	outer
150	16402	125	178	10	10

Reflector 125 mm Pearl – 2.35.1 **ES/E27**
Beam angle: 35°

240/250 V

Watts	Code No.	Dimen. mm		Pack	
		Ø	L	inner	outer
150	16403	125	178	10	10

SYLVANIA GTE

Display Lamps

Hi-Light PAR 38 Spot – 2.38.4
Beam angle: 12° – 2000 h life

ES/E27

120 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
120	20261	122	135	15	15

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
60	20251	122	135	15	15
80	20255	122	135	15	15
120	20259	122	135	15	15

Hi-Light PAR 38 Flood – 2.38.5
Beam angle: 30° – 2000 h life

ES/E27

120 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
120	20262	122	135	15	15

240/250 V

Watts	Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
60	20252	122	135	15	15
80	20256	122	135	15	15
120	20260	122	135	15	15

Hi-Light PAR 38 Flood Coloured – 2.38.3
Beam angle: 30° – 2000 h life

ES/E27

240/250 V

Watts	Blue Code No.	Green Code No.	Red Code No.	Yellow Code No.	Dimen. mm Ø	Dimen. mm L	Pack inner	Pack outer
80	20094	20095	20096	20097	122	135	15	15

Special Service Lamps

Industrial/Rough Service Pearl – 2.11.1 BC/B22

200/250 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
40	09175	60	105	25	100
60	09237	60	105	25	100
100	09355	60	105	25	100

110 Volt Pearl – 2.11.3 BC/B22

110 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
40	03434	60	105	25	100
60	03644	60	105	25	100
100	04040	60	105	25	100

110 Volt Pearl – 2.11.3 ES/E27

110 V

Watts	Code No.	Dimen. mm Ø	L	Pack inner	outer
40	03435	60	105	25	100
60	03645	60	105	25	100
100	04039	60	105	25	100

Extra Low Voltage Pearl – 2.11.4 BC/B22

Watts	24/25 V Code No.	48/50 V Code No.	Dimen. mm Ø	L	Pack inner	outer
25	09667	09673	60	105	25	100
40	09695	09702	60	105	25	100
60	09727	09734	60	105	25	100
100	09785	09787	60	105	25	100

Special Service Lamps

Extra Low Voltage Pearl – 2.11.4

ES/E27

Watts	24/25 V Code No.	48/50 V Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
40	09697	09700	60	105	25	100
60	09729	09732	60	105	25	100
100	09781	09789	60	105	25	100

Pygmy Clear – 2.12.1

BC/B22

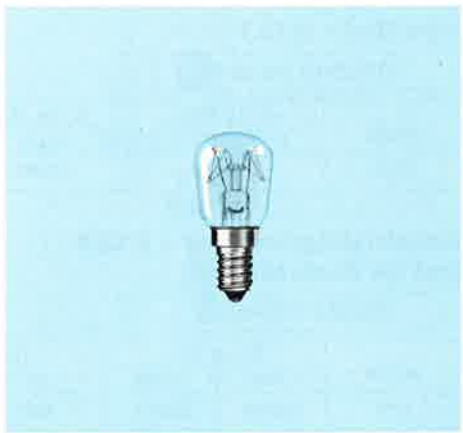
Watts	200/250 V Code No.	110/120 V Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
15	08077	08070	28	57	100	100
25	08116	–	28	57	100	100

Pygmy Clear – 2.12.1

SES/E14

200/250 V

Watts	200/250 V Code No.	110/120 V Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
15	08080	08071	28	64	100	100
25	08117	–	28	64	100	100



Pygmy Coloured – 2.12.1

BC/B22

200/250 V

Watts	Red Code No.	Yellow Code No.	Green Code No.	Blue Code No.	Orange Code No.	Pink Code No.	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
15	09050	09051	09052	09053	09054	09055	28	57	100	100

SYLVANIA GTE

Special Service Lamps

Pygmy Clear – 2.12.1

ES/E27

200/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
15	08079	28	57	100	100

Pygmy Clear – 2.12.1

SBC/B15

200/250 V

Watts	Code No.	Dimen. mm		Pack	
		∅	L	inner	outer
15	08078	28	64	100	100

Infra-Red – 2.13.1

BC/B22

200/250 V Hardglass

Watts	Code No. Pearl	Code No. Ruby	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
250	09942	09943	126	178	10	10

Industrial/Agricultural – 2.13.2 (not for domestic use)

200/250 V Softglass

Watts	Code No. Clear	Code No. Pearl	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
275	09958	09961	126	178	10	10

Infra-Red – 2.13.1

ES/E27

200/250 V Hardglass

Watts	Code No. Ruby	Code No. Clear	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
250	09941	09940	126	178	10	10

Industrial/Agricultural – 2.13.2 (not for domestic use)

200/250 V Softglass

Watts	Code No. Ruby	Code No. Clear	Dimen. mm ∅	Dimen. mm L	Pack inner	Pack outer
250	09970	09969	126	178	9	9

SYLVANIA GTE

Lamp Cap Identification Chart

A great variety of lamp caps are in use today. Often they are referred to by different descriptions making identification difficult. The Sylvania Lamp Cap Identification Chart graphically shows most of the caps used for Incandescent and Tungsten-Halogen lamps. The popular descriptions as well as the corresponding IEC Nomenclature (Publication 61-1) are indicated and the most important dimensions necessary for positive cap identification are shown.

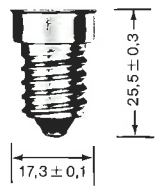
E40/GES

Goliath Edison Screw Cap

E27/ES

Edison Screw Cap

E14/SES

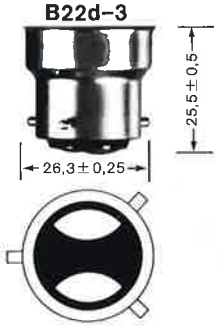


Small Edison Screw Cap

B22d/BC

Bayonet Cap

B22d-3

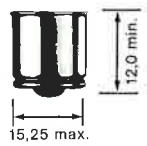


3-pin Bayonet Cap

B15d/SBC

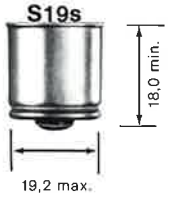
Small Bayonet Cap

S15s



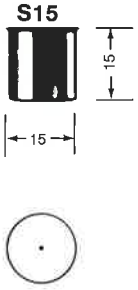
Centre Contact Cap

S19s



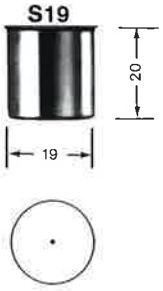
Centre Contact Cap

S15



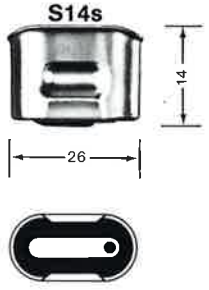
Shell Contact Cap

S19



Shell Contact Cap

S14s

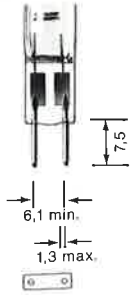


Flat Centre Contact Cap

R7s

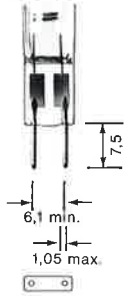
Recessed Single Contact Cap

GY6.35



Bi-pin Base

G6.35

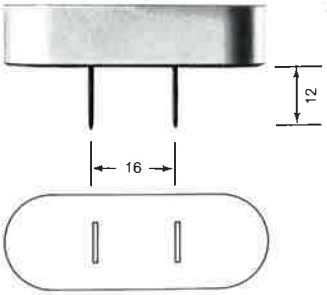


Bi-pin Base

Fa4

Single-pin Cap

Gx16d



Bi-prong Cap

The information given in this catalogue is typical and must not be considered as a guarantee of individual performance and/or characteristics.

SYLVANIA GTE

SYLVANIA GTE

Efficient Lighting Solutions

Tungsten Halogen Lamps

SYLVANIA GTE

Efficient Lighting Solutions

Tungsten Halogen Lamps — A History

The conventional incandescent lamp, still today the most-purchased light source in the world, has been the subject of improvement since its inception at the turn of the last century. Since around 1959 an important variant — the tungsten halogen lamp — has been successfully commercialised. One of the limiting features of incandescent lamp design is the evaporation of tungsten from the hot wire filament (coil) which blackens the inside bulb and which eventually leads to a break. The tungsten halogen lamp is designed to significantly reduce the filament evaporation rate and eliminate the blackening process. This process is described in detail later on.

Tungsten halogen lamp operation is essentially dependent on a rigourous distribution of temperatures from filament to bulb wall to the hermetic seal admitting the electrical connections. For the most part these lamps are also high power light sources involving very strong and compactly-made filaments. The general design resulting from these considerations are ranges of very compact (therefore photometrically efficient) and powerful (high luminous flux) lamps. Moreover, the halogen cycle, which controls the tungsten filament evaporation rate, permits much higher filament operating temperatures. As a result, compared with our conventional incandescent lamp, the light output (lumens) per watt of electrical energy consumed is almost double.

Today Tungsten Halogen lamps come in a wide variety of shapes and sizes serving floodlighting, display, airfield, auto vehicle, photographic, medical and infra-red heating applications. This catalogue deals with the Sylvania programme of lamps for general lighting needs.

SYLVANIA Tungsten Halogen Manufacturing

The European home of Sylvania's manufacturing operations for tungsten halogen lamps is Erlangen, West Germany. Since the first days of operation 25 years ago by Sylvania Tungsten Halogen lamps for general lighting, for fusing, for copying and photographic purposes have been made. The introduction of the Sylvania Energy Saver Tungsten Halogen programme was made possible there using advanced computer-programmed lamp fill techniques.

More recently Erlangen provided a very special new lamp design for a successful Space Lab experiment to grow silicon crystals in zero gravity in coopération with the University of Freiburg and the MBB Company. The lamp design compensated for the lack of gravity which otherwise provides fill gas convection currents to stabilize the lamp thermally.

Sylvania lamp engineers solved the problem via radical design studies involving special filament constructions.

Sylvania is backed by the full resources of one of the world's largest industrial organizations, the General Telephone & Electronics Group. That's the GTE in GTE Sylvania — which represents 200,000 employees, 150 research, manufacturing and service facilities on all 5 continents with an annual turnover of > $ 14 billion.

The Tungsten Halogen Cycle

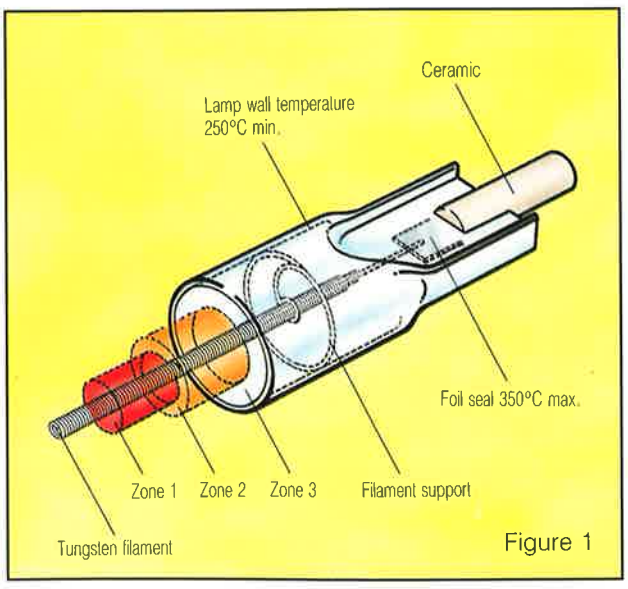


Figure 1

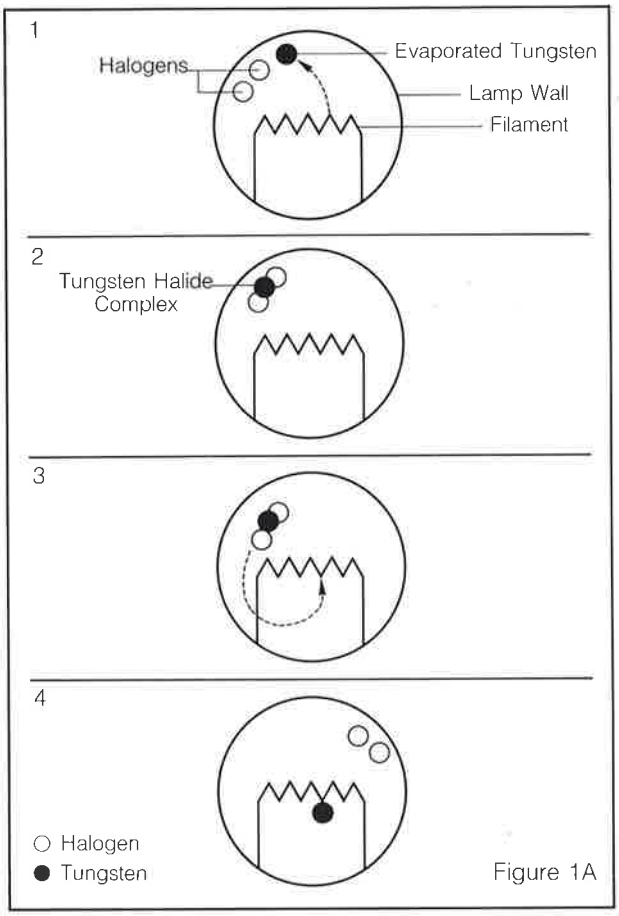


Figure 1A

Figures 1 and 1A illustrate the halogen cycle as applied to a floodlight lamp. The ceramic cap containing a contact button is connected via a molybdenum foil seal to a tungsten filament enclosed hermetically within a translucent quartz envelope. The filament operating temperature is typically 2600°C and is surrounded by a chemically inert fill gas such as nitrogen and/or argon, also halogens such as bromine or iodine in easy dissociable compound form and gettering or scavenging agents. A thermal gradient is formed between the coil and the lamp wall whose operating temperature should be always above 250°C. The tungsten evaporate in the region of the coil mixes with dissociated halogens but with no chemical reactions. In the centre the atoms of tungsten and the halogen atoms form tungsten halides. This process completes in the proximity of the bulb wall where, providing the temperature is correct, the tungsten halide diffuses back toward the centre dissociating into the atomic form very close to the coil.

The tungsten atoms in the vapour phase are then in excess for stable equilibrium and the tungsten will re-deposit on the coil, the exact locations depend on the coil local temperatures.

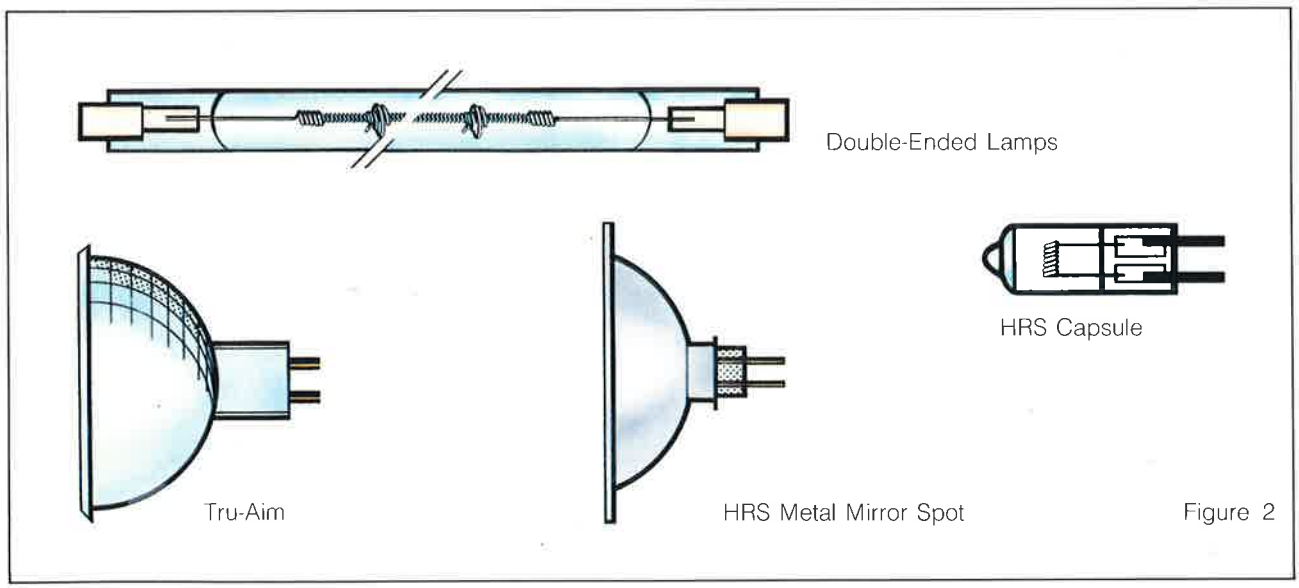


Figure 2

Constructional Features and Materials

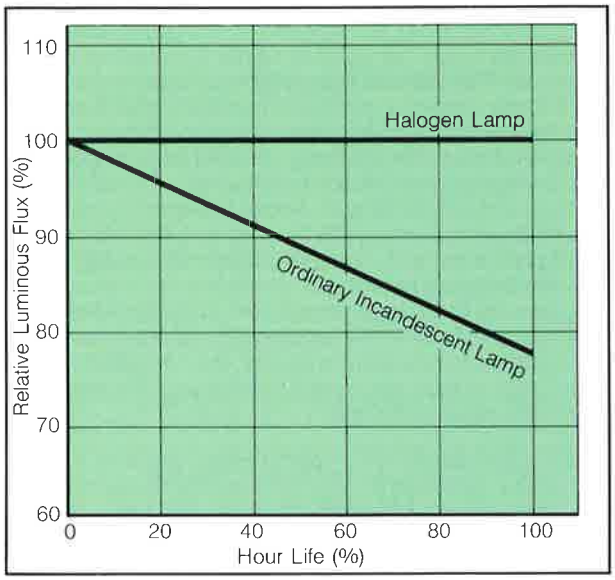
Bulb Shapes and Sizes

Tungsten Halogen lamps are mostly constructed from quartz (fused silica) or aluminosilicate hard glass which is essential to maintain the high temperatures and pressures required for operation of the halogen cycle.

Bulb shapes are tubular double-ended for floodlights, single-ended capsule types or capsules integrated into metal or dichroic glass reflectors for display lighting work.

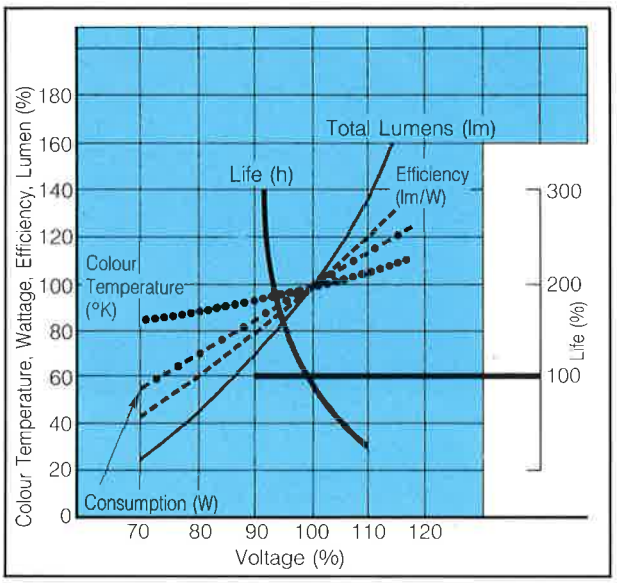
Bulb materials must be capable of withstanding high operating temperatures (up to 900°C) and pressures. Quartz has a melting point of 1650°C and can usually be operated at up to 1100°C satisfactorily. Up to 600°C operating temperature may be served by high-silica glass, for instance in some photo lamps. Aluminosilicate hard glass may be used in low voltage Tungsten Halogen lamps, 50W-rating or less, with wall temperatures around 400°C.

Lumen Maintenance Curve



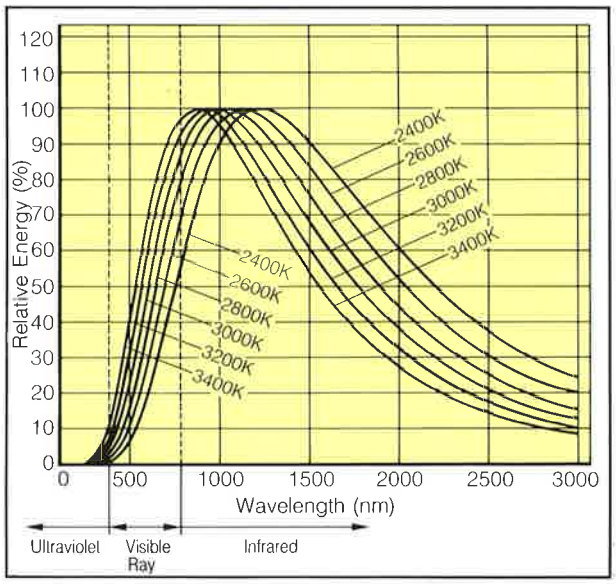
Voltage Fluctuation Characteristics of Halogen Lamp

This diagram shows average figures of common characteristics of halogen lamps.
Figures vary according to type of halogen lamp.

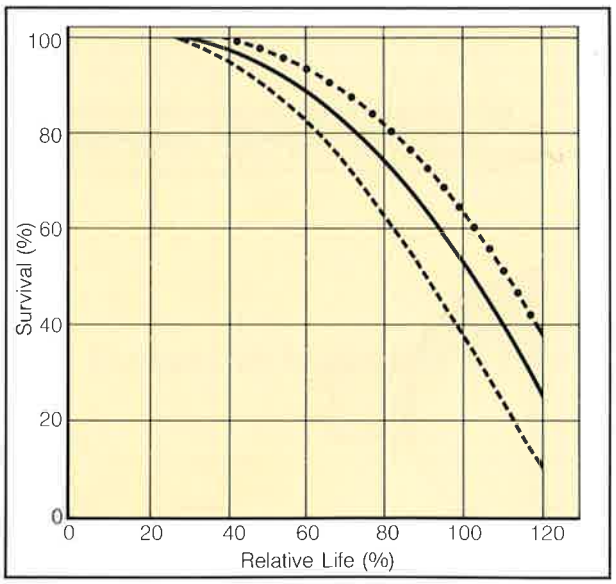


Spectral Energy Distribution

Tungsten Halogen Lamps have the same colour rendering properties and spectral energy distributions as conventional incandescent lamps, but they have increased efficiency both from a lumen output and a colour temperature standpoint. Tungsten Halogen Lamps can operate at much higher internal pressures than conventional incandescent lamps.



Lamp Life



Lamp Fills

Tungsten Halogen lamps are filled with argon/nitrogen, krypton/argon or other similar combinations plus a halogen vapour fill. The halogen vapour may be iodine or one of its organic derivates (e.g. CH_3I-methyl iodide) or of bromine (e.g. CH_3Br, CH_2Br_2 – Methyl or Methylene bromide).

In addition to these compounds, needed to activate the halogen regenerative cycle, the operating pressure is crucial to the filament evaporation rate therefore lamp life. The operating gas pressure is therefore at plus several atmospheres. A getter such as bromophosphonitrite $(PNBr_2)_{3,4}$ is used to reduce traces of hydrogen, oxygen or water vapour which may be present in minute amounts.

Filaments

Tungsten Halogen lamp filaments operate at very high temperatures and are generally of close-wound construction. They must remain rigid, without sagging, throughout life. The purity of the material and the precision thickness of the tungsten wire are also essential to long life.

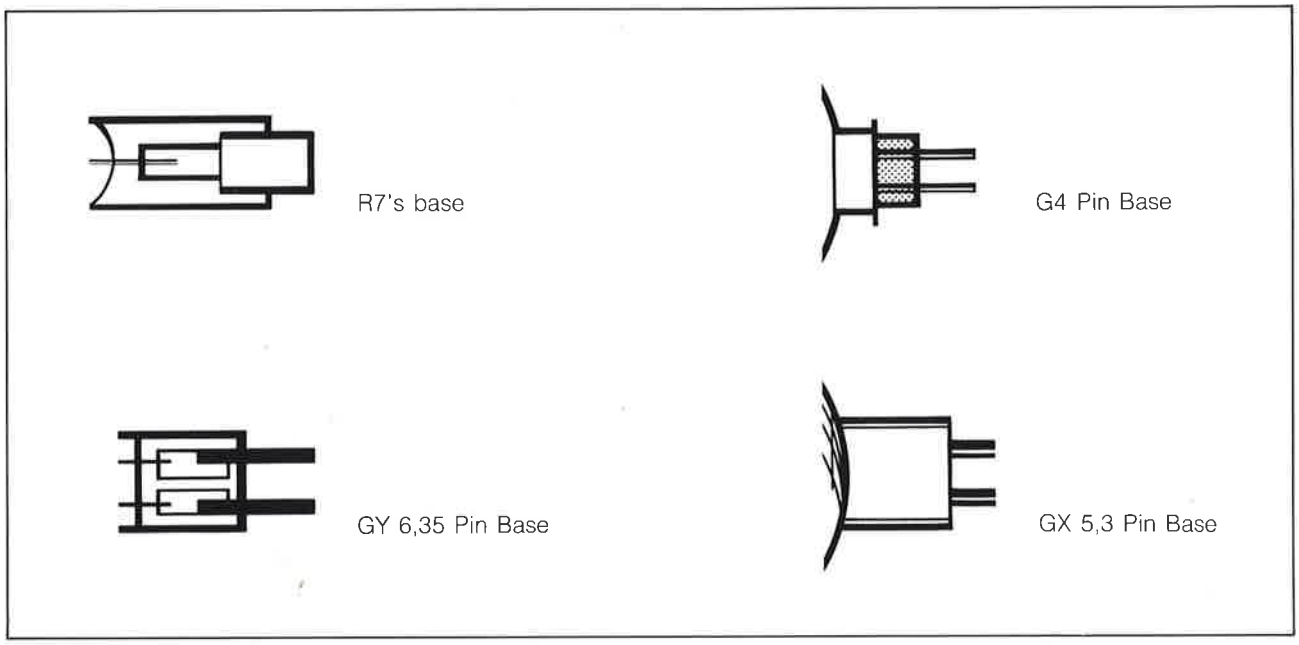
Lead Wires and Seals

The electrical connections to the filament must pass through a hermetic seal formed between the quartz and the lead wires known as a "press seal". It is crucial to ensure that the thermal expansion characteristics of the quartz are matched by the metal of the lead wires in order to avoid strain cracks. It is equally important not to exceed local temperatures at the seal which should normally be a maximum of 350°C. The longevity of the seal is obtained using thin-section molybdenum foil welded to tungsten rods (filament end).

Caps

Lamp caps for Tungsten Halogen lamps are designed to be suitable for high temperatures and high current amperes. In a 12 volt 60 Watt lamp, for example, the current is 5 amperes. Low electrical resistance and durable contact surfaces versus corrosion over long periods of use are essential.

Caps for lighting lamps fall into two general categories — high voltage double-ended and low voltage single-ended. The caps for double-ended lamps are standardized around the R7s and Fa4 — see the drawing below. The low voltage lamps use a variety of push-in pin types of which the GY6.35 and GX5.3 bases are among the most popular. Generally speaking such bases are for electrical connection purposes only, the lamp rim taking care of the mechanical support and optical positioning requirements.



New Tungsten Halogen Lamp Technology

Low Voltage Tungsten Halogen Display Lamps

The dimensions of a Tungsten Halogen filament depend largely on the current (filament wire diameter) and the voltage drop (filament length). The filament thickness increases with increasing ampères and the filament length decreases with decreasing applied voltage. The effect is that for a given power rating, lowering the applied voltage effectively makes the filament dimension much more compact. As a result the filament more closely approximates to a photometrically ideal light source — the "point" source — which improves substantially the fundamental efficiency of a reflector lamp system.

One substantial problem with all incandescent light sources, especially light-concentrating types such as reflector lamps, is that not only are visible frequencies emitted but also infrared. In some cases, for instance, in displaying foodstuffs or fabrics, this heat radiation is undesirable. For this reason two general types of lamp-reflector combinations have evolved — metal reflectors and "dichroic" glass multi-facetted reflectors.

Dichroic Reflector Theory

The dichroic reflector has the properties of a semi-transparent system which can selectively reflect specified wavelengths in the visible region and transmit in the opposite sense unwanted wavelengths in the infrared region. The lamps may also be designed to reflect certain colours. The Sylvania "Tru-Aim" series comprises red, blue, green and yellow reflector versions. Such lamps are excellent for special effect display work and avoid the use of filters which are very light absorbent and which often cannot be placed close to the lamp due to heat generation problems.

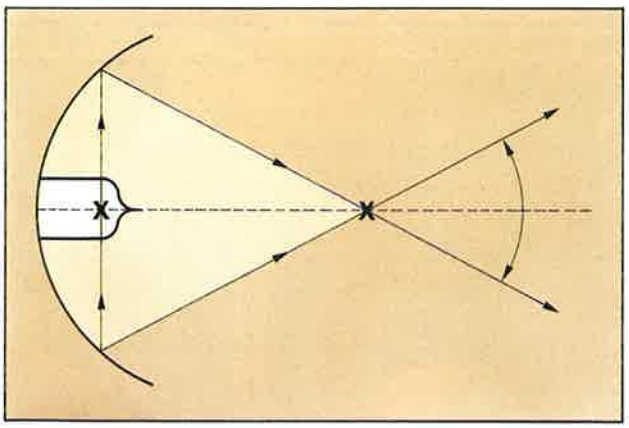
The dichroic reflector is formed from several layers of two different transparent materials on glass, usually magnesium fluoride and zinc sulphide, in a silica substrate to give hardness and prevent rapid degradation of the reflector surface. There are several critical parameters to be met in order to fabricate a good quality reflector:

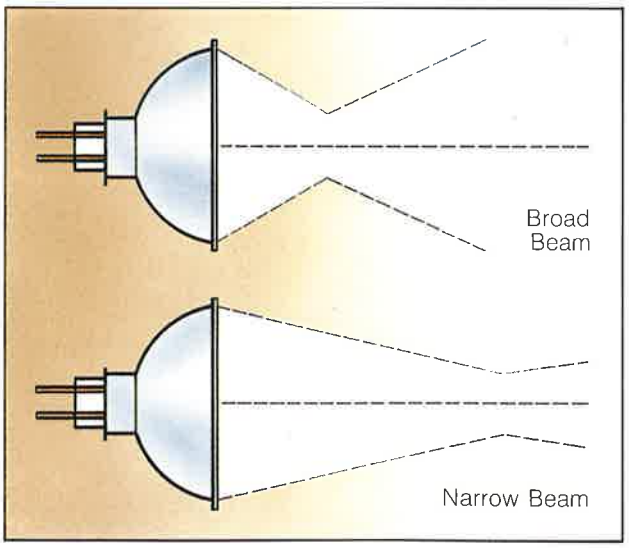
- the alternate layering of high and low refractive index materials must be of a thickness equal to one quarter of the wavelength to be reflected
- up to thirty layers must be built up in a vacuum furnace starting and finishing with the highest refractive index material.

The dichroic reflector uses the principle of "phase shifting" of the incident lightwave train since at every layer boundary the incident light ray suffers a phase-change of 180°. As the light passes through each layer interference effects occur. Depending on the coating thickness certain wavelengths will be reflected and others transmitted.

The reflector efficiency obtained by this system is generally excellent.

Optical Principles of Ellipsoid Reflectors





Using Tungsten Halogen Lamps

Tungsten Halogen lamps are an easy-to-use lighting product, nevertheless, there are a few simple rules to observe in order to ensure satisfactory service is received from the product.

Handling

Lamp bulbs should not be touched with bare fingers as salt/fatty acids and skin oils present will cause the quartz material to stain and crack leading to short life. One should also take care in inserting lamps into the luminaire lampholder so as not to apply shear forces to the cap or pins.

Protection — Fusing

For safety reasons, the lamp must be protected in series by a quick-acting, high-breaking capacity fuse (according to IEC Publication 127/CEE 4 or the equivalent National Standard) of proper rating (see table).

Directives are included in the lamp packaging, however, the recommendations are listed below:

Lamp		Fuse	
Voltage (V)	Wattage (W)	Rated Current (A) a)	b)
100-135	200-300	4.0	
200-250	200-300	2.0	
100-135	420	4.0	
100-135	450-500	6.3	
200-250	450-500	4.0	
100-135	750	10.0*	10.0
200-250	750	6.3	6.0
100-135	900-1000	10.0*	10.0
200-250	900-1000	6.3	6.0
100-135	1250-1500		20.0
200-250	1250-1500	6.3	6.0
100-135	1750-2000		25.0
200-250	1750-2000		10.0

a) "Quick-acting" miniature fuses, 250 V with "high-breaking capacity" (IEC Publication 127/CEE 4, or the equivalent National Standard).

b) "Quick-acting" D-fuses, 500 V (IEC Publication 241/CEE 16, or the equivalent National Standard).

* Not included in IEC Publication 127, or CEE Publication 4, but in common use.

Protection — Lamp Shattering

This lamp operates with an internal pressure greater than atmospheric pressure and may, in rare cases, shatter. Precautions must be taken to ensure that lamp fragments cannot cause damage to persons, animals or property. Therefore, only luminaires fitted with a means of preventing ejection of such fragments must be used.

Sylvania reserves the right to change data and specifications without notice.
Data for guidance only.

ENERGY SAVER
SYLVANIA

SYLVANIA GTE

Tungsten Halogen Lamps

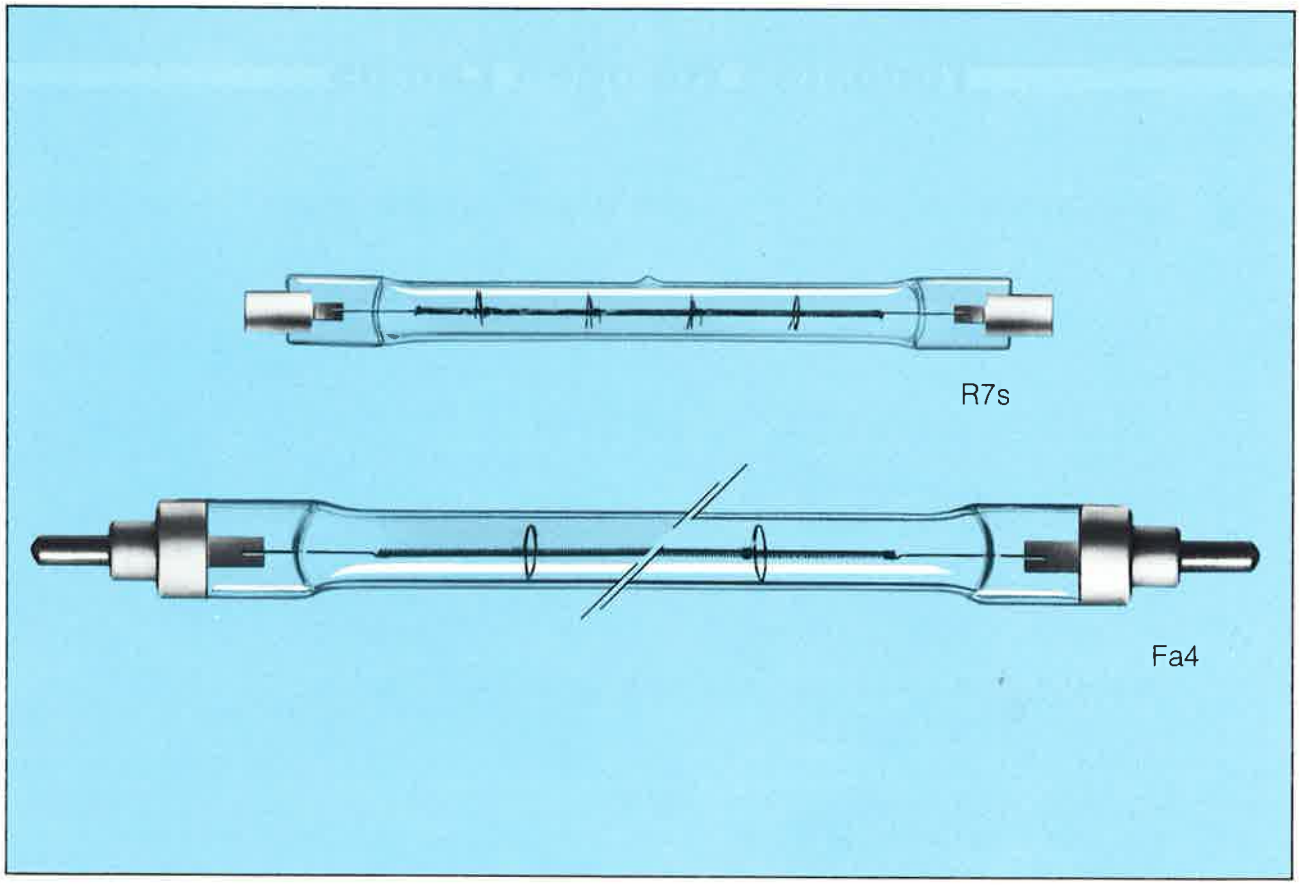
2.40.1	**Hi-Light ES** Tungsten Halogen Floodlight Lamps	**225 V, 245 V;** 450 W, 900 W, 1250 W, 1750 W
2.41.1	Standard Tungsten Halogen Floodlight Lamps	**225 V;** 250 W, 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W
2.41.2	Standard Tungsten Halogen Floodlight Lamps	**245 V;** 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W
2.41.3	Standard Tungsten Halogen Floodlight Lamps	**120 V;** 300 W, 500 W
2.42.1	Single-ended High Voltage Tungsten Halogen Lamps	**225 V, 245 V;** 250 W Mini-can, 250 W E14, 250 W E27
2.43.1	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps without reflector	**12 V;** 20 W/G4, 50 W/GY 6.35, 100 W/GY 6.35, 50 W/GY 6.35 for traffic signals
2.43.2	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps with 48 mm dia. metal reflector	**12 V;** 20 W 10° Spot/G4, 20 W 15° Flood/G4
2.43.3	**Hi-Light HRS** Low Voltage Tungsten Halogen Lamps with 70 mm dia. metal reflector	**12 V;** 20 W 10° Spot/BA15d; 30° Flood/BA15d **12 V;** 50 W 10° Spot/BA15d; 30° Flood/BA15d
2.44.1a	**Hi-Light Tru-Aim** Low Voltage Tungsten Halogen Lamps with 50 mm dia. dichroic reflector	
2.44.1b	ENL Data	12 V 50 W 30° Narrow Flood
2.44.2b	EXN Data	12 V 50 W 38° Flood
2.44.3b	ESX Data	12 V 20 W 12° Narrow Spot
2.44.4b	EYR Data	12 V 42 W 12° Narrow Spot
2.44.5b	EXT Data	12 V 50 W 13° Narrow Spot
2.44.6b	EYF Data	12 V 75 W 14° Narrow Spot
2.44.7b	EXZ Data	12 V 50 W 24° Spot
2.44.8b	BAB Data	12 V 20 W 36° Flood
2.44.9b	EYC Data	12 V 75 W 38° Flood
2.45.1	**Hi-Light Tru-Aim** Low Voltage Tungsten Halogen Lamps with 50 mm dia. coloured dichroic reflector	**12 V;** 50 W 13° Spot in red, yellow, green, blue

Tungsten Halogen Lamp Product Information

Description: **Hi-Light ES** Tungsten Halogen Floodlight Lamps
450 W, 900 W, 1250 W, 1750 W
in **225 V and 245 V**

T-HAL

2.40.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	225 V **450 W**	245 V **450 W**	225 V **900 W**	245 V **900 W**	225V **1250W**	245V **1250W**	225V **1750W**	245V **1750W**
Type Description	L 2291	L 2292	L 2289	L 2290	L 2280	L 2281	L 2287	L 2288
Mechanical Data								
Maximum Overall Length mm	119.6	119.6	191.1	191.1	256.1	256.1	334.4	334.4
Contact Length, nom. mm	114.2	114.2	185.7	185.7	250.7	250.7	—	—
Clearance Length, max. mm	117.6	117.6	189.1	189.1	254.1	254.1	322.0	322.0
Bulb Diameter, max. mm	12	12	12	12	12	12	12	12
Bulb Type/Finish	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular
Cap	R7s	R7s	R7s	R7s	R7s	R7s	Fa4	Fa4
Average Life (hrs)	2000	2000	2000	2000	2000	2000	2000	2000
Illumination Characteristics								
Nominal lm	9500	9500	22000	22000	33000	33000	44000	44000

Features **Energy Saver replacement for Standard Tungsten Halogen Floodlight Lamps**

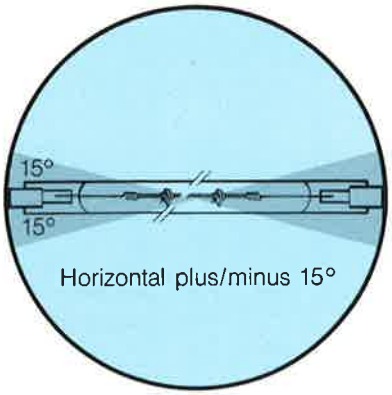
- 450 W replaces 500 W saving 10% energy
- 900 W replaces 1000 W saving 10% energy
- 1250 W replaces 1500 W saving 16% energy
- 1750 W replaces 2000 W saving 13% energy

SYLVANIA GTE

Applications

- Floodlighting of Building Sites, Car Parks Monuments, Parks and Gardens especially where instant light after switch-on is needed

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Bulb: T3 Quartz/Clear.

Cap:

According to IEC Publication 61

Ordering Information

Lamp Rating	225 V **450 W**	245 V **450 W**	225 V **900 W**	245 V **900 W**	225 V **1250 W**	245 V **1250 W**	225 V **1750 W**	245 V **1750 W**
Type Description	L 2291	L 2292	L 2289	L 2290	L 2280	L 2281	L 2287	L 2288
Packing Quantity	10	10	10	10	10	10	10	10
Order Code	21778	21779	21776	21777	21740	21741	21774	21775

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires preferably fitted with toughened front glasses.
(4) All wattage and lumen ratings are subject to tolerances.

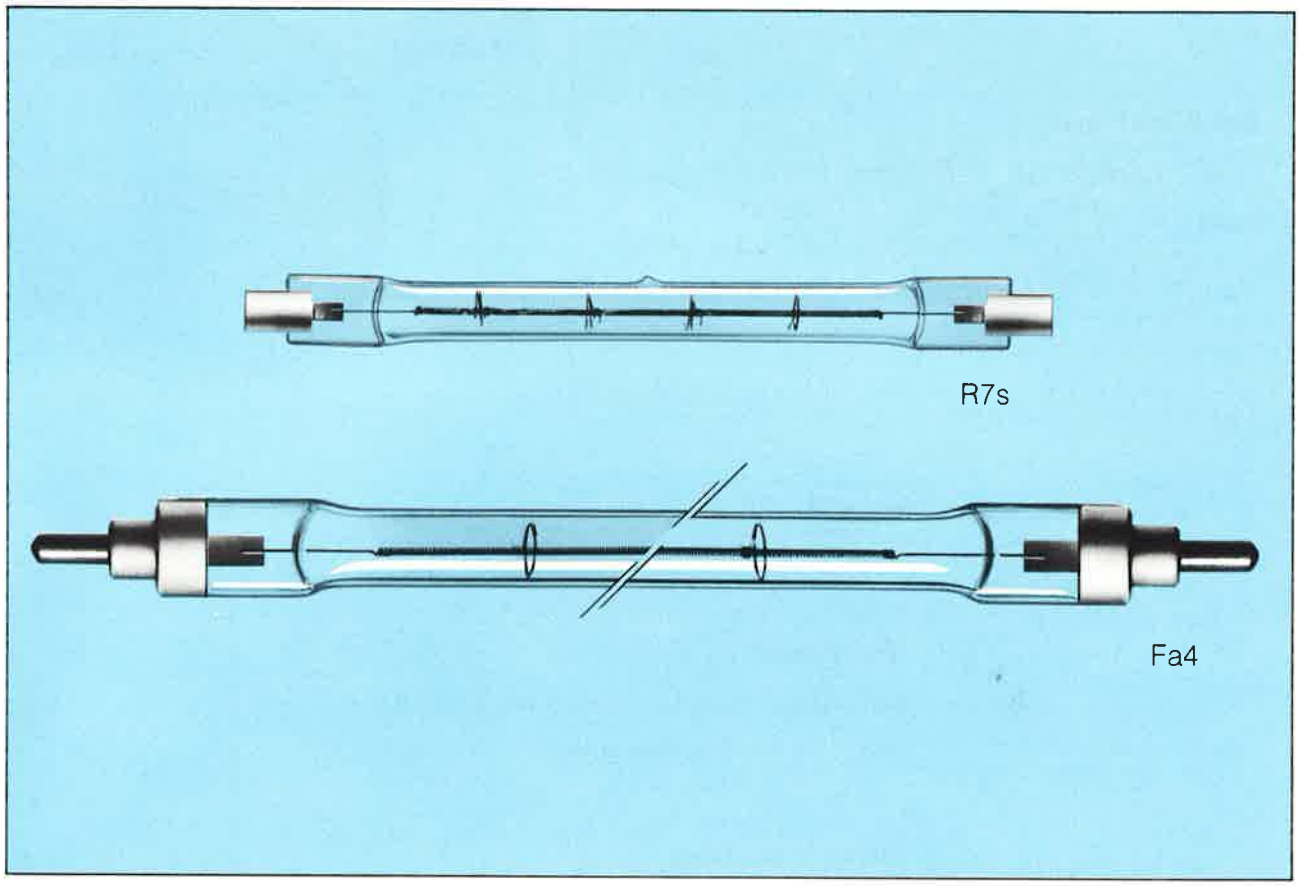
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp Product Information

Description: Standard Tungsten Halogen Floodlight Lamps 250 W, 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W in **225 V**

T-HAL

2.41.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	225 V **250 W**	225 V **300 W**	225 V **500 W**	225 V **750 W**	225 V **1000 W**	225 V **1500 W**	225 V **2000 W**	225 V **2000 W**
Type Description	L 2282	L 2258	L 2248	L 2208	L 2202	L 2209	L 2204	L 2203
Mechanical Data								
Maximum Overall Length mm	119.6	119.6	119.6	191.1	191.1	256.1	334.4	333.0
Contact Length, nom. mm	114.2	114.2	114.2	185.7	185.7	250.7	—	327.4
Clearance Length, max. mm	117.6	117.6	117.6	189.1	189.1	254.1	322.0	331.0
Bulb Diameter, max. mm	9	9	12	12	12	12	12	12
Bulb Type/Finish	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular
Cap	R7s	R7s	R7s	R7s	R7s	R7s	Fa4	R7s
Average Life (hrs)	1000	2000	2000	2000	2000	2000	2000	2000
Illumination Characteristics								
Nominal lm	4000	5000	9500	15000	22000	33000	44000	44000

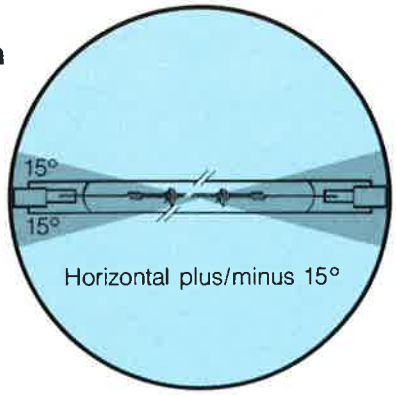
Features
- Long service life
- Excellent lumen maintenance
- Suitable for luminaires such as **Sylvania FMH/FEH**

SYLVANIA GTE

Applications

- Floodlighting of Building Sites, Car Parks Monuments, Parks and Gardens especially where instant light after switch-on is needed

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Bulb: T2.5 and T3 Quartz/Clear.

Cap:

According to IEC Publication 61

Ordering Information

Lamp Rating	225 V **250 W**	225 V **300 W**	225 V **500 W**	225 V **750 W**	225 V **1000 W**	225 V **1500 W**	225 V **2000 W**	225 V **2000 W**
Type Description	L 2282	L 2258	L 2248	L 2208	L 2202	L 2209	L 2204	L 2203
Packing Quantity	10	10	10	10	10	10	10	10
Order Code	21742	21681	21620	21622	21624	21626	21630	21629

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires preferably fitted with toughened front glasses.
(4) All wattage and lumen ratings are subject to tolerances.

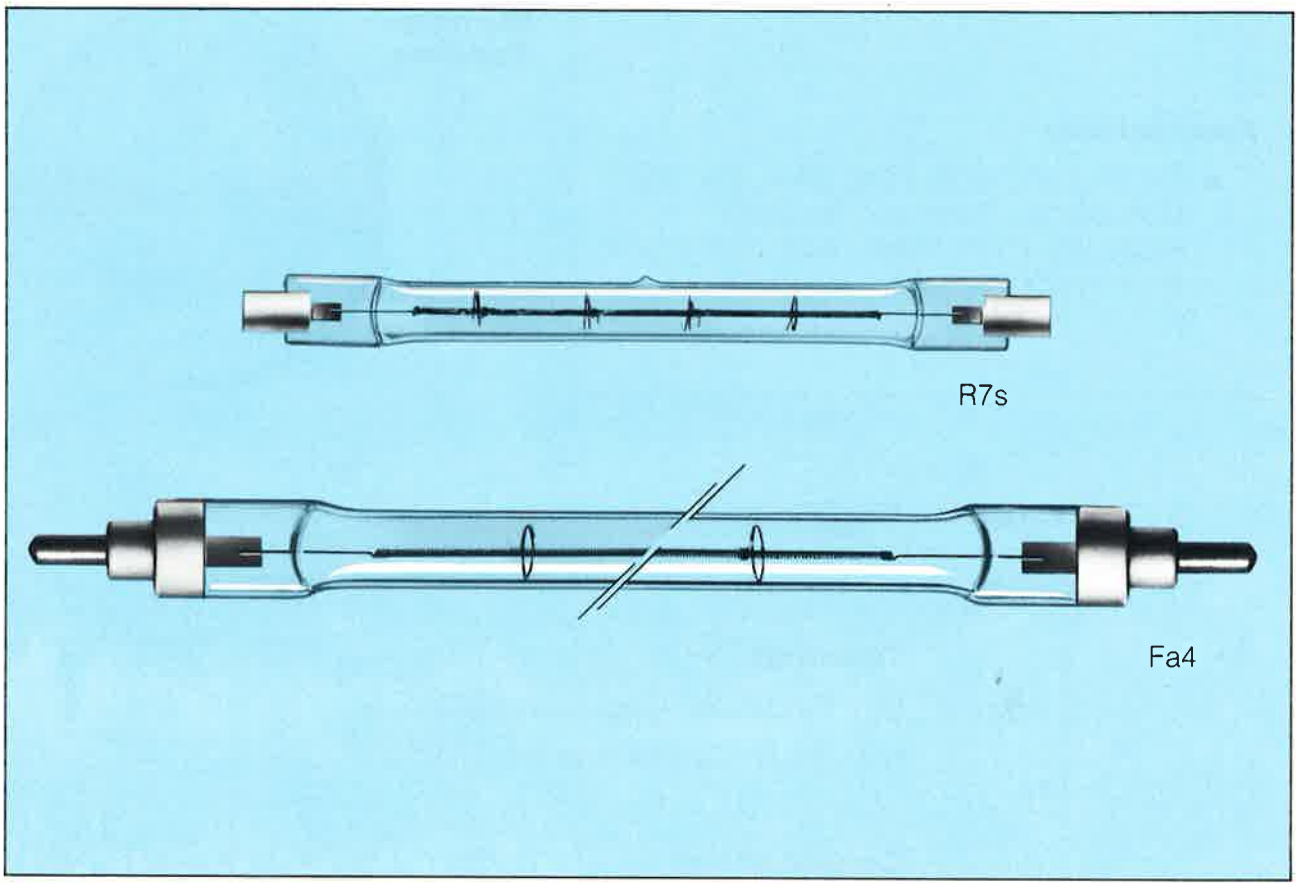
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp
Product Information

Description: Standard Tungsten Halogen Floodlight Lamps 250 W, 300 W, 500 W, 750 W, 1000 W, 1500 W, 2000 W in **245 V**

T-HAL

2.41.2a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	245 V **250 W**	245 V **300 W**	245 V **500 W**	245 V **750 W**	245 V **1000 W**	245 V **1500 W**	245 V **2000 W**	
Type Description	L 2283	L 2270	L 2229	L 2230	L 2228	L 2201	L 2269	
Mechanical Data								
Maximum Overall Length mm	119.6	119.6	119.6	191.1	191.1	256.1	334.4	
Contact Length, nom. mm	114.2	114.2	114.2	185.7	185.7	250.7	—	
Clearance Length, max. mm	117.6	117.6	117.6	189.1	189.1	254.1	322.0	
Bulb Diameter, max. mm	9	9	12	12	12	12	12	
Bulb Type/Finish	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	Clear/Tubular	
Cap	R7s	R7s	R7s	R7s	R7s	R7s	Fa4	
Average Life (hrs)	1000	2000	2000	2000	2000	2000	2000	
Illumination Characteristics								
Nominal lm	4000	5000	9500	15000	22000	33000	44000	

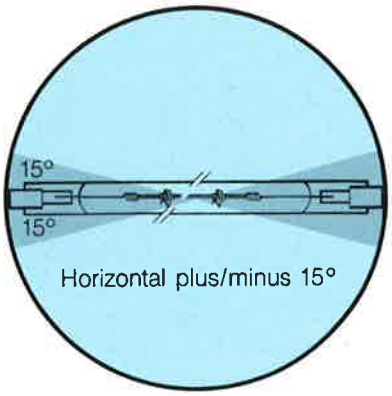
Features
- Long service life
- Excellent lumen maintenance
- Suitable for luminaires such as **Sylvania FMH/FEH**

SYLVANIA GTE

Applications

- Floodlighting of Building Sites, Car Parks Monuments, Parks and Gardens especially where instant light after switch-on is needed

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Bulb: T2.5 and T3 Quartz/Clear.

Cap:

According to IEC Publication 61

Ordering Information								
Lamp Rating	245 V **250 W**	245 V **300 W**	245 V **500 W**	245 V **750 W**	245 V **1000 W**	245 V **1500 W**	245 V **2000 W**	
Type Description	L 2283	L 2270	L 2229	L 2230	L 2228	L 2201	L 2269	
Packing Quantity	10	10	10	10	10	10	10	
Order Code	21743	21653	21621	21623	21625	21628	21652	

Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires preferably fitted with toughened front glasses.
(4) All wattage and lumen ratings are subject to tolerances.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp
Product Information

Description: Standard Tungsten Halogen Floodlight Lamps
300 W, 500 W in **120 V**

T-HAL

2.41.3a

R7s

Mechanical Data and Illumination Characteristics

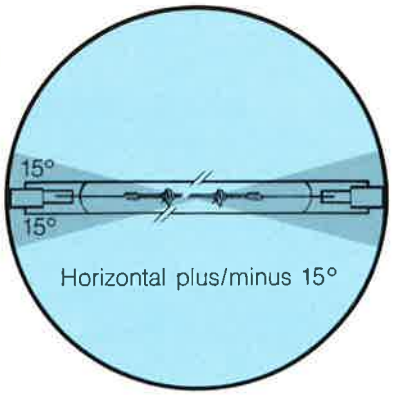
General Information								
Lamp Rating	120 V **300 W**	120 V **500 W**						
Type Description	L 2274	L 2207						
Mechanical Data								
Maximum Overall Length mm	119.6	119.6						
Contact Length, nom. mm	114.2	114.2						
Clearance Length, max. mm	117.6	117.6						
Bulb Diameter, max. mm	9	12						
Bulb Type/Finish	Clear/Tubular	Clear/Tubular						
Cap	R7s	R7s						
Average Life (hrs)	2000	2000						
Illumination Characteristics								
Nominal lm	5100	10500						

Features
- Long service life
- Excellent lumen maintenance
- Suitable for luminaires such as **Sylvania FMH/FEH**

Applications

- Floodlighting of Building Sites, Car Parks Monuments, Parks and Gardens especially where instant light after switch-on is needed

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Bulb: T2.5 and T3 Quartz/Clear.

Cap:

According to IEC Publication 61

Ordering Information								
Lamp Rating	120 V **300 W**	120 V **500 W**						
Type Description	L 2274	L 2207						
Packing Quantity	50	50						
Order Code	21685	21619						

Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires preferably fitted with toughened front glasses.
(4) All wattage and lumen ratings are subject to tolerances.

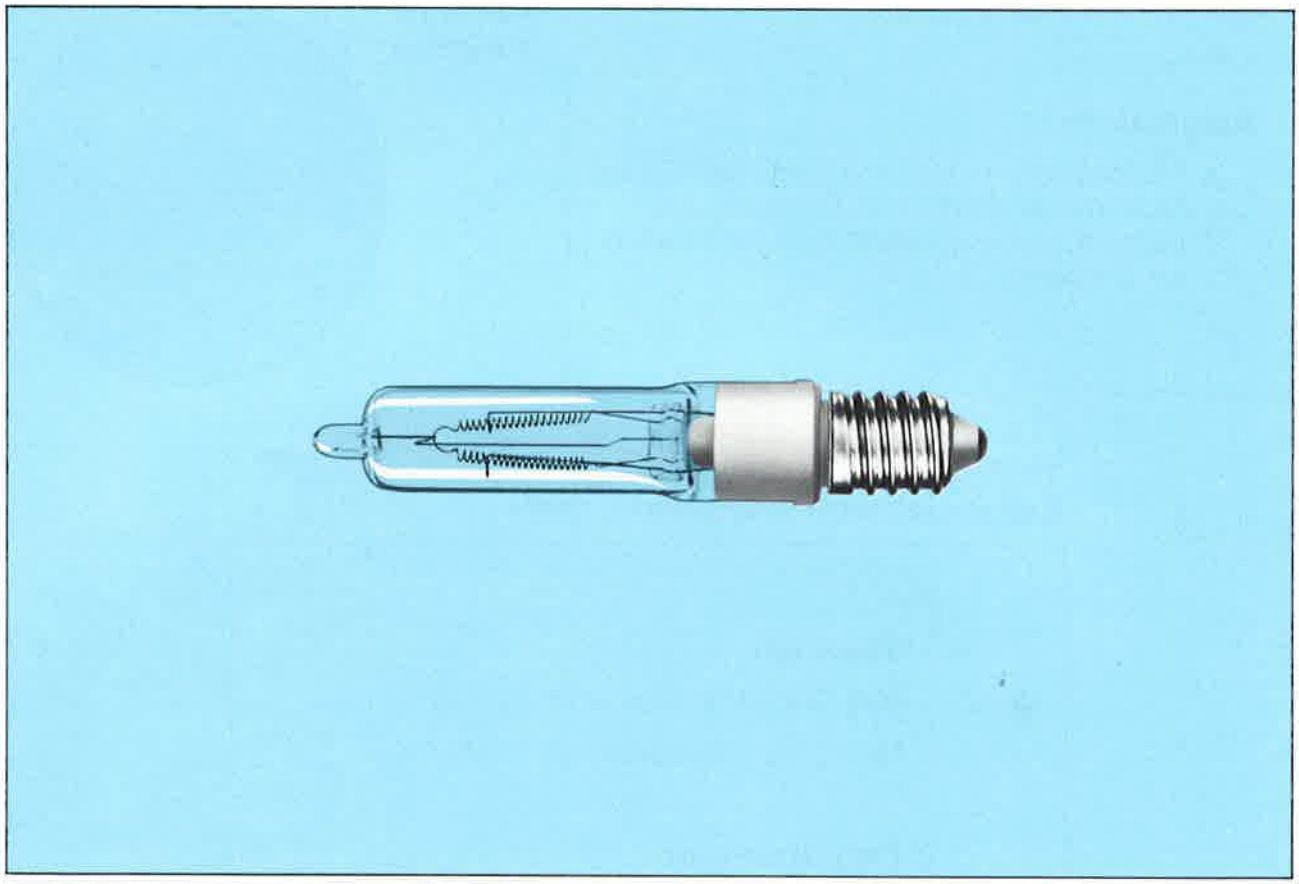
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp
Product Information

Description: Single-ended High Voltage Tungsten Halogen Lamps
250 W MINI-CAN, 250 W E14, 250 W E27
in **225 V and 245 V**

T-HAL

2.42.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	225 V **250 W** Mini-Can	245 V **250 W** E14		225 V **250 W** E27				
Type Description	L 2273	L 2276		L 2300				
Mechanical Data								
Maximum Overall Length mm	90	95		90				
Bulb Diameter, max. mm	16	16		16				
Bulb Type/Finish	Capsule/Clear	Capsule/Clear		Capsule/Clear				
Base	Minican	E14		E27				
Average Life (hrs)	2000	2000		2000				
Illumination Characteristics								
Nominal lm	3800	3800		4200				

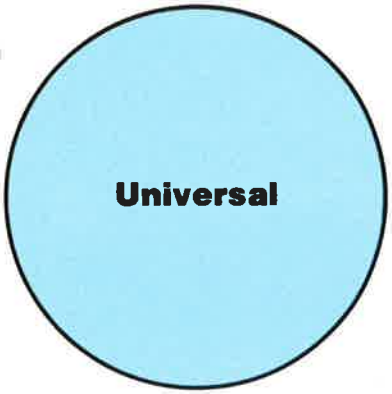
Features

- Compact dimensions, high light output, long service life
- Lamp mounted into rugged ceramic base
- Filament construction suitable for parabolic spot/flood optics

Applications

- Spot and floodlighting for show windows and general display work

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Tubular Clear Quartz Bulb

Cap:

NB: Do not overtighten/apply excessive force on insertion

Ordering Data								
Lamp Rating	225 V **250 W** Mini-Can	245 V **250 W** E14		225 V **250 W** E27				
Type Description	L 2273	L 2276		L 2300				
Packing Quantity	50	50		50				

Special Notes (1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires always fitted with toughened front glasses.

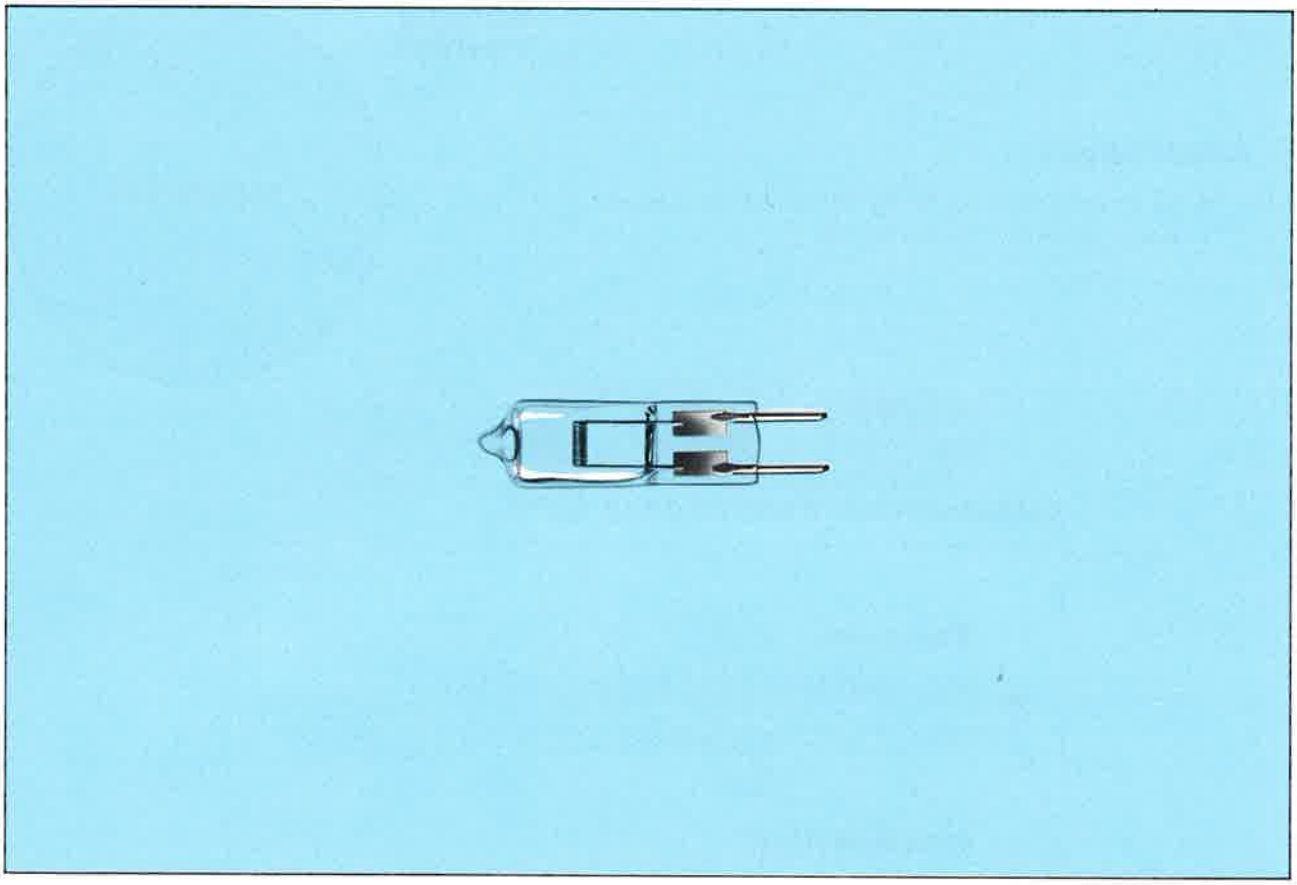
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp
Product Information

Description: **Hi-Light HRS** Low Voltage Tungsten Halogen Lamps **without reflector**
12 V; 20 W, 50 W, 100 W. G4 or GY 6.35 Bi-Pin base
12 V; 50 W for Traffic Signals. GY 6.35 Bi-Pin base

T-HAL

2.43.1a



Mechanical Data and Illumination Characteristics

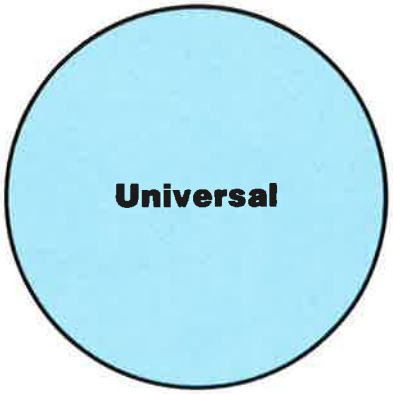
General Information								
Lamp Rating	12 V **20 W**	12 V **50 W**	12 V **100 W**		12 V **50 W**			
Type Description	L 2279	L 2294	L 2235		L 2303 Traffic.			
Mechanical Data								
Maximum Overall Length mm	31.0	44.0	44.0		44.0			
Contact Pin Length, min. mm	7.5	7.5	7.5		7.5			
Bulb Diameter, max. mm	9	12	12		12			
Bulb Type/Finish	Capsule/Clear	Capsule/Clear	Capsule/Clear		Capsule/Clear			
Base	G4	GY 6.35	GY 6.35		GY 6.35 Plated			
Average Life (hrs)	2000	2000	2000		3000			
Illumination Characteristics								
Nominal lm	350	950	2500		850			

Features
- Very compact dimensions for optimum luminaire design
- High performance rugged lamp construction filament for long life
- Rough service version available for traffic signals
- Platinum plated coated pins (L 2303)

Applications

- L 2303 — Traffic Signals (switching cycle 30 sec. "on", 30 sec. "off")
- Others — Interior Displays, Show Windows, Restaurants, Discotheques
  — Precision Task Lighting

Burning Position



Construction/Performance Data

Thermal:

Min. Bulb Wall Temperature: 250°C

Max. Pinch Temperature : 350°C

Construction:

Tubular Clear Quartz Bulb

Base:

NB: Do not overtighten/apply excessive force on insertion

Ordering Data								
Lamp Rating	12 V **20 W**	12 V **50 W**	12 V **100 W**		12 V **50 W**			
Type Description	L 2279	L 2294	L 2235		L 2303			
Packing Quantity	50	50	50		50			
Order Code	21794	21789	21601		21692			

Special Notes (1) Do not touch the quartz envelope with bare fingers.
(2) Use quick-acting H.R.C. fuses in the external circuit.
(3) Use in luminaires preferably fitted with toughened front glasses.

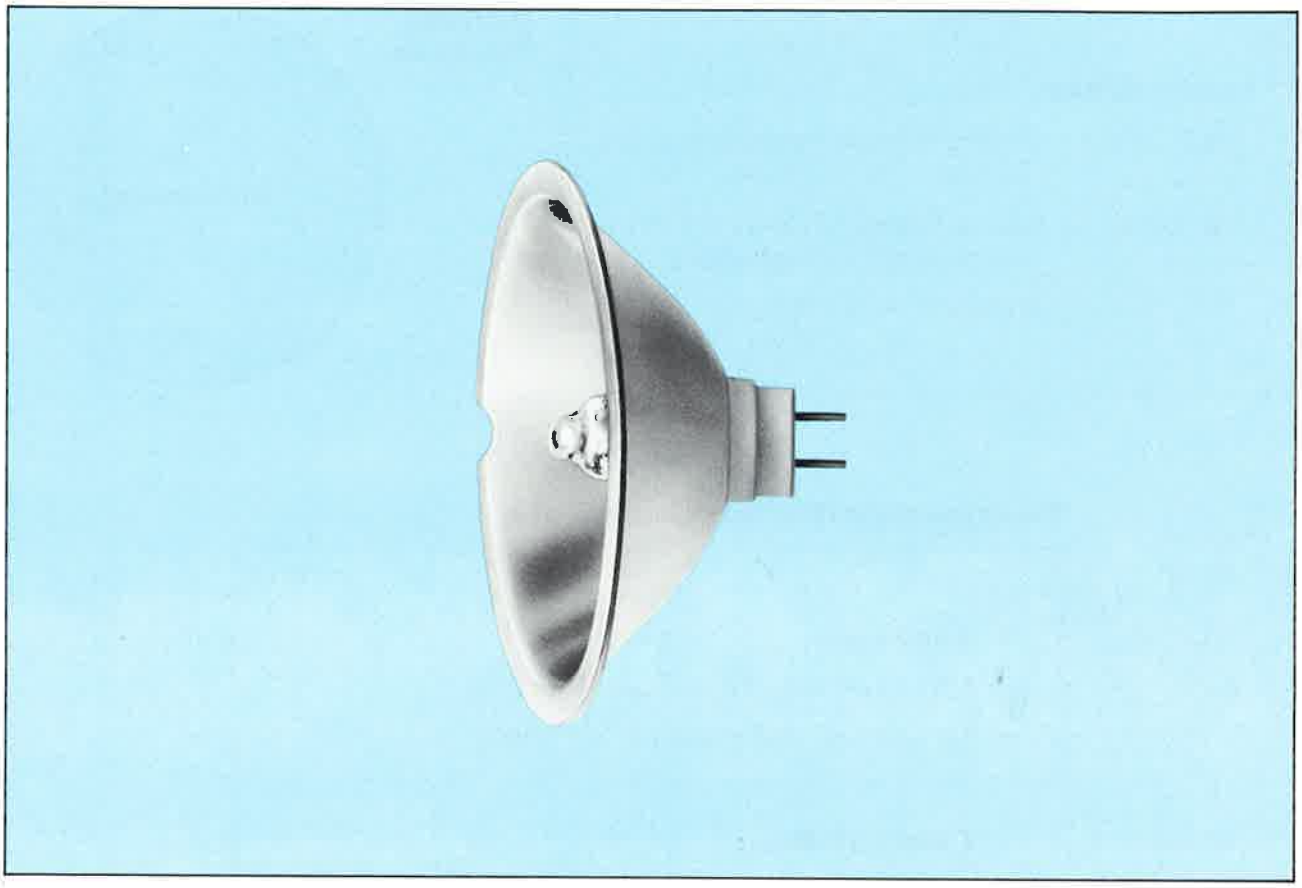
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp Product Information

Description: **Hi-Light HRS** Low Voltage Tungsten Halogen Lamps **with 48 mm diameter reflector** **12 V;** 20 W 10° Spot, 15° Flood/G4 Bi-Pin Base

T-HAL

2.43.2a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	12 V **20 W**	12 V **20 W**						
Type Description	L 2275 SP	L 2297 FL						
Mechanical Data								
Maximum Overall Length mm	32.0	32.0						
Contact Pin Length, min. mm	7.5	7.5						
Reflector Diameter, max. mm	48.8	48.8						
Reflector Type/Finish	Alloy/ Reflector Neutral	Alloy/ Reflector Neutral						
Base	G4 Bi-Pin	G4 Bi-Pin						
Average Life (hrs)	2000	2000						
Illumination Characteristics								
Peak Luminous Intensity (cd)	3800	1000						
Half Peak Angle	10°	15°						

Features

- Very compact dimensions for optimum luminaires design
- High performance, rugged construction filament/optic design
- Highly efficient treated aluminium alloy reflector for good through-life performance

Applications

- Special effects, e.g. fibre optics
- Accent lighting in show windows, etc. where heat in the beam is not a problem
- Home lighting (with a suitable luminaire)

Burning Position

Universal

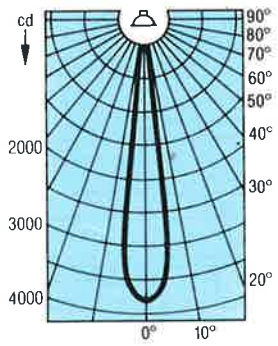
Photometric Data

Axial Polar Curve Data

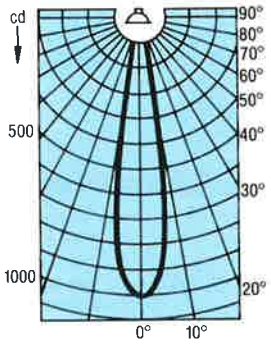
(in candelas)

A L2275
D L2297

A



D



DISTANCE (M)	L 2275 LUX LEVEL	L 2297 LUX LEVEL
1	3800	1300
2	950	325
3	422	144
4	237	81
Half Peak Angle		
	10°	15°

Lux Plot

Ordering Data								
Lamp Rating	12 V **20 W**	12 V **20 W**						
Type Description	L 2275 SP	L 2297 FL						
Packing Quantity	10	10						
Order Code	21793	21796						

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

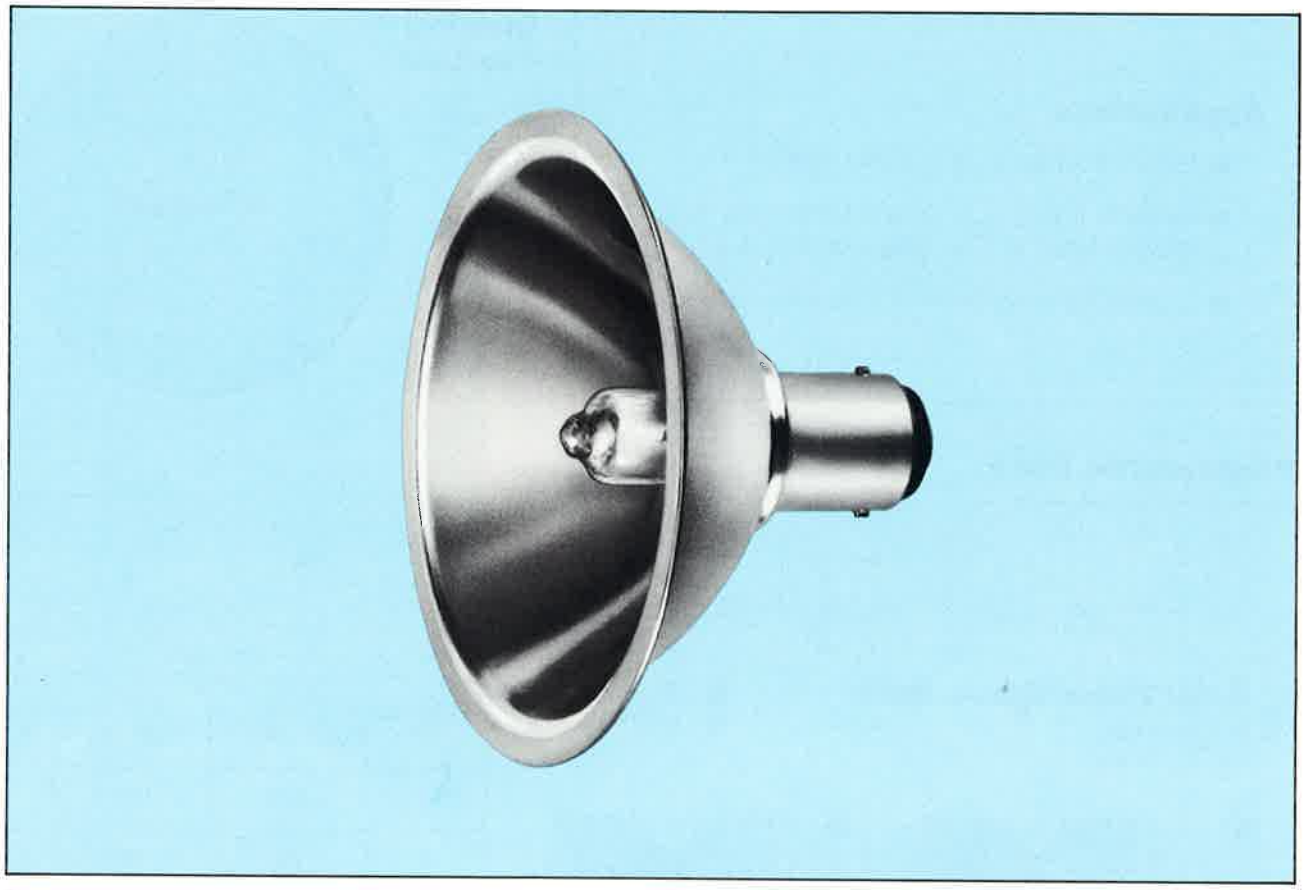
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp Product Information

Description: **Hi-Light HRS** Low Voltage Tungsten Halogen Lamps **with 70 mm diameter reflector** **12 V;** 20 W, 50 W; 10° Spot and 30° Flood/BA15d Base

T-HAL

2.43.3a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	12 V **20 W**	12 V **20 W**	12 V **50 W**	12 V **50 W**				
Type Description	L 2296 SP	L 2299 FL	L 2295 SP	L 2298 FL				
Mechanical Data								
Maximum Overall Length mm	46.5	46.5	46.5	46.5				
Reflector Diameter, max. mm	70.2	70.2	70.2	70.2				
Reflector Type/Finish	Alloy/Matt Reflector Neutral	Alloy/Matt Reflector Neutral	Alloy/Matt Reflector Neutral	Alloy/Matt Reflector Neutral				
Base	BA15d	BA15d	BA15d	BA15d				
Average Life (hrs)	2000	2000	2000	2000				
Illumination Characteristics								
Peak Luminous Intensity (cd)	5000	600	10000	1100				
Half Peak Angle	10°	30°	10°	30°				

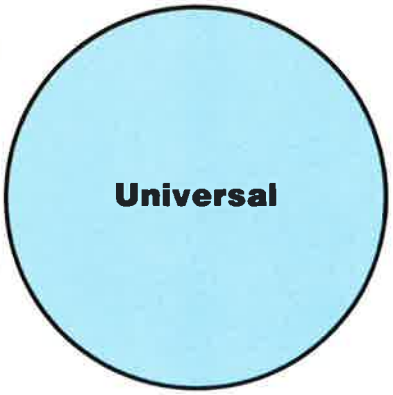
Features

- Very compact dimensions for optimum luminaire design
- High performance, rugged construction filament/optic design
- Highly efficient treated large diameter aluminium Alloy reflector for good through-life performance
- BA15d bayonet cap for solid lamp location and good electrical contact to socket

Applications

- Special effects, e.g. fibre optics
- Accent lighting in shop windows, etc. where heat in the beam is not a problem
- Home lighting (with a suitable luminaire)

Burning Position

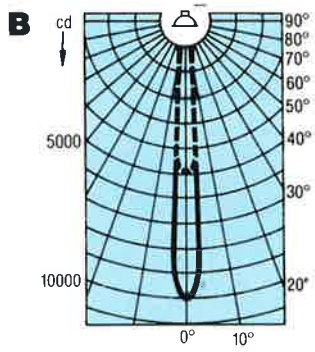


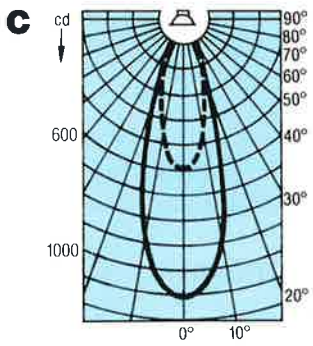
Photometric Data

Axial Polar Curve Data

(in candelas)

B L2295/L2296
C L2298/L2299





Lux Plot

DISTANCE (M)	L 2296 LUX LEVEL	L 2299 LUX LEVEL	L 2295 LUX LEVEL	L 2298 LUX LEVEL
1	5000	600	10000	1100
2	1250	150	2500	275
3	556	67	1111	122
4	313	38	625	69
Half Peak Angle	10°	30°	10°	30°

Ordering Data								
Lamp Rating	12 V **20 W**	12 V **20 W**	12 V **50 W**	12 V **50 W**				
Type Description	L 2296 SP	L 2299 FL	L 2295 SP	L 2298 FL				
Packing Quantity	10	10	10	10				
Order Code	21795	21797	21790	21798				

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

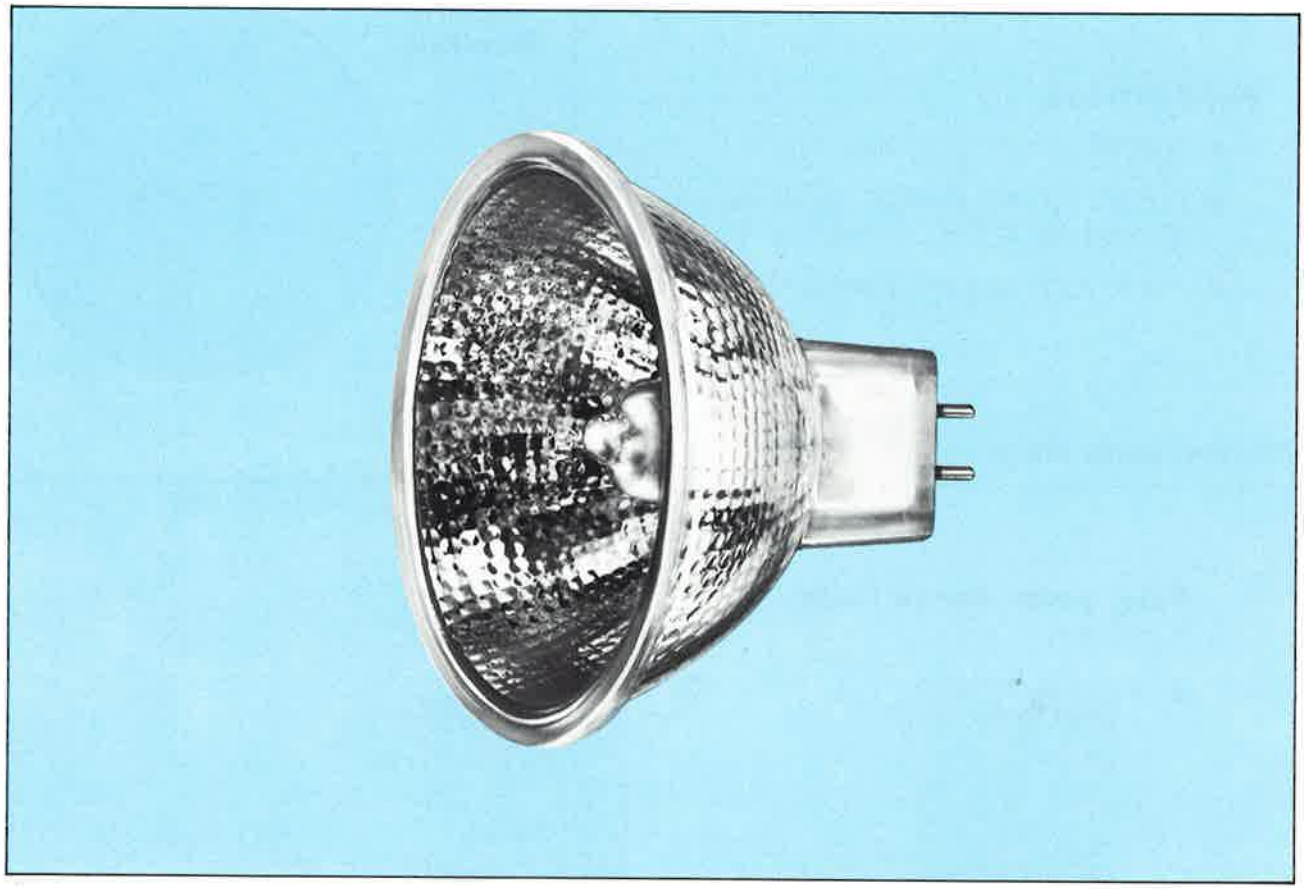
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp Product Information

Description: Hi-Light Tru-Aim
Low Voltage Tungsten Halogen Lamps
with 50 mm diameter dichroic reflector
12 V; 20 W, 42 W, 50 W, 75 W-GX5.3 Base

T-HAL

2.44.1a



Mechanical Data and Illumination Characteristics

General Information									
Lamp Rating	50 W/12 V	50 W/12 V	20 W/12 V	42 W/12 V	50 W/12 V	75 W/12 V	50 W/12 V	20 W/12 V	75 W/12 V
Type Description	ENL	EXN	ESX	EYR	EXT	EYF	EXZ	BAB	EYC
Mechanical Data									
Maximum Overall Length mm	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Contact Pin Length Min. Max. mm	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86
Rim Diameter, max. mm	50.67	50.67	50.67	50.67	50.67	50.67	50.67	50.67	50.67
Reflector Type	Dichroic	Dichroic	Dichroic	Dichroic	Dichroic	Dichroic	Dichroic	Dichroic	Dichroic
Base	GX5.3	GX5.3	GX5.3	GX5.3	GX5.3	GX5.3	GX5.3	GX5.3	GX5.3
Average Life (hrs)	3000	3000	2000	2500	3000	3500	3000	2000	3500
Illumination Characteristics									
Peak Luminous Intensity cd	2500	1500	3300	7070	9150	11500	3000	460	2000
Colour Temperature K	3050	3050	2925	3025	3025	3050	3075	2925	3050
Half Peak Angle (nominal)	28°/NFL	38°/FL	12°/NSP	12°/NSP	13°/NSP	14°/NSP	24°/SP	36°/FL	38°/FL

Features

- Compact, high performance filaments mounted in super-efficient reflector
- Dichroic reflector coatings permit substantial reduction in infrared energy projected in the beam
- Long service lives typically around 3000 hrs

SYLVANIA GTE

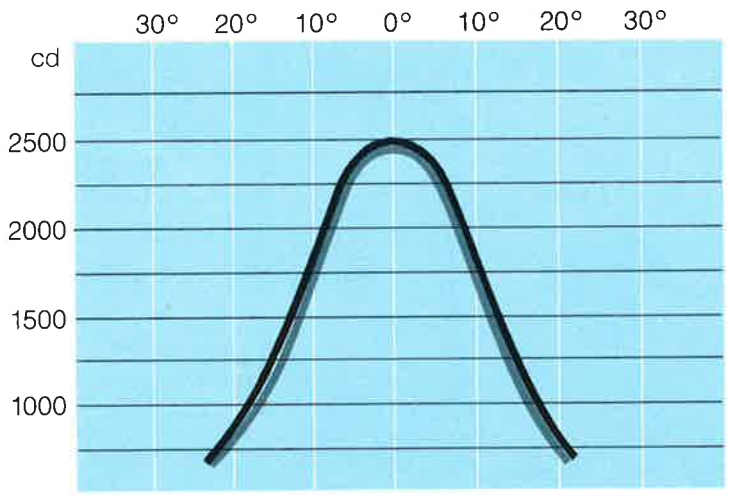
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellery from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type ENL



Polar Curve (Axial)

28° Narrow Flood

DISTANCE (m)	LUX LEVEL
1	**2500**
2	**625**
3	**278**
4	**156**
Half Peak Angle	
28°HOR	26°VERT

Lux Plot

Ordering Data									
Lamp Rating	50 W/12 V								
Type Description	ENL								
Packing Quantity	12								
Order Code	60979								

Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

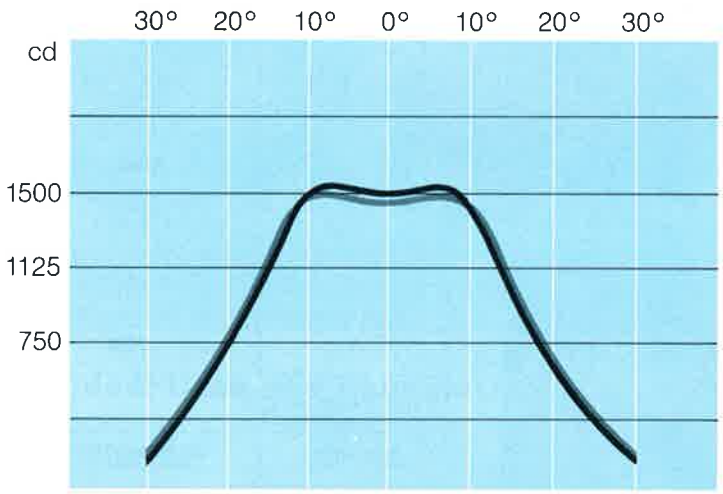
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type EXN



Polar Curve (Axial)

38° Flood

DISTANCE (m)	LUX LEVEL
1	**1500**
2	**375**
3	**167**
4	**94**
Half Peak Angle	
39°HOR	37°VERT

Lux Plot

Ordering Data										
Lamp Rating	50 W/12 V									
Type Description	EXN									
Packing Quantity	12									
Order Code	60988									

Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

T-HAL

2.44.3b

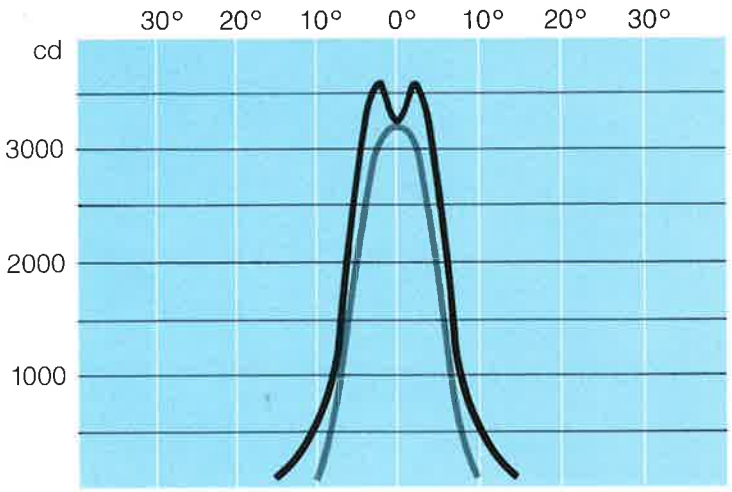
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type ESX



Polar Curve (Axial)

12° Narrow Spot

DISTANCE (m)	LUX LEVEL
1	**3300**
2	**825**
3	**367**
4	**206**
Half Peak Angle	
13°HOR	10°VERT

Lux Plot

Ordering Data									
Lamp Rating	20 W/12 V								
Type Description	ESX								
Packing Quantity	12								
Order Code	60987								

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

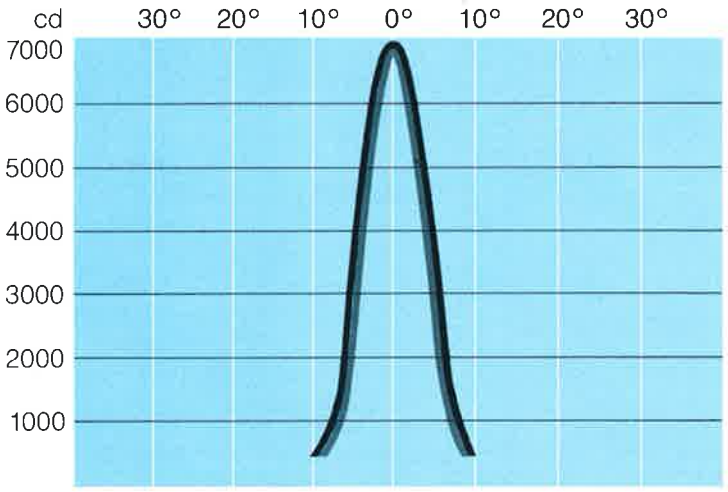
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type EYR



Polar Curve (Axial)

12° Narrow Spot

DISTANCE (m)	LUX LEVEL
1	**7070**
2	**1768**
3	**786**
4	**442**
Half Peak Angle	
13°HOR	10°VERT

Lux Plot

Ordering Data									
Lamp Rating	42 W/12 V								
Type Description	EYR								
Packing Quantity	12								
Order Code	60989								

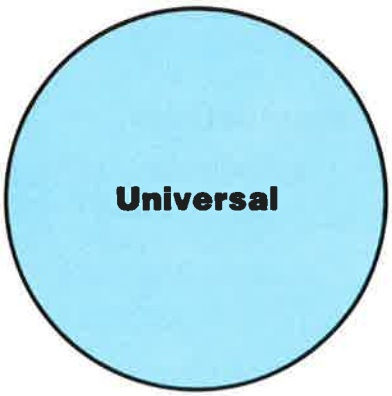
Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

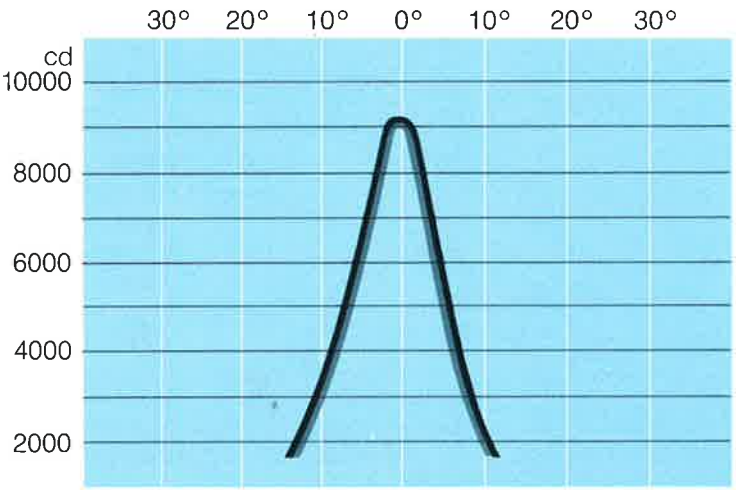
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position



Photometric Data: Type EXT



Polar Curve (Axial)

13° Narrow Spot

DISTANCE (m)	LUX LEVEL
1	**9150**
2	**2288**
3	**1017**
4	**572**
Half Peak Angle	
13°HOR	11°VERT

Lux Plot

Ordering Data									
Lamp Rating	50 W/12 V								
Type Description	EXT								
Packing Quantity	12								
Order Code	60997								

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

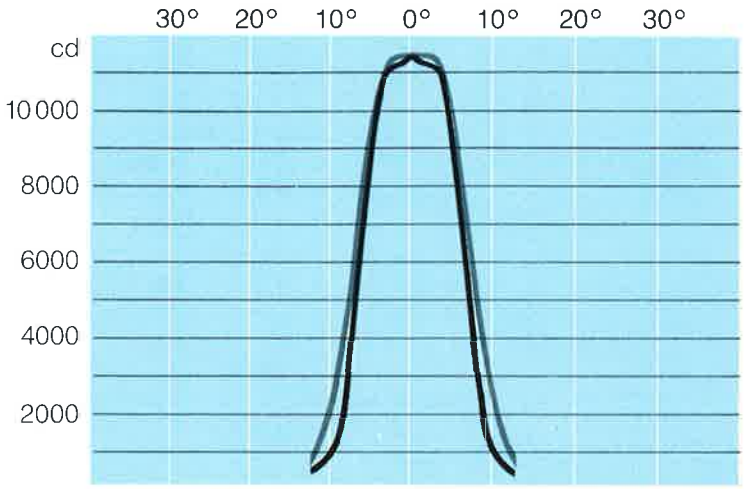
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type EYF



Polar Curve (Axial)

14° Narrow Spot

DISTANCE (m)	LUX LEVEL
1	**11500**
2	**2875**
3	**1278**
4	**719**
Half Peak Angle	
15°HOR	14°VERT

Lux Plot

Ordering Data									
Lamp Rating	75 W/12 V								
Type Description	EYF								
Packing Quantity	12								
Order Code	60999								

Special Notes
(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

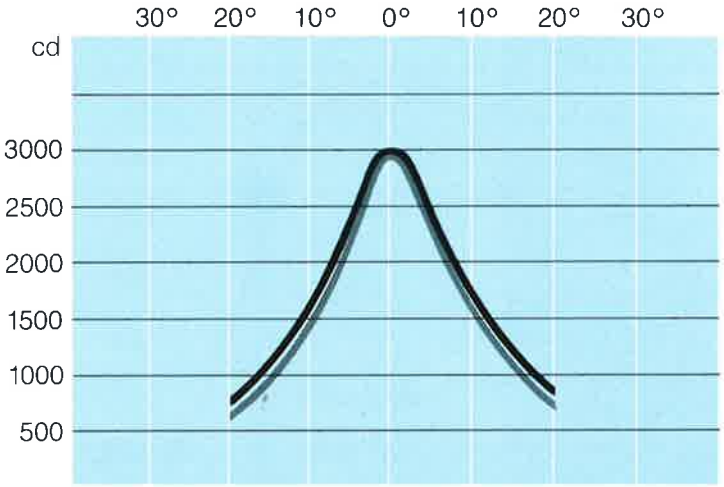
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type EXZ



Polar Curve (Axial)

24° Spot

DISTANCE (m)	LUX LEVEL
1	**3000**
2	**750**
3	**333**
4	**188**
Half Peak Angle	
24°HOR	22°VERT

Lux Plot

Ordering Data									
Lamp Rating	50 W/12 V								
Type Description	EXZ								
Packing Quantity	12								
Order Code	61000								

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

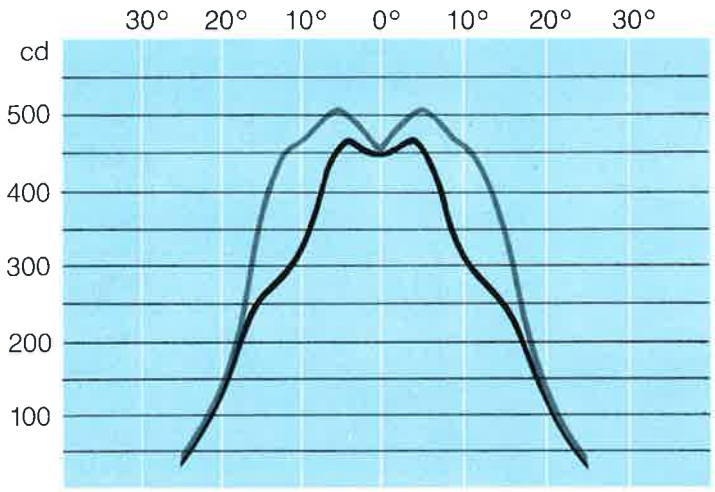
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type BAB



Polar Curve (Axial)

36° Wide Flood

DISTANCE (m)	LUX LEVEL
1	**460**
2	**115**
3	**51**
4	**29**
Half Peak Angle	
36°HOR	38°VERT

Lux Plot

Ordering Data									
Lamp Rating	20 W/12 V								
Type Description	BAB								
Packing Quantity	12								
Order Code	61001								

Special Notes (1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

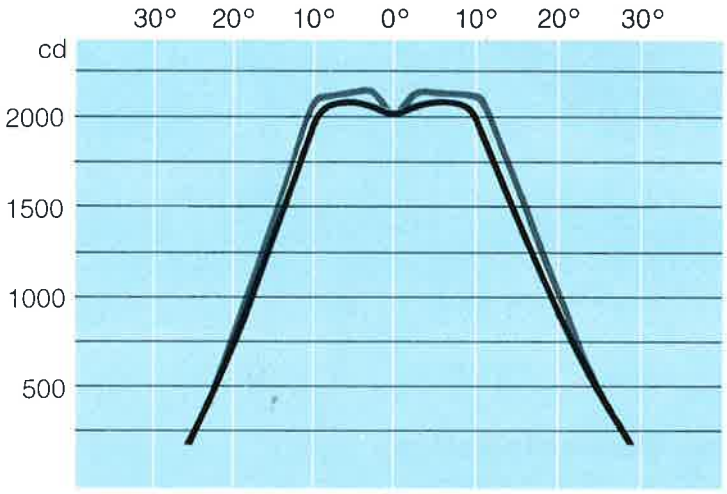
Applications

- Particularly suited for display lighting of foodstuffs, works of art, fabrics, jewellry from recessed downlights, wall mounted spots and track-mounted luminaires

Burning Position

Universal

Photometric Data: Type EYC



Polar Curve (Axial)

38° Flood

DISTANCE (m)	LUX LEVEL
1	**2000**
2	**500**
3	**222**
4	**125**
Half Peak Angle	
40°HOR	38°VERT

Lux Plot

Ordering Data									
Lamp Rating	50 W/12 V								
Type Description	EYC								
Packing Quantity	12								
Order Code	61002								

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C.
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Tungsten Halogen Lamp Product Information

Description: **Hi-Light Tru-Aim**
Low Voltage Tungsten Halogen Lamps
with 50 mm diameter coloured dichroic reflector
12 V; 50 W, 10° spot in red, yellow, green, blue – GX5.3

T-HAL

2.45.1a

Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	50 W/12 V	50 W/12 V	50 W/12 V	50 W/12 V				
Type Description	JCR12-50SB	JCR12-50SY	JCR12-50SG	JCR12-50SR				
Mechanical Data								
Maximum Overall Length mm	45.0	45.0	45.0	45.0				
Contact Pin Length Min. Max. mm	4.45-6.86	4.45-6.86	4.45-6.86	4.45-6.86				
Rim Diameter, max. mm	50.67	50.67	50.67	50.67				
Reflector Type	Dichroic	Dichroic	Dichroic	Dichroic				
Base	GX5.3	GX5.3	GX5.3	GX5.3				
Average Life (hrs)	3000	3000	3000	3000				
Illumination Characteristics								
Colour	Blue	Yellow	Green	Red				
Half Peak Angle	13°	13°	13°	13°				

Features

- Compact high performance filaments mounted in super efficient coloured reflector
- Choice of red, yellow, green or blue
- Cool-beam performance reducing heat projected in the beam
- Long service life of 3000 hrs

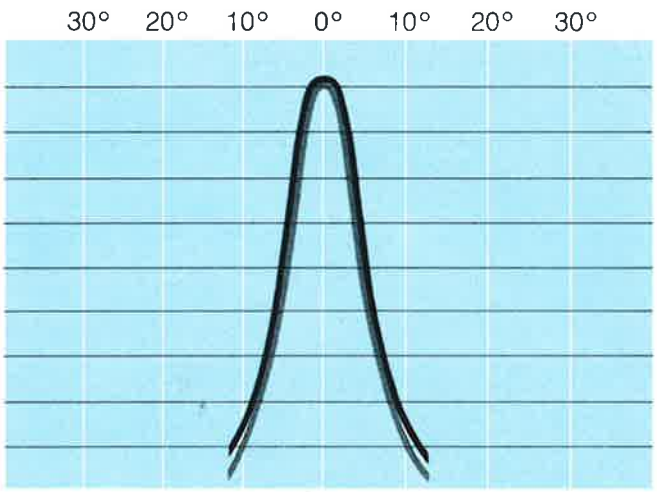
Applications

- For special effect display lighting of merchandize, fabrics, jewellry, glassware and ceramics from recessed downlights, wall-mounted spots and track mounted luminaires

Burning Position

Universal

Photometric Data: Type



Polar Curve (Axial)

Ordering Data								
Lamp Rating	50 W/12 V	50 W/12 V	50 W/12 V	50 W/12 V				
Type Description	JCR12-50SB	JCR12-50SY	JCR12-50SG	JCR12-50SR				
Packing Quantity	12	12	12	12				
Order Code	61005	61006	61007	61008				

Special Notes

(1) Do not touch the quartz envelope with bare fingers.
(2) Pinch temperature should not exceed 350°C
(3) Use quick-acting H.R.C. fuses in the external circuit.
(4) Use in luminaires preferably fitted with toughened front glasses.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Discharge Lamps

SYLVANIA GTE

Efficient Lighting Solutions

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

Lighting Products

The brighter way to save energy

Saving energy demands a lot of effort — especially in the lighting business.

But we make that effort. Because saving energy means lower lighting costs — a benefit which is as much in our interest as it is in the consumer's interest.

This has been our working philosophy for some 80 years. As a result, we have the reputation of being the most cost-conscious manufacturer in the industry — and the performance of our lighting products proves it.

The Energy Saver symbol represents Sylvania's on-going commitment to the development and manufacture of new, high quality products designed to reduce energy consumption and costs — yet still give the maximum usable light.

And that commitment is evidenced by the outstanding quality and performance of our Discharge lamp range — the product of high quality materials, sophisticated manufacturing techniques and stringent quality control.

GTE SYLVANIA — the reliable way to save energy

The name Sylvania on the Energy Saver symbol is the user's guarantee of quality and reliability. A thrusting international enterprise in its own right, Sylvania is part of the giant General Telephone & Electronics Corporation — one of the world's leading industrial organizations, with over 200,000 employees, 150 manufacturing, research and service facilities and an annual turnover in excess of $11 billion.

GTE achieved this ranking by spearheading the advancement and development of telecommunication systems, radio and television, microwave and data transmission systems, data processing, satellite communications, a range of electronic componentry, optic fibres and, of course, performance-efficient lighting.

Now marketing over 6000 different lighting products, GTE Sylvania is among the first three in the lighting business — and getting bigger. Already the number-one brand in fluorescent lamps, photoflash and projector lamps, we are surging ahead with the production of advanced, high quality incandescent and energy-saving Discharge lamps.

It is this rate of progress that makes us the fastest growing lamp manufacturer in Europe — where we now have seven plants producing some 90 percent of all our lighting products sold in this sophisticated and expanding market.

Sylvania High Pressure Sodium Arc tubes and miniature fluorescent lamps — are manufactured at our extensive facilities near Shipley, in West Yorkshire, England.

Our Tienen plan in Belgium handles the high-volume, high-precision production of photoflash and incandescent lamps. And another plant, at Vicenza in Italy, produces many decorative shapes and wattage ratings of incandescent lamps to meet a wide variety of consumer needs.

Even more incandescent lamps and display lamps are produced by our factory at Lyons in France. To the north, our Reims plant produces High Intensity Discharge lamps — and to the south near St-Etienne, the Fouillouse plant specializes in Sylvania lighting fittings.

Fluorescent lamps, projector lamps and tungsten halogen floodlight lamps are manufactured at the Erlangen plant in Germany. Here the fluorescent lamps are produced by a high-speed horizontal technique, developed by Sylvania engineers, that more thoroughly eliminates impurities during the tube-filling stage — ensuring uniform lamp performance.

In fact, it is this capability to design and build our own production facilities — together with a high investment in research and development projects — that makes GTE Sylvania one of the most innovative and competitive manufacturing company in the lighting industry worldwide.

It all adds up to a lot of effort.
But we save a lot of energy.

SYLVANIA High Intensity Discharge Lamps

Introduction

Quality First

Sylvania Discharge lamps — in common with all other Sylvania lamps — comply with the requirements of the International Electrotechnical Commission (IEC) and in many aspects far exceed the international standards.

The outstanding quality of Sylvania Discharge lamps rests on three pillars... quality lamp materials, quality manufacturing techniques and quality control. When we make lamps, we don't just use glass. We use half a dozen specialised materials, ranging from high-resistance lead-alkali silicate to sodium-resistant ceramic alumina. More than a dozen different metals and alloys are tailor-made for specific components: tungsten with a melting point higher than 3400°C is used for long life electrodes; niobium with an expansion co-efficient close to alumina makes the dependable seal in our High Pressure Sodium lamps. Some of the gases used in Sylvania Discharge lamps are so rare that out of every million parts of air distilled, only nine parts of filling gas can be extracted.

Sylvania's sophisticated lamp-making machines automatically test lamps during each stage of production. The finished lamps are re-tested and inspected in our quality control departments. That is why customers throughout Europe find that they can depend on Sylvania lamps for performance and reliability.

Lamp Type Comparison

MERCURY LAMPS

- The universal Discharge lamp combining excellent colour rendering with good efficacy.
- Available in numerous bulb shapes and sizes.
- In Sylvania Mercury lamps, light is produced by a combination of "excitation" and "fluorescence". The mercury discharge tube emits a cool white light and some ultra-violet. The phosphor on the bulb converts the ultra-violet to visible light in the red range. The combined light output is of excellent colour.
- Efficacies up to 60 lm/W are achieved.

METAL HALIDE LAMPS

- No other lamp combines the excellent white light, high colour rendering and high efficiency of Super Metalarc.
- Available in numerous wattages, two different coatings, one centred at 3000°K to give warm incandescent type colour appearance, as well as clear versions for maximum photometric control.
- In Sylvania Super Metalarc lamps the special arc tube geometry and the metal halide additions give up to 50% more light than standard metal halide lamps, as well as improving life and lumen maintenance.
- The efficacy is from 68 to 112 lm/W.

BLENDED LAMPS

- A Discharge lamp which can directly replace incandescent lamps.
- Gives more light and lasts six times as long as an incandescent lamp.
- Requires no control gear; simply screws into incandescent lamp holder.
- In Sylvania Blended lamps, a mercury discharge arc tube and an incandescent filament operate in the same bulb. The filament controls the arc tube current and at the same time contributes light. The combination of mercury radiation, phosphor radiation and incandescent radiation produces a very pleasant white light.
- The efficacy is from 19 to 28 lm/W.

HIGH PRESSURE SODIUM LAMPS

- Unique combination of good colour appearance and very high efficacy.
- Pleasant golden-white colour enhances environment.
- Sylvania High Pressure Sodium lamps have arc tubes made of high-purity aluminium-oxide ceramic which are able to withstand the severe chemical attacks of sodium at over 1300°C. Light is produced by excitation of sodium atoms coupled with complex processes of absorption and re-radiation at different wavelengths. This results in a pleasant, warm, golden-white light colour.
- Efficacies up to 120 lm/W are obtained.

LOW PRESSURE SODIUM LAMPS

- The most efficient light source commercially available.
- Yellow light colour coincides with maximum spectral sensitivity of the eye; provides good perception and contrast.
- Provides safety and security at lowest running cost.
- Sylvania Low Pressure Sodium lamps are a typical single energy conversion lamp in which light is generated by exciting sodium atoms to resonance radiation. The crucial lamp pressure and temperature are controlled by advanced indium-oxide film technology.
- With efficacies up to 183 lm/W, this is the most efficient lamp.

The bridge over the river Tagus in Portugal, connecting Lisbon with Almada

Sylvania Mercury Lamps

Sylvania Mercury Lamps are designed to be operated on simple series choke circuits with appropriate power factor correction capacitors as listed later.

The auxiliary starting electrode and resistor combination together with accurate mercury dosing and initial gas fill pressure, provide the lamp with excellent starting characteristics particularly at mains voltages above 180 V and temperatures well below 0°C.

Examination of the typical starting characteristics shows that the lamp will reach 80% of its final light output value within 5 minutes of switch-on, reaching stable operation after 6 minutes. In the event of a temporary interruption of the mains supply, the re-strike delay will be approximately 5 minutes depending upon the ambient temperature and luminaire construction.

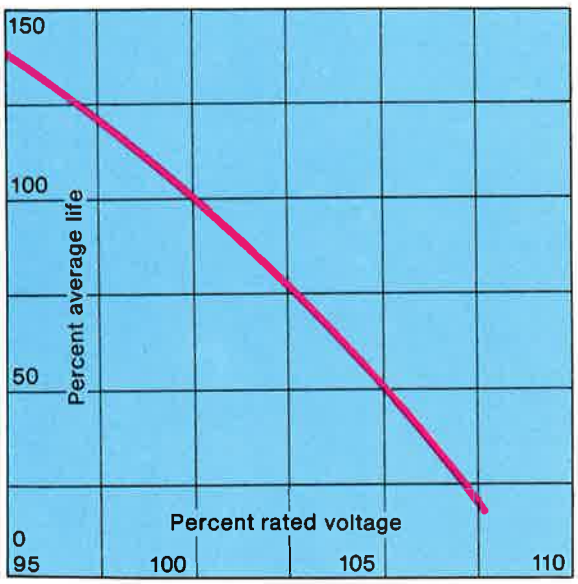
All Sylvania Mercury Lamps are manufactured to and comply with BS 3677 and IEC Publication 188.

The quartz arc tube is optically aligned to ensure good photometric performance by means of a sturdily designed frame which is strengthened at each end by mounts capable of withstanding shocks and vibration associated with every day indoor and outdoor use.

Reliability and long life are achieved by ensuring good retention of the electron emissive material through advanced techniques used in the manufacturer of electrodes.

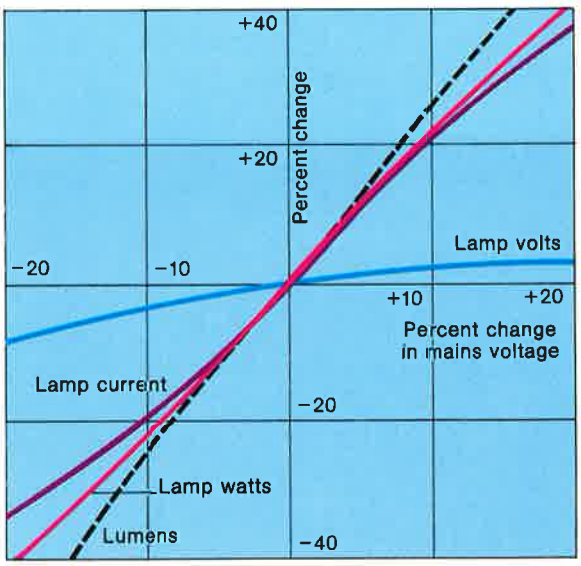
The caps are made of corrosion-resistant nickel plate which ensure easy removal of the lamp after many thousands of hours of burning. For higher wattage lamps of 250 W and above which develop much higher temperatures, the cap is fixed by means of glass thread and solder lock. This ensures that the lamp remains firmly in position throughout its life and can readily be removed from the socket when necessary.

The operating parameters of Sylvania Blended lamps are so determined that optimum light and life are obtained at the specified mains voltage. Changes in the supply voltage can influence the lamp's characteristics. The relationship between lamp life and mains voltage is illustrated in the graph.

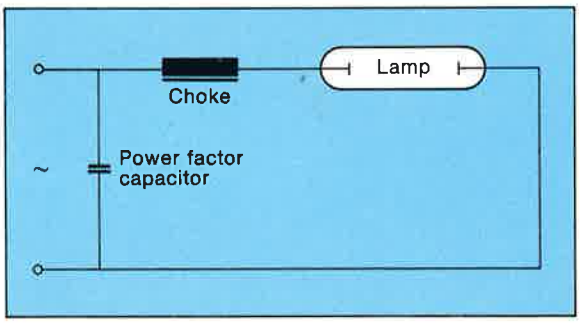


Typical Relationship of Blended Lamp Life and Mains Voltage

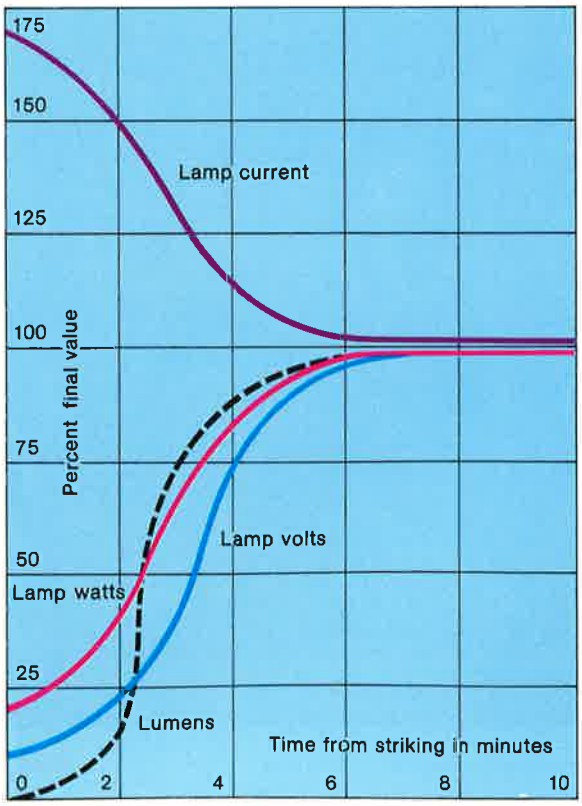
Operating Characteristics of Mercury Lamps



Typical Effect of Mains Voltage Variations



Typical Operating Circuit



Typical Starting Characteristics

SHX Plug-in High Pressure Sodium Lamps

The range of SHX plug-in lamps incorporates their own internal "probe" type starters. The arc tube contains a gas fill mixture of Neon and Argon in place of Xenon. This has the effect of lowering the starting voltage requirement so that the lamp is able to start reliably at mains voltage, enabling it to be used as a more efficient lamp replacement on the standard choke circuit of Mercury discharge lamps.

The probe electrode consists of a wire spiral, wrapped around the arc tube outer wall and is connected to one of the electrical input leads. The starting effect is capacitive and does not involve the use of high-pulse voltages.

(See catalogue sheet SHX 3.9.1a.)

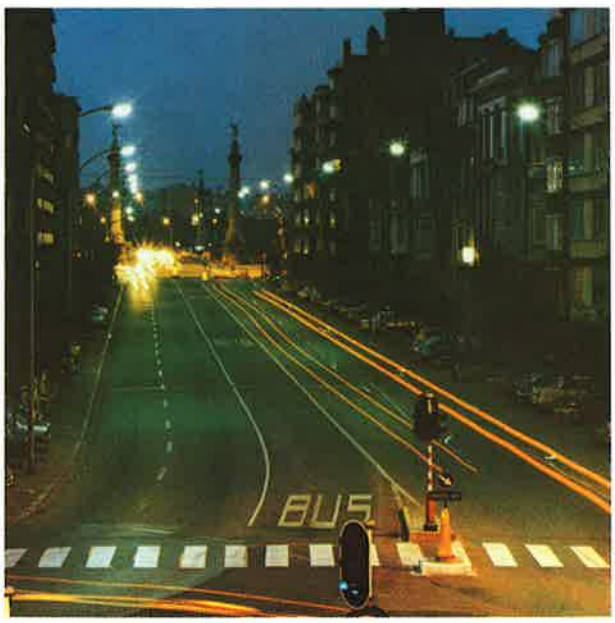
The result of this is a range of 3 lamps that can directly replace mercury lamps with no change in control gear, giving up to 50% more light and a 12%-16% reduction in energy consumption.

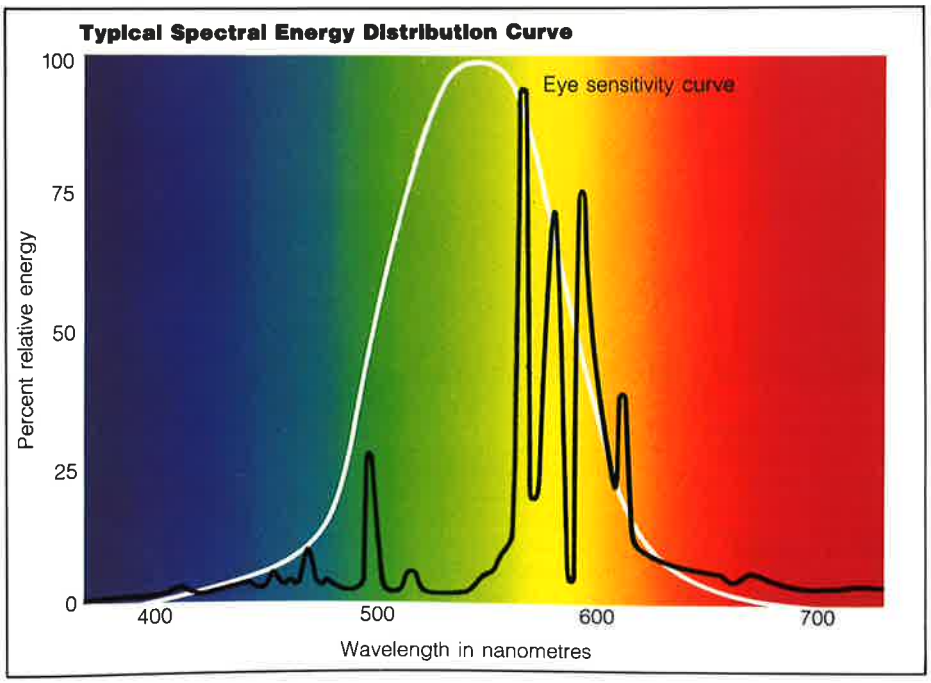
Applications:

- 110W SHX replaces 125W MBF/U
- 210W SHX replaces 250W MBF/U
- 350W SHX replaces 400W MBF/U
- Suitable for all road lighting/industrial applications using above type mercury lamps.

These lamps therefore provide the ideal solution where the existing mercury lighting needs up-grading to higher lighting levels. Simply replace with SHX Lamps.

An added benefit is the warm golden white colour of SHX which adds so much to the appeal of the illuminated night time environment.





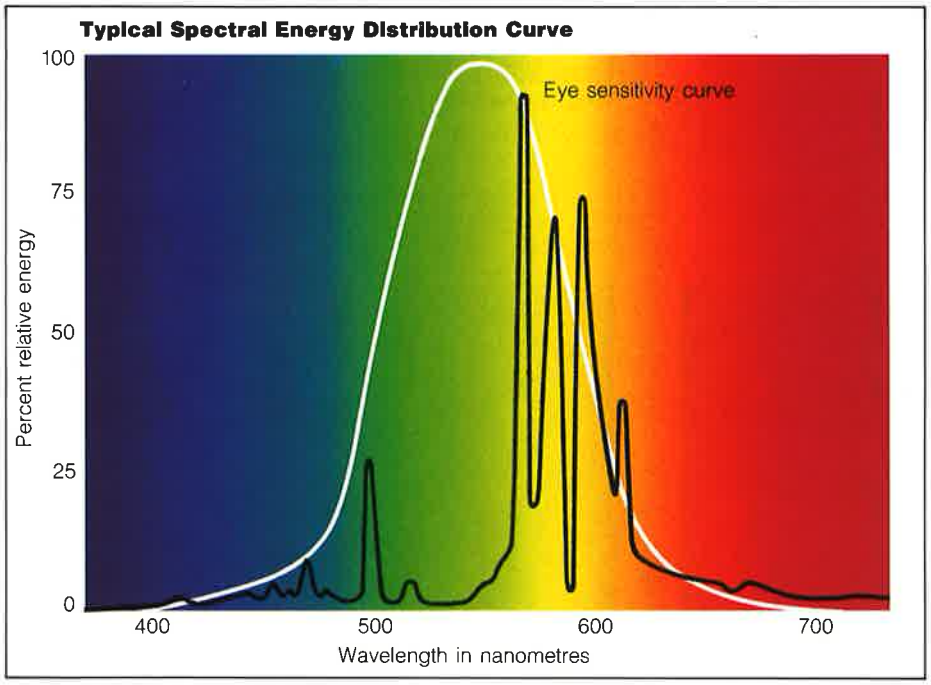
Reference Colour Data

	SHX 110 W	SHX 210/ 350 W
Tc (Kelvin):	2000	2000
x :	0,546	0,527
y :	0,391	0,408
Colour Rendering Index (ra8) :	20	25

SYLVANIA High Pressure Sodium Lamps

In the 1940's, the first form of sodium lamp (low pressure sodium) appeared on the market. This lamp operated at very low vapour pressure of about 1 Pascal (Pa) and radiated 35% of its input energy at the so-called "doublet" or "D" lines in the orange part of the visible spectrum of 589.0 and 586.6 nanometres (nm). This resulted in lamps with luminous efficacies of up to 180 lumens per watt (lm W^{-1}).

The colour rendering improvement from a low to a High Pressure Sodium lamp is dramatic. As shown below the high pressure discharge produces a broad spectral power distribution and this power is produced from a much smaller discharge tube.



Reference Colour Data

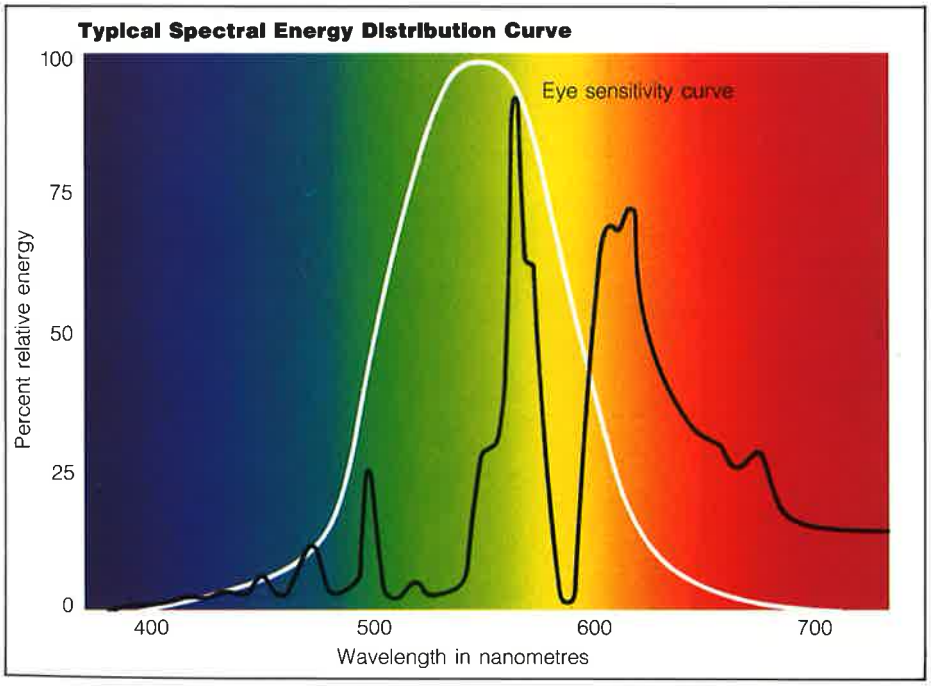
Tc (Kelvin) : 2050

x : 0,52

y : 0,42

Colour Rendering Index (ra8): 20

Standard High Pressure Sodium



Reference Colour Data

Tc (Kelvin) : 2200

x : 0,506

y : 0,412

Colour Rendering Index (ra8): 65 Avg.

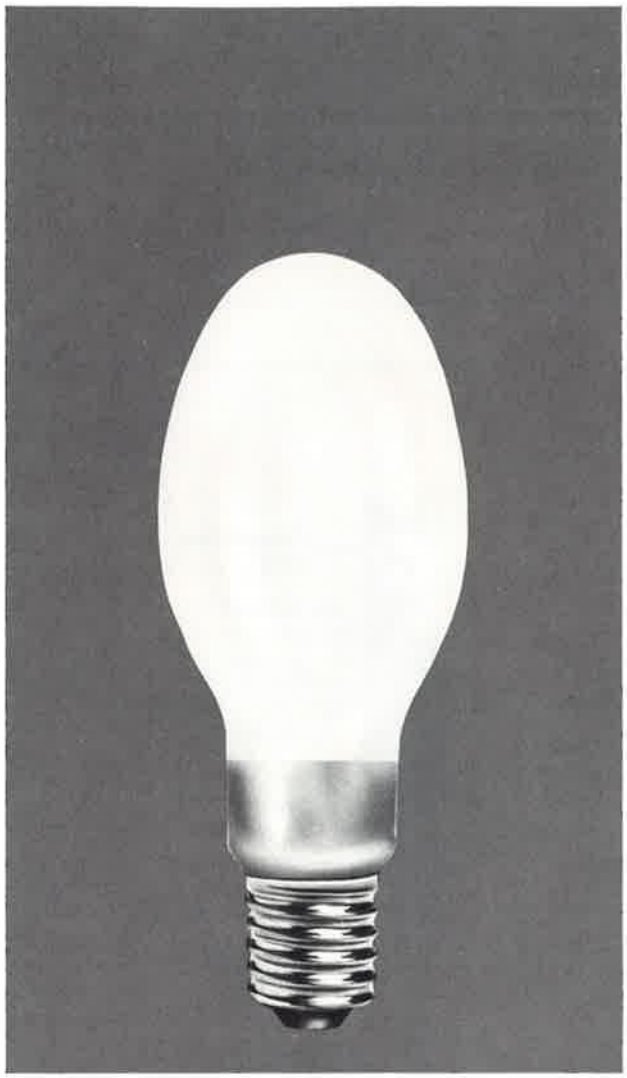
Colourplus-E High Pressure Sodium

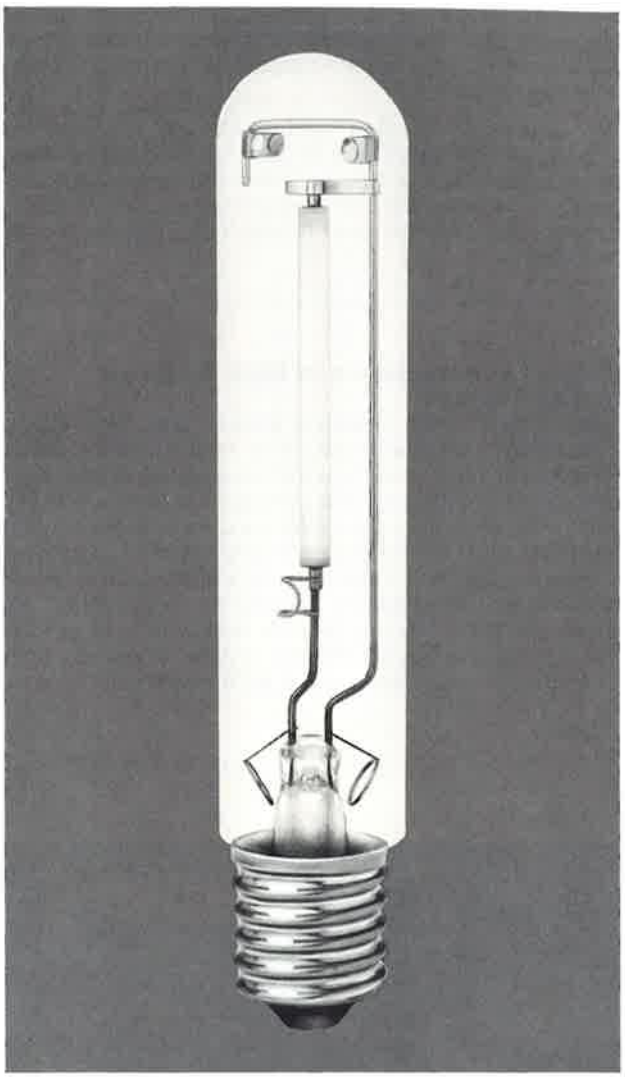
ATTENTION:
Product Name changed to
COLOUR-DELUXE

Colourplus-E High Pressure Sodium Lamps

The amber colour appearance and relative deficiency in the red part of the spectrum restricts the use of conventional High Pressure Sodium lamps in applications where colour judgement is critical. To meet this requirement, a new High Colour Rendering Index (HCRI) lamp called "Colourplus-E" was recently developed. This has been brought about by further increases in vapour pressure which have achieved a CRI of 65 with only a loss of 10-15% in luminous efficacy.

Sylvania High Pressure Sodium Lamps





Ellipsoidal Lamps with Diffusing Finish
The ellipsoidal version is a general purpose lamp, primarily for use in fittings with conventional optical systems. Frequently used in street lighting installations, ellipsoidal lamps are equally suitable for industrial and commercial lighting.

Clear Tubular Lamps
The compact linear light source of the tubular lamp lends itself to accurate optical control. Incorporated in fittings specifically designed for linear light sources, they are often used for floodlighting, in high-bay industrial installations and street lighting.

Discharge lamps invariably need some form of starting aid and High Pressure Sodium lamps are no exception. The right starting conditions are created by a combination of arc tube design and electrical control circuit.

Construction of High Pressure Sodium Lamps
The discharge tube of a High Pressure Sodium lamp is made from PCA tubing, which is resistant to hot sodium over tens of thousands of hours. Although opaque in appearance, PCA transmits over 90% of the light from the discharge. It is a ceramic of the alumina family.

A ceramic plug containing the electrode is sealed into each end of the PCA tube in a high temperature vacuum furnace. The electrodes are made of coiled tungsten impregnated with an emissive material to aid the transfer of electrons into the discharge. The construction of the seal is called the "monolithic" arc tube seal.

The principal constituent of the arc tube fill is Sodium, which provides the bulk of the light emitted. Other important elements such as Mercury and either Xenon or a Neon-Argon gas mixture are added. The Mercury vapour acts as a buffer, causing many more electron collisions with the sodium and resulting in a more efficient light output. A further effect of the Mercury is to raise the voltage in the arc tube and to allow higher power in a short arc length. The presence of Xenon at low pressure is important for starting when the lamp is cold.

SHX-type plug-in lamps use a different starting technique and since no external electronic starting aid is normally available, the starting gas is a mixture of Neon and Argon. Although this causes a slight lamp efficacy loss, the major

advantage of using this type of gas fill is that no high voltages are needed to start the lamp. Such high voltages, if present, could damage the Mercury ballast.

Normal hard glass bulbs are used in all but the lowest wattage lamps and their shape and finish depend on the application of the lamp. The two principal shapes are ellipsoidal and tubular (see below).

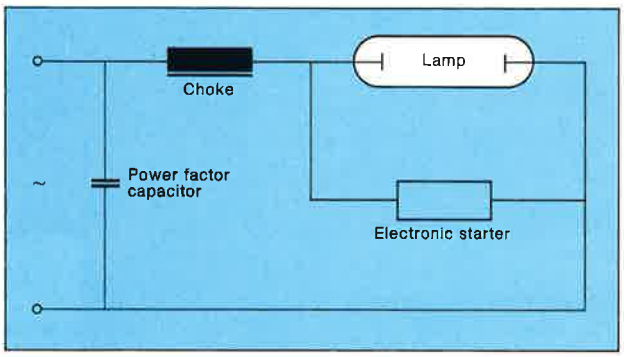
The ellipsoidal bulb (SHP and SHX lamps) has a diffuse coating on the inside and is used for most conventional lighting fixture optical systems. When a more precise optical design is needed, such as for parabolic through floodlight reflector systems, the clear tubular bulb (SHP-T) is more suitable.

The operational parameters of High Pressure Sodium lamps are affected by changes in supply voltage. An increase in mains voltage will lead to a rise in lamp voltage, which in turn will increase the arc tube voltage. The changes are to some extent dependent on the control gear used. Typical variations in lamp current, voltage, wattage and light output which result from mains voltage variations are illustrated.

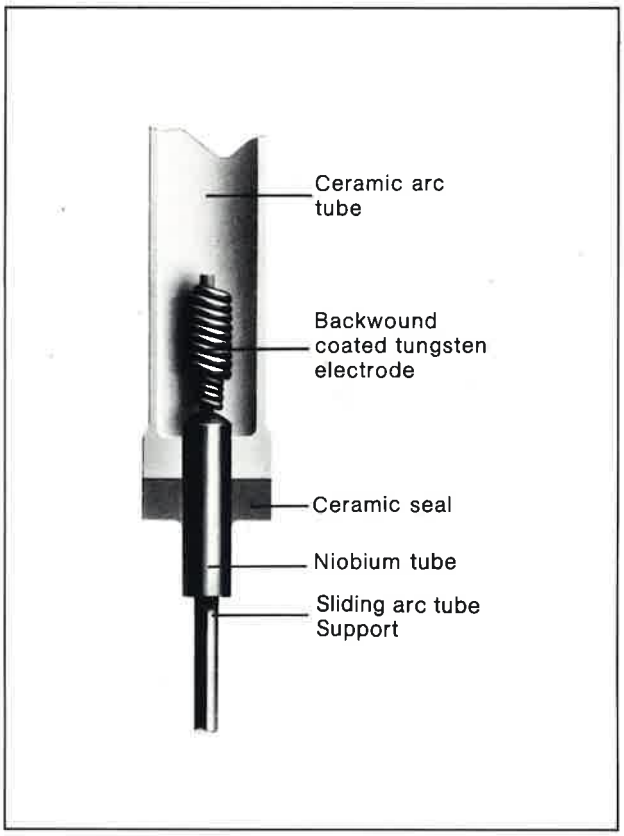
The starting voltage required is largely independent of the ambient temperature and lamp operation will not be seriously affected within a range of —40°C to +70°C.

Electrical Parameters of High Pressure Sodium Lamps

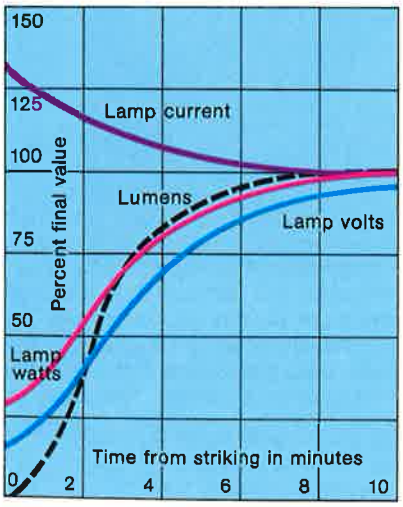
The standard High Pressure Sodium and High Colour Rendering range of lamps rely on an external starting device (electronic ignitor) which is part of the external control circuit. Reliable starting is achieved using a combination of the ignitor and the starting gas inside the discharge tube. When the lamp is first switched on, the ignitor applies impulses of between 2,300 and 4,000 volts. This is sufficient to initiate a discharge in the Xenon, followed by vapourisation and ionisation of the Mercury and the Sodium. An acceptable light output is achieved after two minutes of burning time, but full light output takes about eight minutes.



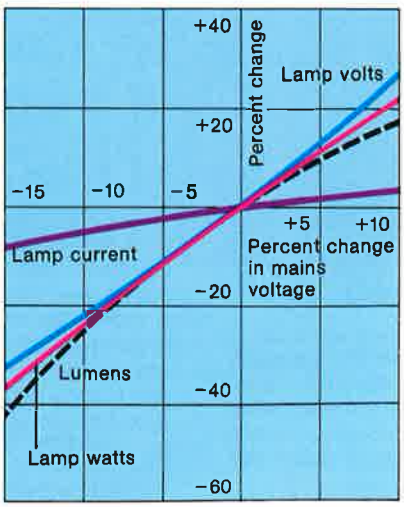
Typical Operating Circuit



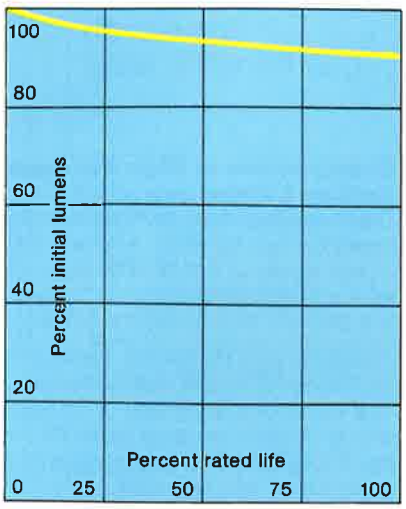
Monolithic Arc Tube Seal



Typical Starting Characteristics



Typical Effect of Mains Voltage Variations

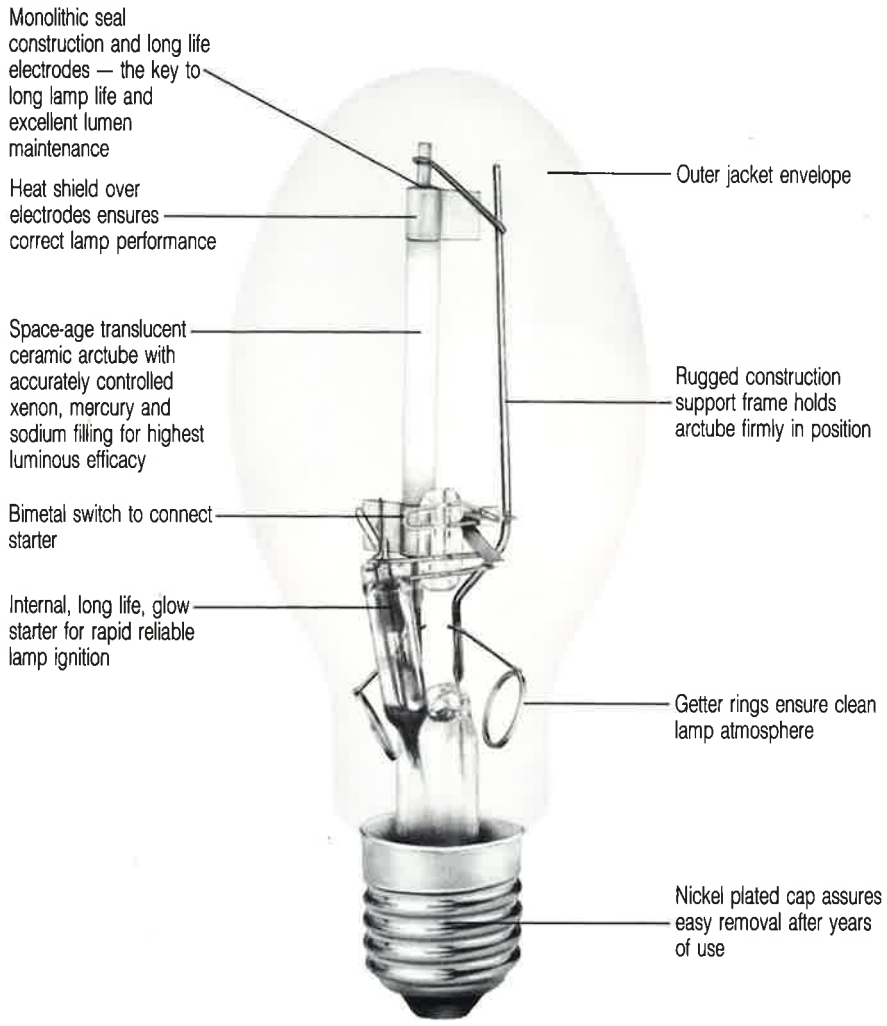


Typical Lumen Maintenance Curve

Low Wattage High Pressure Sodium Lamps

In addition to lamps which are suitable for external electronic ignitors, alternative types of 50 W and 70 W SHP are available with a built-in starter, see below. The built-in starter is a glow bottle type in series with a thermal switch to cut out the starter once the lamp is running. The advantage of providing an internal lamp starter is to allow these lower wattage lamps to be used as direct physical replacements to equivalent lumen-package mercury vapour lamps (although the ballast **must** be changed).

See catalogue sheet SHP 3.1.3a/b.



Colour-Deluxe High Colour Rendering High Pressure Sodium Lamps

In the Introductory section, the general effects of increasing the sodium vapour pressure in a discharge arc tube were described in order to illustrate the differences between High Pressure and Low Pressure Sodium lamps. Recently, even further vapour pressure increases have been made. A ten-fold increase in sodium vapour pressure causes a significant jump in the colour rendering properties of standard High Pressure Sodium lamps, with only around 15% loss of efficacy. These lamps, called **Colour-Deluxe** lamps are electrically and physically compatible with standard High Pressure Sodium fixtures and circuits, so that users may improve the colour standards in a variety of applications; e.g. quality inspection areas and areas where colour is important, such as emergency system colour coding in chemical plants or for automotive plants in general. See catalogue sheet SHP/SON-HCRI 3.8.1 a/b.

Principal Features of Colour-Deluxe Lamps

- 90 lumens per watt efficacy
- Better quality light — CRI = 65 average
- Available in 250 W and 400 W ratings
- Equivalent lamp dimensions to standard High Pressure Sodium
- Will operate on standard High Pressure Sodium control gear
- Energy Saver alternative to "de Luxe" Mercury lamps

Sylvania Low Pressure Sodium Lamps

Sodium vapour is chemically very active and destroys most types of glass. The arc tubes of Sylvania Low Pressure Sodium lamps are made of a two-ply material with an internal sodium-resistant layer, which resists discolouration and therefore, ensures long lamp life and good lumen maintenance.

Long life, triple-coil tungsten electrodes are employed and the joints between the electrodes and the lead-in wires are protected from sodium attacks by ceramic beads.

The arc tube contains a small amount of sodium which, by careful control of temperature and pressure, is operated at resonance radiation, producing the characteristic yellow-coloured light. Argon is added for easy starting and neon is used as a filler gas.

The heat generated by a low pressure sodium discharge is not sufficient to bring the vapour pressure to the optimum value. The arc tube is, therefore, sealed into a high-vacuum jacket with an internal infra-red-reflecting, indium-oxide film which reduces heat-radiation losses and ensures lamp operation at maximum efficacy.

Excellent lumen maintenance is a key feature of Sylvania Low Pressure Sodium lamps. Discolouration of the arc tube is kept to a minimum and the lamps continue to deliver their remarkably high light output throughout the rated life, ensuring a most economical use of electrical energy.

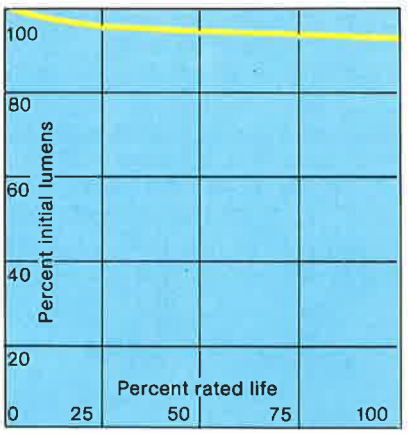
Sylvania Low Pressure Sodium lamps are cold started. They are generally operated in conjunction with leak reactance transformers which step-up the mains voltage to provide the high lamp starting voltage required. The impedance required to control the arc tube current is obtained from the same transformer by introducing leakage reactance.

The high starting voltage available and the low lamp operating pressure ensure quick re-striking of a lamp after a momentary power cut.

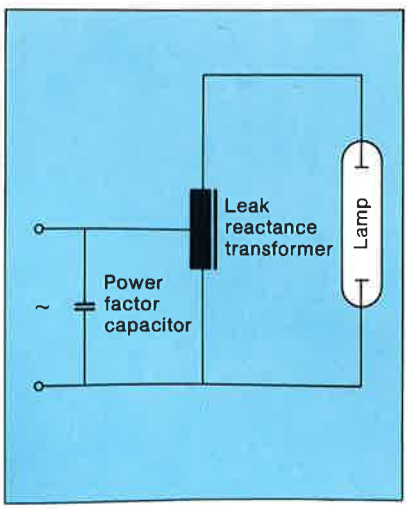
The effect of mains voltage variations on the operating characteristics of Sylvania Low Pressure Sodium lamps is illustrated in the graph. Increases in mains voltage influence the vapour pressure which is critical for the maintenance of optimum resonance radiation.

Sylvania Low Pressure Sodium lamps require a starting voltage roughly twice that of the stabilised arc tube voltage. The initial arc is struck in argon gas, initiating a discharge in the neon gas filling. The heat developed vapourises the sodium. As illustrated, Sylvania lamps reach about 80% light output within ten minutes from striking.

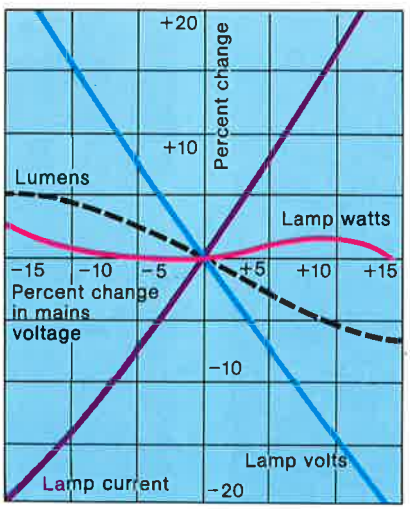
The starting voltage is hardly influenced by the ambient temperature, ensuring dependable starting even under adverse conditions.



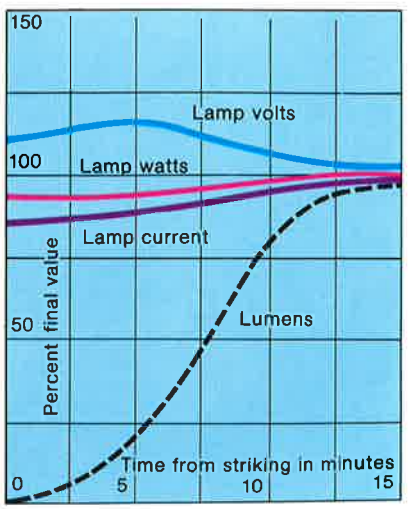
Typical Lumen Maintenance Curve



Typical Operating Circuit



Typical Effect of Mains Voltage Variations



Typical Starting Characteristics

SYLVANIA Super Metalarc — The Best Choice for High Efficiency, Natural Looking Lighting

No other metal halides combine the colour rendering capabilities, energy and cost saving efficiency and sustained high lumen output that are features of Sylvania Super Metalarc lamps, which makes them the ideal choice wherever you want high light levels and pleasing natural looking white light.

There's no need to compromise on lamp selection either because Sylvania has the broadest range of Metal Halide lamps in the industry.

Whatever your lighting requirements — retail and merchandising displays, lobbies, offices, industrial plants, horticulture and interior landscape lighting — you can meet your lighting needs most effectively and economically with Sylvania Super Metalarc lamps.

Choose clear lamps for maximum light output and optical control, phosphor coated for softer diffused light and Super Metalarc 3K for a warm colour and the finest colour rendering.

The Latest Generation of High Efficiency, Colour Balanced Lighting

Sylvania Super Metalarc lamps provide a more natural looking whiter light than either sodium or mercury vapour lights.

This white light is the luminous discharge from a combination of metal additives in the arc tube of the lamp.

During lamp operation the metal additives are vapourised, producing light more evenly aross the visible light spectrum than other HID sources. Since almost all colours are present in this white light colours are rendered more vividly to the viewer. Therefore Super Metalarc lamps are recommended wherever excellent colour rendition is important.

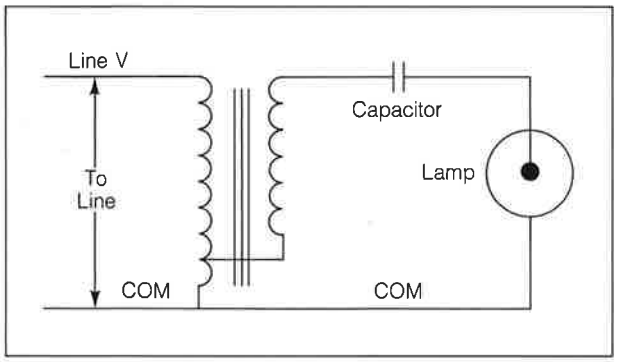
The optimised design of the lamps' arc tubes results in more isothermal are tube wall temperatures and increased use of light emitting materials. This development helps provide longer lamp life, increased lumen output, improved efficiency and colour uniformity.

Super Metalarc lamps are compatible with colour television broadcasting equipment and because they emit light in red and blue wavelengths, they are ideal for horticultural plant growth and interior landscape lighting applications.

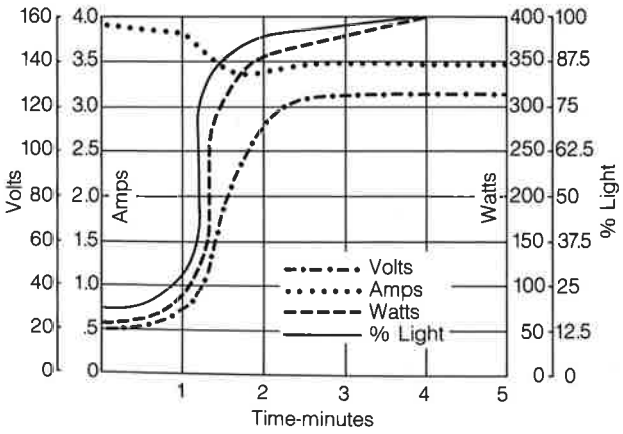
This, combined with the arc tube improvements, gives excellent colour uniformity.

With a colour rendering Index (CRI) of 70 it is an excellent choice for retail stores, conference rooms, sales areas, commercial offices and other installations where warmth and quality of colour is the prime consideration.

This new highly efficient lamp family, with its incandescent light colour, offers a new opportunity for the use of HID sources in interior lighting design.



Circuit Diagram



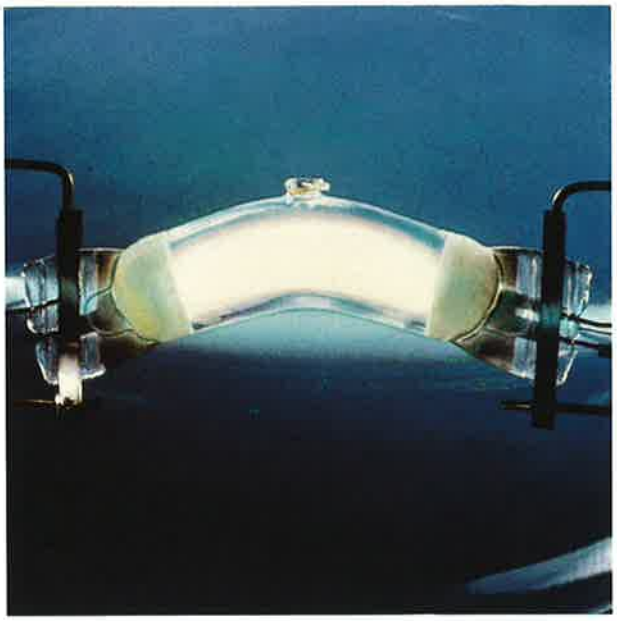
Warm Up Characteristics of a 400 Watt Metalarc Lamp

Vertical

Vertical Burning Super Metalarc Lamps

The exclusive expanded arc tube in these lamps accommodates the convection current generated by the arc stream in the vertical position.

As in the horizontal burning types, the unique arc tube design assures that the tube walls are heated uniformally, increasing lamp life, efficiency, lumen output and colour uniformity.



Horizontal

Horizontal Burning Super Metalarc Lamps
In these lamps the arc tube is bowed upward to follow the natural curve of the arc stream in the horizontal operating position.

They are excellent choices for energy efficient low profile luminaires.

SYLVANIA Offers a Complete Range of Metal Halide Lamps to Meet Your Needs Exactly

Clear
Where highest light levels and good optical control are important in sports halls, factories and similar installations, clear Super Metalarc lamps are ideal. They provide maximum non-diffused light with excellent colour.

Coated
Phosphor coated Super Metalarc-C lamps are designed for use in commercial interiors and retail installations, where the soft diffused lighting helps to create a cheerful atmosphere, and in industrial interiors where the glare from clear light sources may be a problem.

Super Metalarc 3K
This latest edition to the Super Metalarc line is coated with rare earth phosphors selected to provide warmth and enhanced colour similar to that of incandescent lighting.

Just as important, though, is the fact that all wattages are targeted at the same colour appearance level of 3200°K.

This, combined with the arc tube improvements, gives excellent colour uniformity.

With a colour rendering Index (CRI) of 70 it is an excellent choice for retail stores, conference rooms, sales areas, commercial offices and other installations where warmth and quality of colour is the prime consideration.

This new highly efficient lamp family, with its incandescent light colour, offers a new opportunity for the use of HID sources in interior lighting design.

Standard Sylvania Super Metalarc provides cooler, whiter lighting.

New Sylvania Super Metalarc 3K enhances colour with warmer lighting.

SYLVANIA GTE

Efficient Lighting Solutions

High Intensity Discharge Lamps

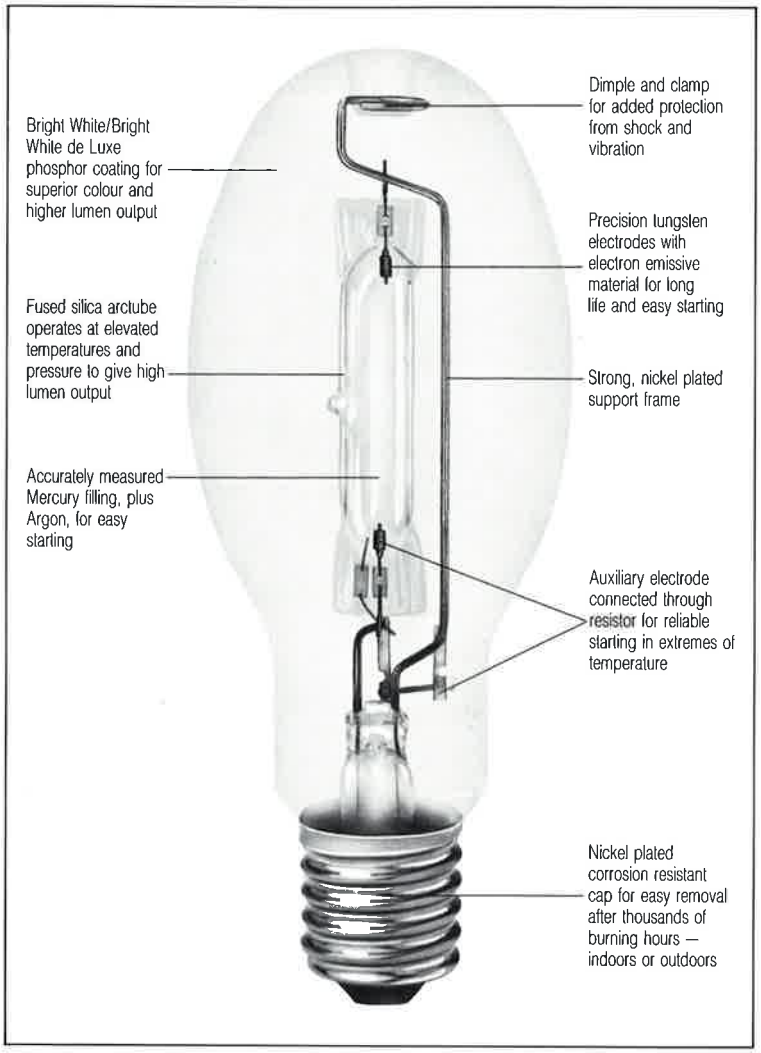
Discharge Lamp Product Information

Description

"Brightwhite" Standard Mercury Lamps

MBF/U (HSL-BW)

3.1.1a



Mechanical Data and Illumination Characteristics

General Information									
Lamp Rating	50 W	80 W	80 W 3Pin	125 W	125 W 3Pin	250 W	400 W	700 W	1000 W
Type Description	HSL-BW/50	HSL-BW/80	HSL-BW/80	HSL-BW/125	HSL-BW/125	HSL-BW/250	HSL-BW/400	HSL-BW/700	HSL-BW/1000
Mechanical Data									
Bulb Shape	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid
Bulb Finish	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated
Bulb Diameter mm	56	71	71	76	76	91	122	152	167
Overall Length mm	130	156	152	177	173	226	292	343	380
Arc Length mm	—	—	—	—	—	—	—	—	—
Light Centre Length mm	—	—	—	—	—	—	—	—	
Cap	E27	E27	B22-3	E27	B22-3	E40/45	E40/45	E40/45	E40/45
Illumination Characteristics									
Light Output (2000 hr) lm	1800	3650	3650	6200	6200	13300	21500	38000	58000
Efficacy lm/W	36	45	45	50	50	53	54	54	58

Features

- Operation on simple choke circuits
- Excellent starting characteristics at supply voltages above 180 V and at temperatures well below 0°C
- Rugged construction to withstand shocks and vibration

SYLVANIA GTE

Discharge Lamp Product Information

Description

"Brightwhite" Standard Mercury Lamps

MBF/U (HSL-BW)

3.1.1b

Applications

- Road lighting applications of all types
- Docks, railway yards and industrial stock yards
- Parks and gardens

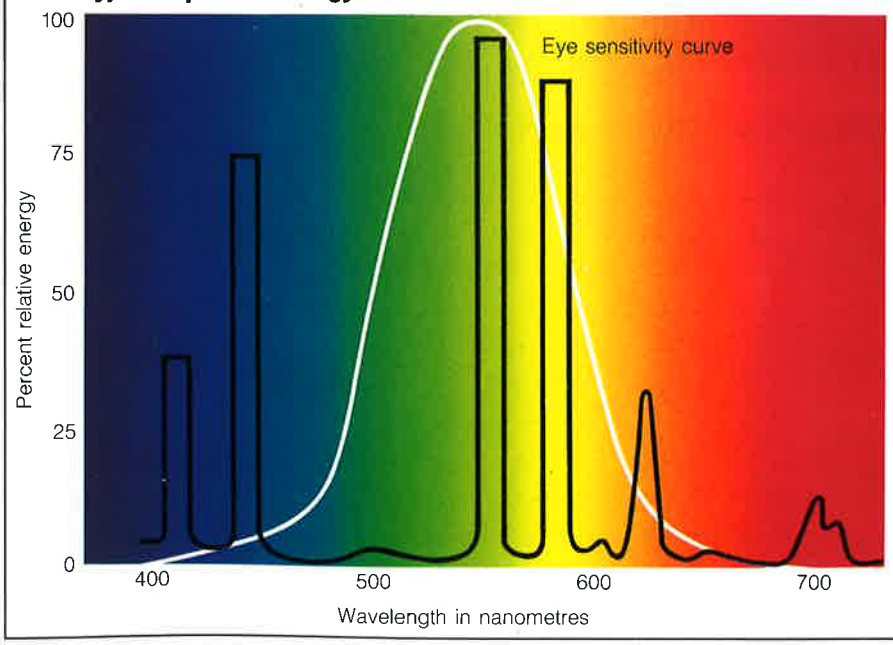
Burning Position

Universal

Electrical Data									
Lamp Rating	50 W	80 W	80 W 3Pin	125 W	125 W 3Pin	250 W	400 W	700 W	1000 W
Arc Tube Voltage V	95	115	115	125	125	130	135	140	145
Arc Current A	0,61	0,80	0,80	1,15	1,15	2,15	3,25	5,40	7,50
Starter Type (1)	AUX	AUX	AUX	AUX	AUX	AUX	AUX	AUX	AUX
Peak Starting Voltage	—	—	—	—	—	—	—	—	—
PF Capacitor mfd	7	8	8	10	10	18	25	40	60
Min. Supply Voltage V	180	180	180	180	180	180	180	180	180

Ordering Data									
Code No	20405	20406	20518	20407	20447	20408	20409	20410	20411
Type Description	HSL-BW/50	HSL-BW/80	HSL-BW/80	HSL-BW/125	HSL-BW/125	HSL-BW/250	HSL-BW/400	HSL-BW/700	HSL-BW/1000
Packing Quantity	40	40	40	40	40	12	12	6	6

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 4000

x : 0,38

y : 0,38

Colour Rendering Index (ra8): 42

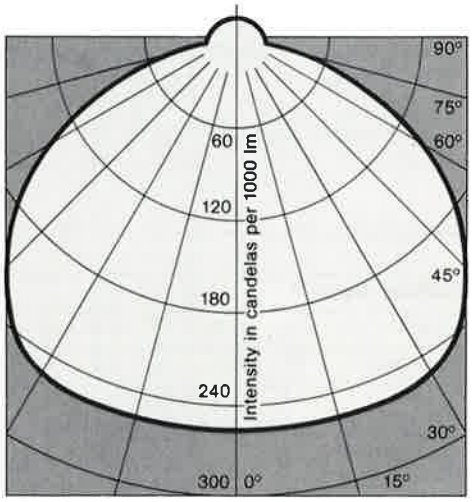
Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC 188.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

Description

"Brightwhite" Mercury Reflector Lamps



Typical Polar Intensity Curve

The combination of bulb shape and titanium-dioxide reflector employed in Sylvania Mercury Reflector lamps gives the polar intensities shown in the diagram. The light output from the lamp is directed below the horizontal, resulting in very high peak intensities.

Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	250 W	400 W						
Type Description	HSR-BW/250	HSR-BW/400						
Mechanical Data								
Bulb Shape	Reflector, Internal Coating							
Bulb Finish	Phosphor Coated	Phosphor Coated						
Bulb Diameter mm	165	180						
Overall Length mm	260	300						
Arc Length mm	—	—						
Light Centre Length mm	—	—						
Cap	E40/45	E40/45						
Illumination Characteristics								
Light Output (2000 hr) lm	10500	18000						
Efficacy lm/W	42	45						

Features

- Internal reflector impervious to dirt and dust
- Directs light to where it is needed
- Hard glass bulb for indoor/outdoor use
- Pleasant, cool "Brightwhite" light colour

Discharge Lamp Product Information

Description

"Brightwhite" Mercury Reflector Lamps

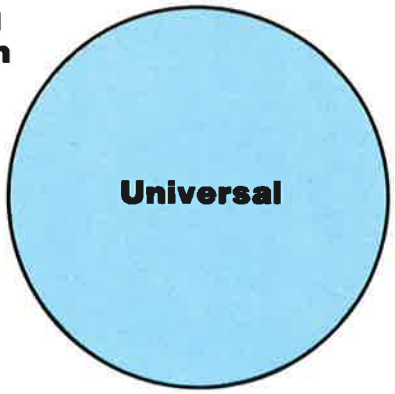
MBFR/U (HSR-BW)

3.2.1b

Applications

- Working environments where lamp soiling is unavoidable and maintenance difficult, e.g.
  - — foundries
  - — industrial workshops
  - — steel mills
  - — mining operations

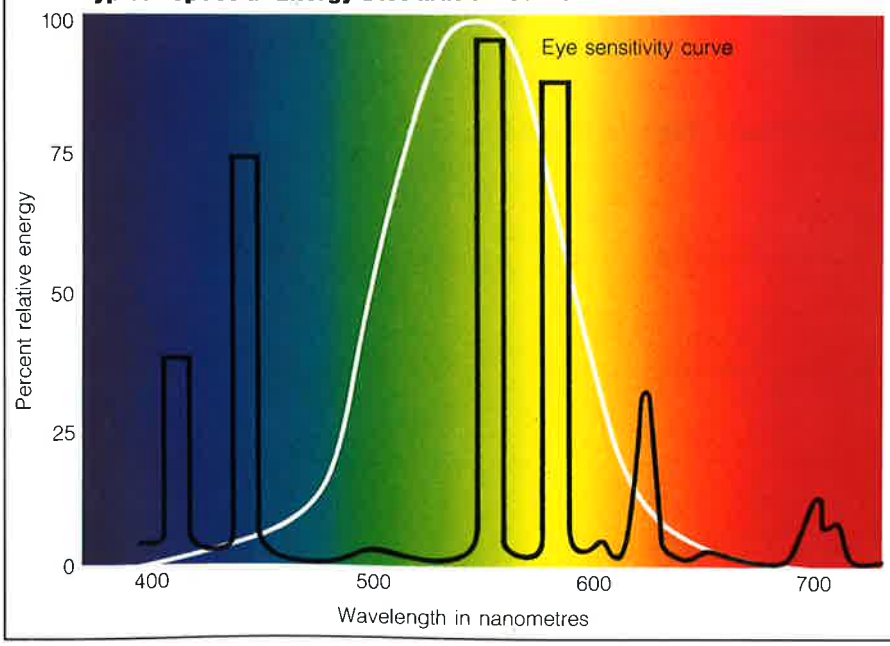
Burning Position



Electrical Data								
Lamp Rating	250 W	400 W						
Arc Tube Voltage V	130	135						
Arc Current A	2,15	3,25						
Starter Type (1)	AUX	AUX						
Peak Starting Voltage	—	—						
PF Capacitor mfd	18	25						
Min. Supply Voltage V	180	180						

Ordering Data								
Code No	20412	20413						
Type Description	HSR-BW/250	HSR-BW/400						
Packing Quantity	6	6						

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 4000

x : 0,38

y : 0,38

Colour Rendering Index (ra8): 42

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

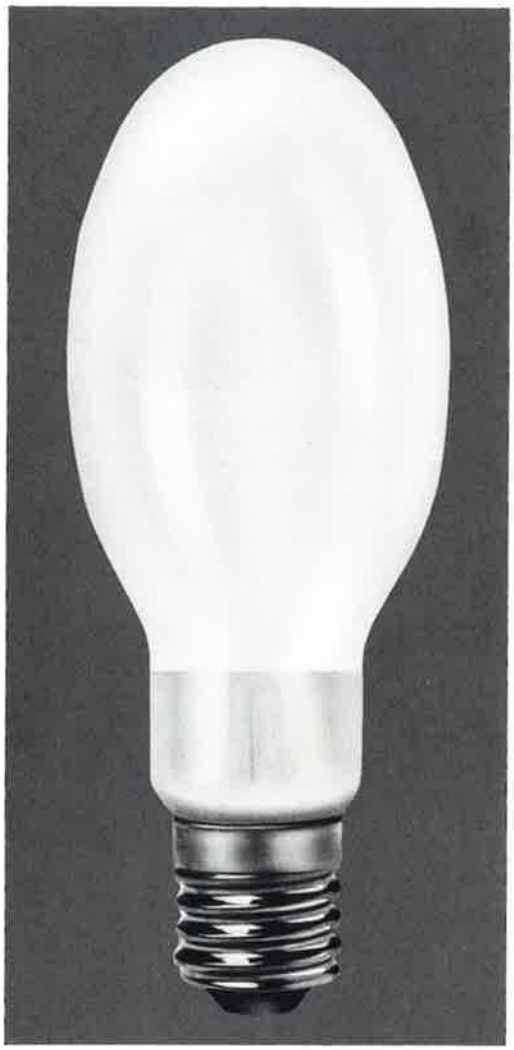
Discharge Lamp Product Information

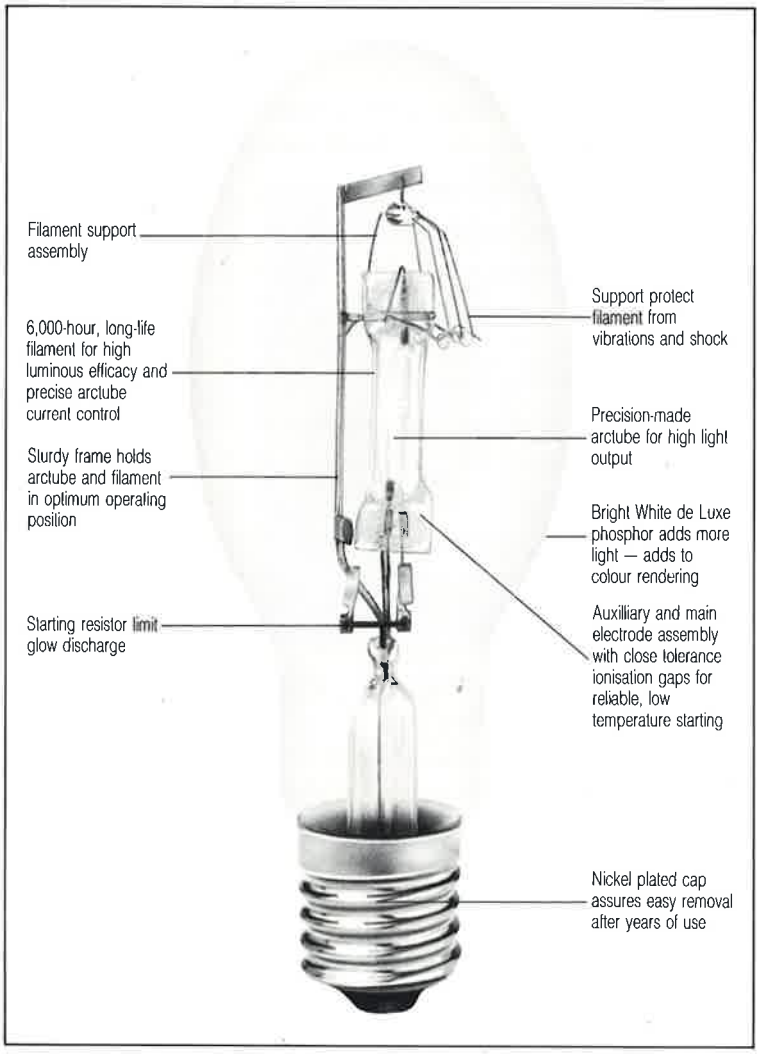
Description

"Brightwhite" Blended Mercury Lamps

MBTF (HSB-BW)

3.3.1a





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	160 W ES	160 W BC	250 W	500 W				
Type Description	HSB-BW/160	HSB-BW/160	HSB-BW/250	HSB-BW/500				
Mechanical Data								
Bulb Shape	Ellipsoid	Ellipsoid	Ellipsoid	Ellipsoid				
Bulb Finish	Phosphor Coated	Phosphor Coated	Phosphor Coated	Phosphor Coated				
Bulb Diameter mm	76	76	91	122				
Overall Length mm	170	170	226	292				
Arc Length mm	—	—	—	—				
Light Centre Length mm	—	—	—	—				
Cap	E27/30	B22	E40/45	E40/45				
Illumination Characteristics								
Light Output (2000 hr) lm	2560	2560	4840	11500				
Efficacy lm/W	16	16	19	23				

Features

- Direct Plug-in replacement for incandescent lamps
- Six times the life of incandescent lamps
- Low initial cost — no control gear needed
- Mercury/Tungsten combination gives most pleasant white light colour
- Reliable starting down to minus 18°C

SYLVANIA GTE

Discharge Lamp Product Information

Description

"Brightwhite" Blended Mercury Lamps

MBTF (HSB-BW)

3.3.1b

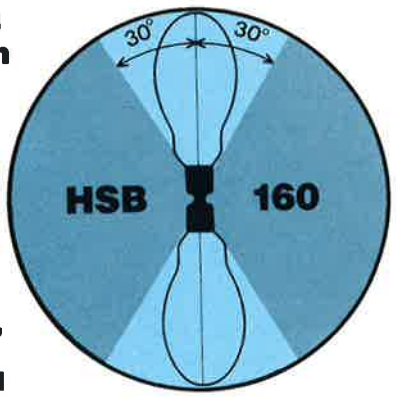
Technical Notes

- Requires no control gear

Applications

- Simple energy saving replacement for incandescent such as:
  - — Old town centres, boulevards
  - — Pedestrian zones
  - — Parks and gardens

Burning Position

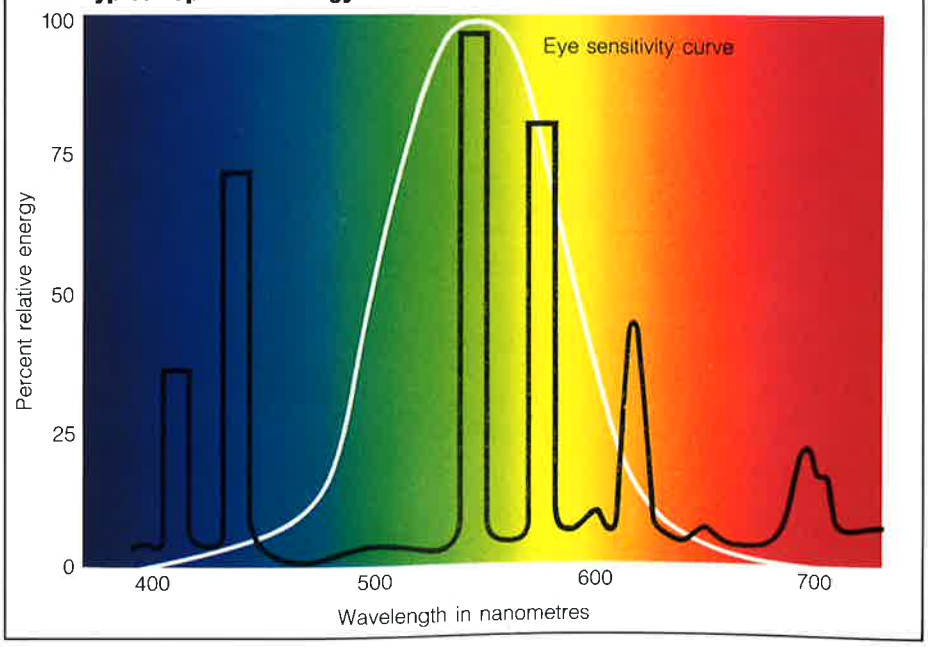


HSB 250, 500 W Universal

Electrical Data									
Lamp Rating		160 W ES	160 W BC	250 W	500 W				
Arc Tube Voltage	V	240/250	240/250	240/250	240/250				
Arc Current	A	0,71	0,71	1,11	2,40				
Starter Type	(1)	AUX	AUX	AUX	AUX				
Peak Starting Voltage		—	—	—	—				
PF Capacitor	mfd	NONE	NONE	NONE	NONE				
Min. Supply Voltage	V	(3)	(3)	(3)	(3)				

Ordering Data								
Code No	20475	20476	20477	20478				
Type Description	HSB-BW/160	HSB-BW/160	HSB-BW/250	HSB-BW/500				
Packing Quantity	40	40	12	6				

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 3500

x : 0,40

y : 0,38

Colour Rendering Index (ra8): 60

Special Notes

(1) AUX = Auxilliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) Min supply voltages at +20°C ambient temperature. Increase by 10% for temperatures down to —18°C.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

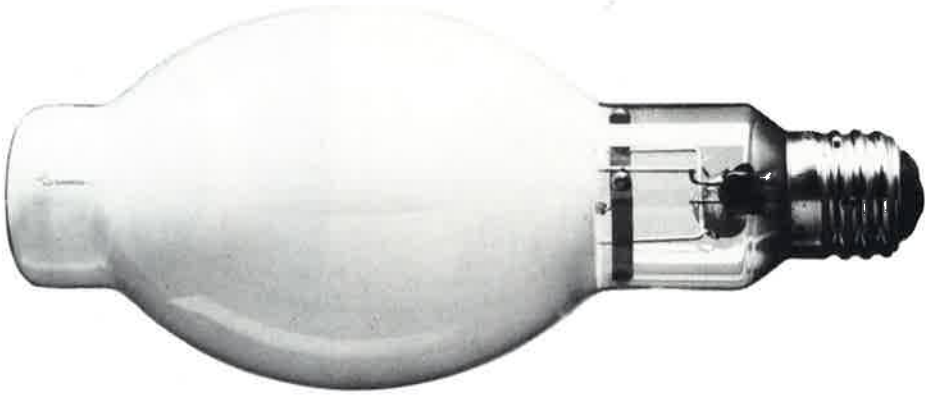
Discharge Lamp Product Information

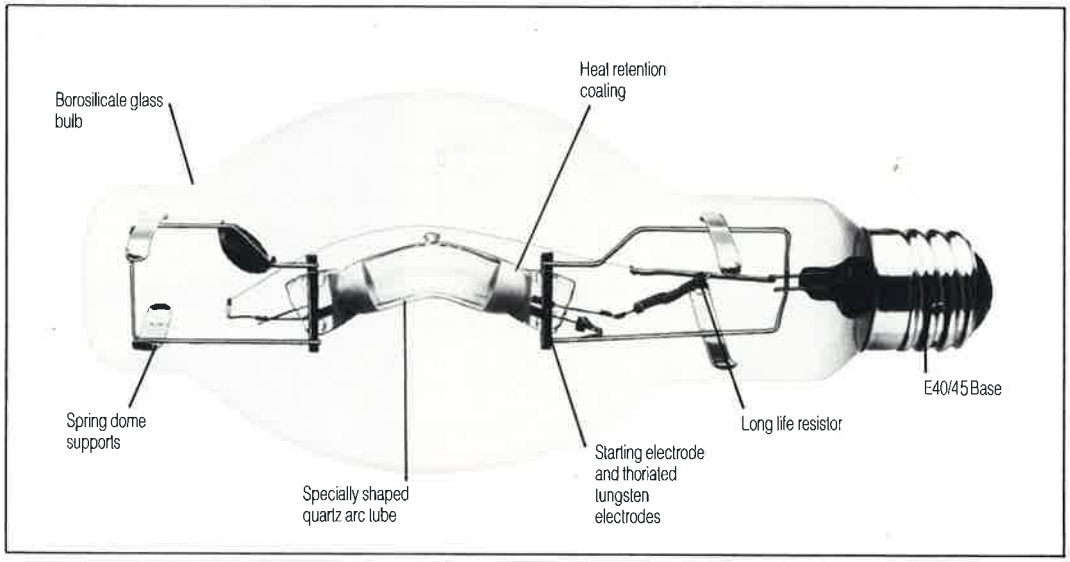
MS-3K

3.4.1a

Description

Super Metalarc 3K Lamps





Physical and Photometric Characteristics

Ordering Abbreviation		MS 175/3K/HOR	MS 250/3K/HOR	MS 400/3K/HOR	MS 400/3K/BU
Bulb Designation		BT-28	BT-28	BT-37	BT-37
Bulb Diameter	mm	89	89	117·5	117·5
Base Type		Position Orientated E40/45	Position Orientated E40/45	Position Orientated E40/45	Position Orientated E40/45
Light Centre Length	mm	132	132	183	183
Arc Length	mm	26	33	39	38
Max. Overall Length	mm	216	216	297	297
Max. Bulb Temp.	°C	350	350	400	400
Max. Base Temp.	°C	210	210	210	210
2000 Hr Lumens		11,900	18,300	33,300	33,300
Warm Up Time	minutes	2	2	2	2
Hot Restrike Time	minutes	10	10	10	10

Features

- Warm colour similar to incandescent
- Excellent colour rendering
- Highest efficiencies available

SYLVANIA GTE

Discharge Lamp Product Information

MS-3K

3.4.1b

Description

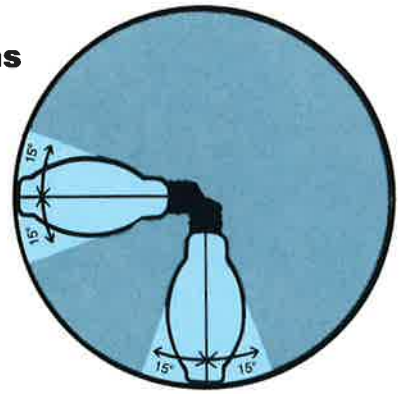
Super Metalarc 3K Lamps

Applications

- Where warm, high efficiency and high colour rendering is required in interiors.
  - — Retail Stores
  - — Commercial Offices

Burning Positions

Horizontal

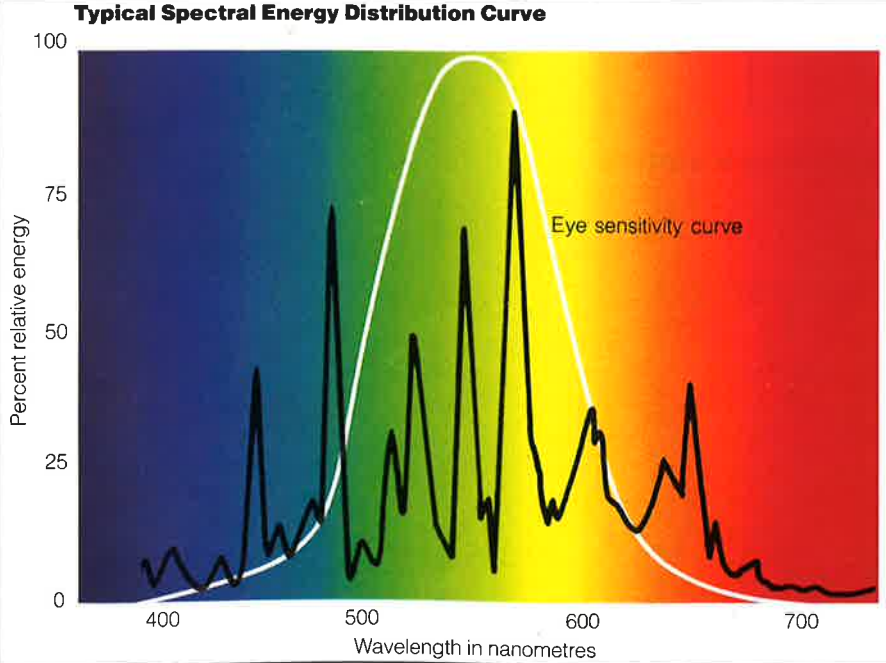


Base-up

Electrical Characteristics

Sylvania Code No	20600		20601		20602		20603	
Ordering Abbreviation	MS 175/3K/HOR		MS 250/3K/HOR		MS 400/3K/HOR		MS 400/3K/BU	
Burning Position	Horizontal ±15°		Horizontal ±15°		Horizontal ±15°		Base Up ±15°	
Nominal Lamp Watts	175		250		400		400	
Nominal Lamp Volts	130		130		130		133	
Nominal Lamp Amps	1·55		2·1		3·4		3·2	
Min. RMS for Lamp Stability	250		250		250		250	
Min Starting Volts Reqd.	**RMS**	**PEAK**	**RMS**	**PEAK**	**RMS**	**PEAK**	**RMS**	**PEAK**
98% Probability at or above	382	540	382	540	382	540	382	540
90% Probability down to with Lead Peak	382	540	382	540	382	540	382	540
Max. Current Crest Factor (Crest Factor 1·8)	295	540	295	540	295	540	295	540

Typical Spectral Energy Distribution Curve



Colour Data

Colour Temperature	: 3200°K
x	: 0·425
y	: 0·410
CRI	: 70

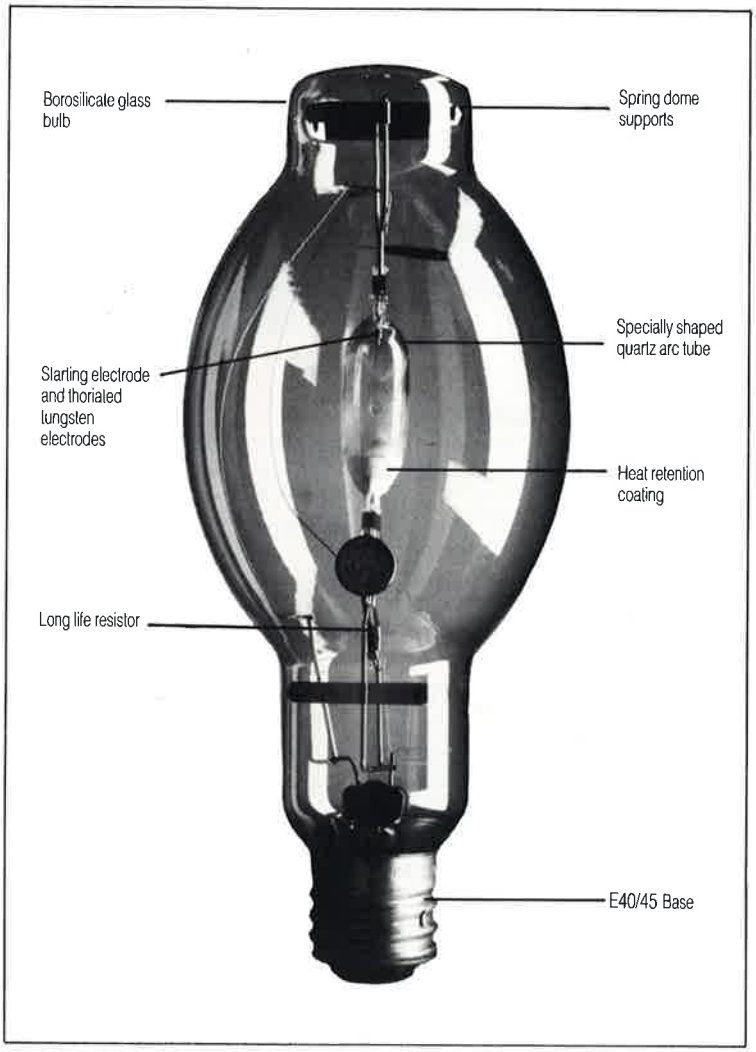
Special Notes:
- 3K Super Metalarc lamps only to be operated on approved CWA control gear.
- Lamps should only be used in suitably enclosed luminaires as there is a small risk of the arc tube shattering at end of life.
- For continuous operation, it is recommended that all Super Metalarc lamps be turned off once per week to reduce the risk of arc tube rupture.
- As with all mercury and metal halide lamps, switch off and remove lamp immediately if outer bulb is broken as skin burn and eye inflammation from short wave UV may occur.
- Do not operate vertical BU and BD types within 60° of horizontal as they may shatter.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

Description

Super Metalarc Coated Lamps



Physical and Photometric Characteristics

Ordering Abbreviation		MS175/C/HOR	MS250/C/HOR	MS400/C/HOR	MS400/C/BU	MS400/C/BD	MS1000/C/BU	MS1000/C/BD
Bulb Designation		BT-28	BT-28	BT-37	BT-37	BT-37	BT-56	BT-56
Bulb Diameter	mm	89	89	117·5	117·5	117·5	178	178
Base Type		Position Orientated E40/45	Position Orientated E40/45	Position Orientated E40/45	E40/45	E40/45	E40/45	E40/45
Light Centre Length	mm	132	132	183	183	183	246	246
Arc Length	mm	26	33	39	38	38	90	90
Max. Overall Length	mm	216	216	297	297	297	395	395
Max. Bulb Temp.	°C	350	350	400	400	400	400	400
Max. Base Temp.	°C	210	210	210	210	210	210	210
2000 Hr. Lumens		12,800	19,600	36,400	37,600	37,600	112,500	112,500
Colour Temperature		4200°K	3700°K	3800°K	3500°K	3500°K	3100°K	3100°K
Chromaticity Co-ord	x	0·373	0·380	0·385	0·410	0·410	0·425	0·425
	y	0·380	0·380	0·368	0·380	0·330	0·390	0·390
CRI		70	70	70	70	70	70	70
Warm Up Time	mins	2	2	2	2	2	4	4
Hot Restrike Time	mins	10	10	10	10	10	10	10

Features

- Highest efficiencies available
- Diffuse light source giving good visual comfort
- Excellent colour rendering

Discharge Lamp Product Information

Description

Super Metalarc Coated Lamps

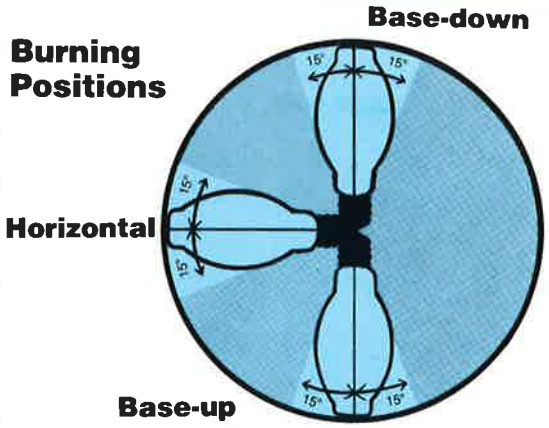
MS-COATED

3.4.2b

Applications

- Where high efficiency, high colour rendering and diffuse lighting is required.
  - — Factories
  - — Warehouses
  - — Sports Halls
  - — Retail Stores
  - — Commercial Offices

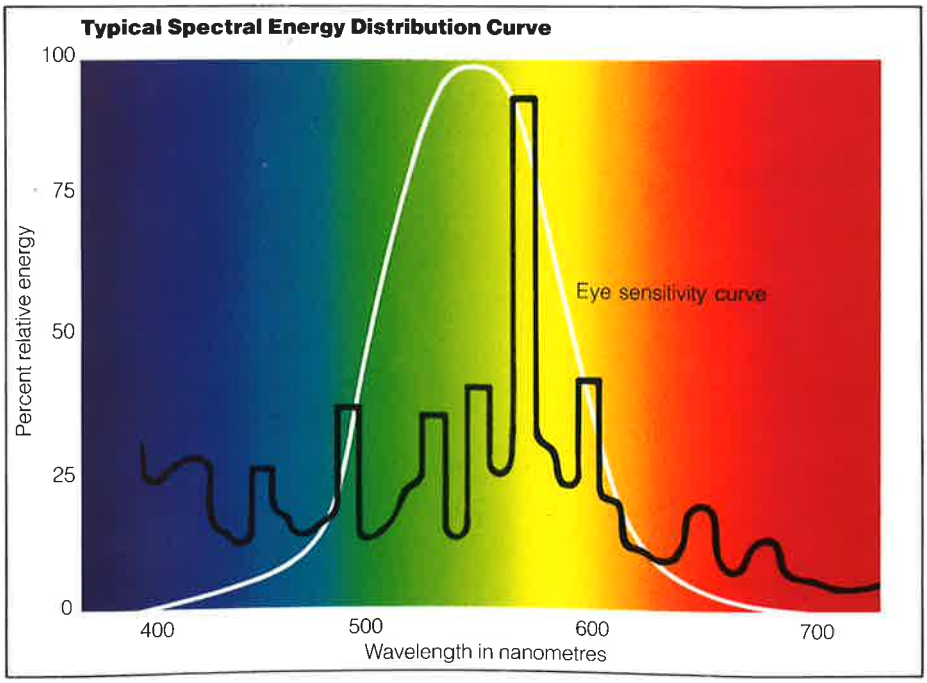
Burning Positions



Electrical Characteristics

Sylvania Code No	20604		20605		20606		20607		20608		20609		20610	
Ordering Abbreviation	MS175/C/HOR		MS250/C/HOR		MS400/C/HOR		MS400/C/BU		MS400/C/BD		MS1000/C/BU		MS1000/C/BD	
Burning Position	Horizontal ±15°		Horizontal ±15°		Horizontal ±15°		Base Up ±15° only		Base Down ±15° only		Base Up ±15° only		Base Down ±15° only	
Nominal Lamp Watts	175		250		400		400		400		1000		1000	
Nominal Lamp Volts	130		130		130		133		133		265		265	
Nominal Lamp Amps	1·55		2·1		3·4		3·2		3·2		4·3		4·3	
Min RMS For Lamp Stability	250		250		250		250		250		340		340	
Min. Starting Volts Req.	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**
98% Probability at or above	382	540	382	540	382	540	382	540	382	540	440	622	440	622
90% Probability down to with Lead Peak	382	540	382	540	382	540	382	540	382	540	530	750	530	750
Max. Current Crest Factor (Crest Factor 1·8)	295	540	295	540	295	540	295	540	295	540	410	750	410	750

Typical Spectral Energy Distribution Curve



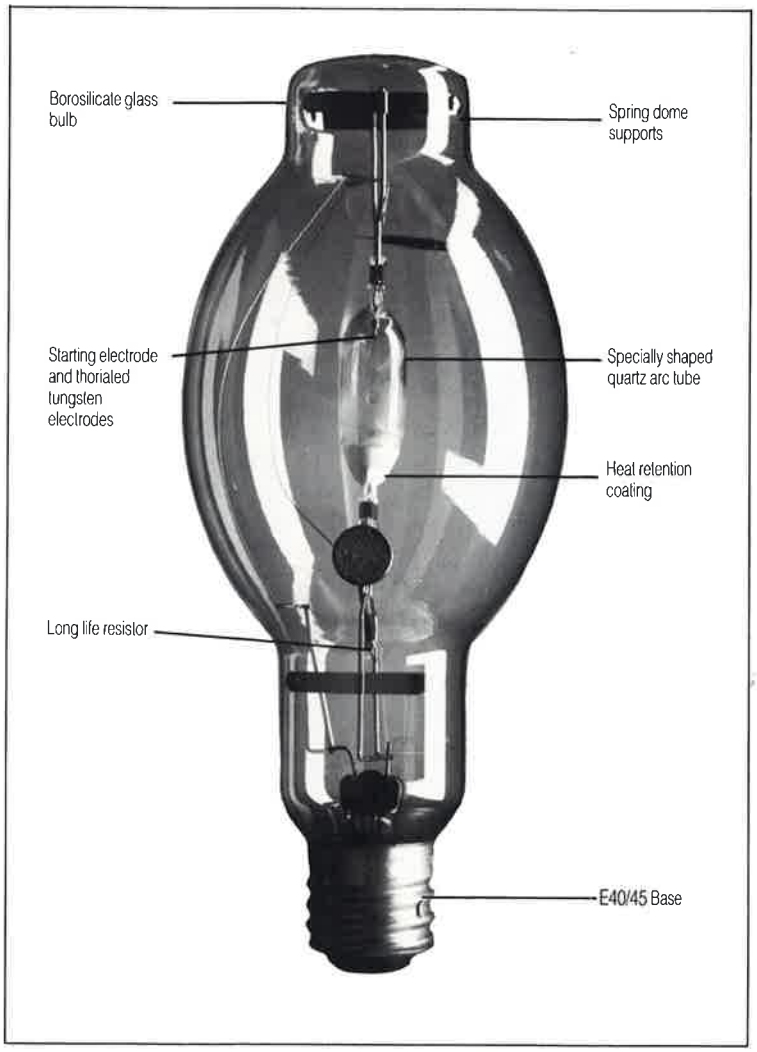
Special Notes:
- Super Metalarc lamps only to be operated on approved CWA control gear.
- Lamps should only be used in suitably enclosed luminaires as there is a small risk of the arc tube shattering at end of life.
- For continuous operation, it is recommended that all Super Metalarc lamps be turned off once per week to reduce the risk of arc tube rupture.
- As with all mercury and metal halide lamps, switch off and remove lamp immediately if outer bulb is broken as skin burn and eye inflammation from short wave UV may occur.
- Do not operate vertical BU and BD types within 60° of horizontal as they may shatter.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

Description

Super Metalarc Clear Lamps



Physical and Photometric Characteristics

Ordering Abbreviation		MS175/HOR	MS250/HOR	MS400/HOR	MS400/BU	MS400/BD	MS1000/BU	MS1000/BD
Bulb Designation		BT-28	BT-28	BT-37	BT-37	BT-37	BT-56	BT-56
Bulb Diameter	mm	89	89	117·5	117·5	117·5	178	178
Base Type		Position Orientated E40/45	Position Orientated E40/45	Position Orientated E40/45	E40/45	E40/45	E40/45	E40/45
Light Centre Length	mm	132	132	183	183	183	246	246
Arc Length	mm	26	33	39	38	38	90	90
Max. Overall Length	mm	216	216	297	297	297	395	395
Max. Bulb Temp.	°C	350	350	400	400	400	400	400
Max. Base Temp.	°C	210	210	210	210	210	210	210
2000 Hr. Lumens		13,500	20,700	36,000	36,800	36,800	112,500	112,500
Colour Temperature		4700°K	4200°K	4500°K	3700°K	3700°K	3500°K	3500°K
Chromaticity Co-ord	x	0·353	0·375	0·360	0·390	0·390	0·400	0·400
	y	0·382	0·395	0·370	0·365	0·365	0·375	0·375
CRI		65	65	65	65	65	65	65
Warm Up Time	mins	2	2	2	2	2	4	4
Hot Restrike Time	mins	10	10	10	10	10	10	10

Features

- Highest efficiencies available
- Allows precise optical control
- Excellent colour rendering

Discharge Lamp Product Information

Description

Super Metalarc Clear Lamps

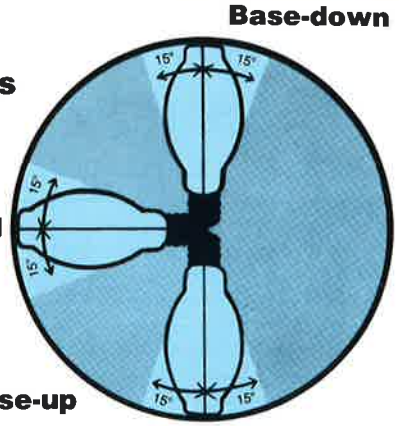
MS-CLEAR

3.4.3b

Applications

- Where the highest light levels and good optical control are required.
  - — Factories
  - — Warehouses
  - — Sports Halls
  - — Floodlighting

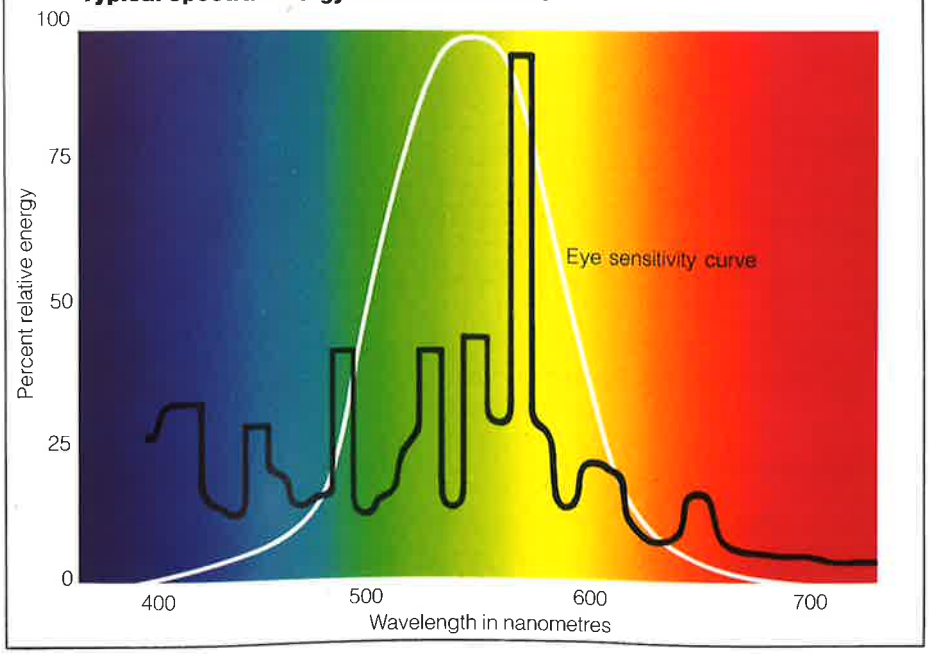
Burning Positions



Electrical Characteristics

Sylvania Code No	20611		20612		20613		20614		20615		20616		20617	
Ordering Abbreviation	MS175/HOR		MS250/HOR		MS400/HOR		MS400/BU		MS400/BD		MS1000/BU		MS1000/BD	
Burning Position	Horizontal ±15°		Horizontal ±15°		Horizontal ±15°		Base Up ±15° only		Base Down ±15° only		Base Up ±15° only		Base Down ±15° only	
Nominal Lamp Watts	175		250		400		400		400		1000		1000	
Nominal Lamp Volts	130		130		130		133		133		265		265	
Nominal Lamp Amps	1·55		2·1		3·4		3·2		3·2		4·3		4·3	
Min RMS For Lamp Stability	250		250		250		250		250		340		340	
Min. Starting Volts Req.	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**	**RMS**	**Peak**
98% Probability at –18°C or above	382	540	382	540	382	540	382	540	382	540	440	622	440	622
90% Probability down to –30°C with Lead Peak	382	540	382	540	382	540	382	540	382	540	530	750	530	750
Max. Current Crest Factor (Crest Factor 1·8)	295	540	295	540	295	540	295	540	295	540	410	750	410	750

Typical Spectral Energy Distribution Curve



Special Notes:
- Super Metalarc lamps only to be operated on approved CWA control gear.
- Lamps should only be used in suitably enclosed luminaires as there is a small risk of the arc tube shattering at end of life.
- For continuous operation, it is recommended that all Super Metalarc lamps be turned off once per week to reduce the risk of arc tube rupture.
- As with all mercury and metal halide lamps, switch off and remove lamp immediately if outer bulb is broken as skin burn and eye inflammation from short wave UV may occur.
- Do not operate vertical BU and BD types within 60° of horizontal as they may shatter.

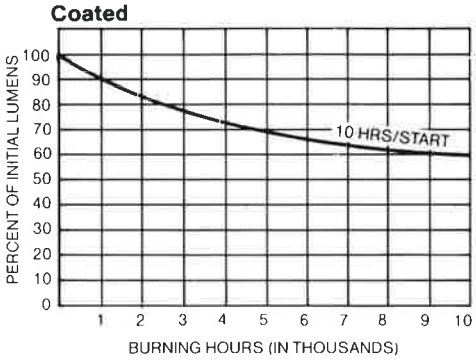
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

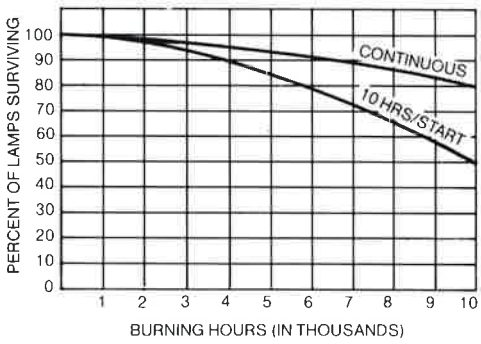
SUPER METALARC 3K COATED

MS175/3K/HOR & MS250/3K/HOR

Coated



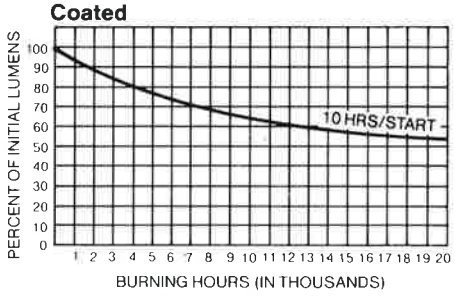
Lamp Lumen Maintenance



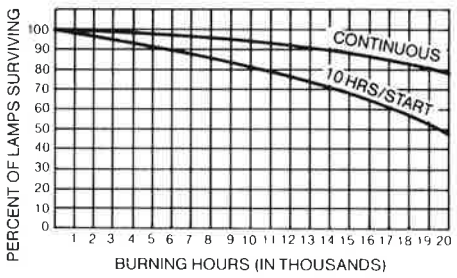
Lamp Survival

MS400/3K/HOR

Coated



Lamp Lumen Maintenance

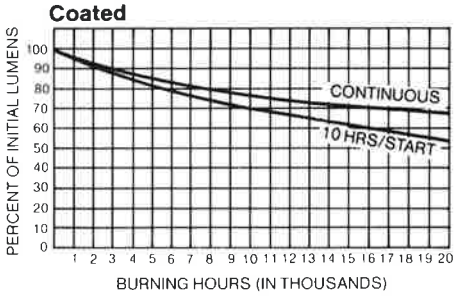


Lamp Survival

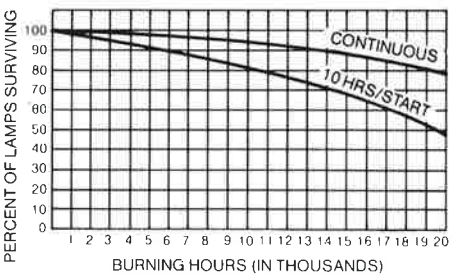
Typical life expectancy or mortality curves for Super Metalarc lamps at various burning cycles. All curves apply to operation on single lamp ballast.

MS400/3K/BU

Coated



Lamp Lumen Maintenance



Lamp Survival

Special Notes:

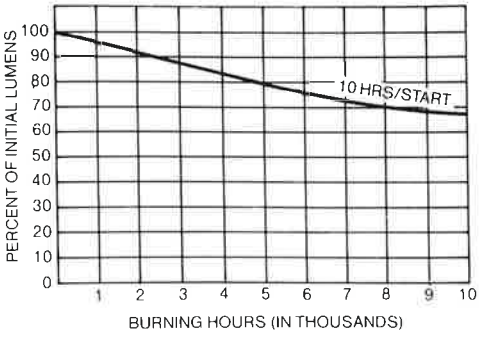
- 3K Super Metalarc lamps only to be operated on approved CWA control gear.
- Lamps should only be used in suitably enclosed luminaires as there is a small risk of the arc tube shattering at end of life.
- For continuous operation, it is recommended that all Super Metalarc lamps be turned off once per week to reduce the risk of arc tube rupture.
- As with all mercury and metal halide lamps, switch off and remove lamp immediately if outer bulb is broken as skin burn and eye inflammation from short wave UV may occur.
- Do not operate vertical BU and BD types within 60° of horizontal as they may shatter.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SUPER METALARC COATED AND CLEAR

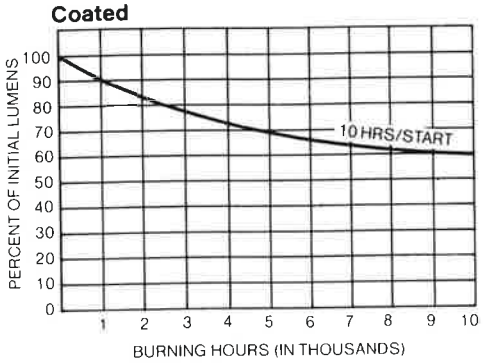
MS175/HOR
MS250/HOR

Clear

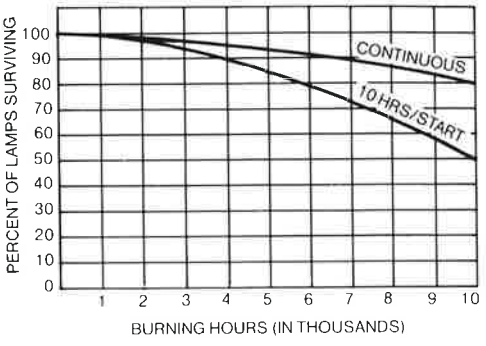


MS175/C/HOR
M250/C/HOR

Coated



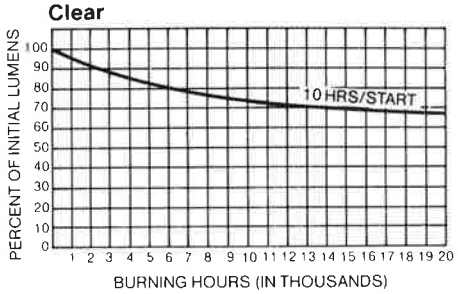
Lamp Lumen Maintenance



Lamp Survival

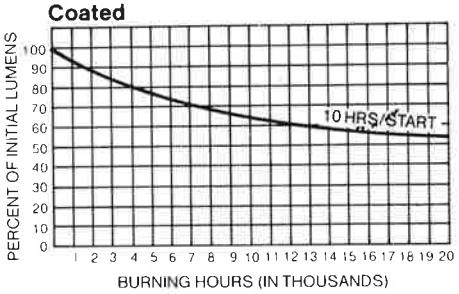
MS400/HOR

Clear

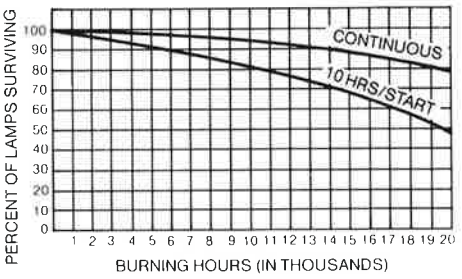


MS400/C/HOR

Coated



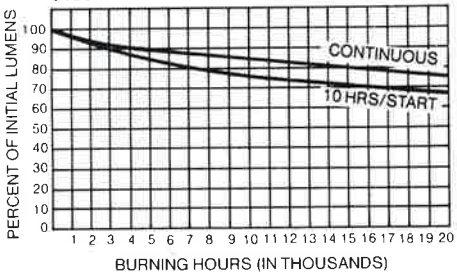
Lamp Lumen Maintenance



Lamp Survival

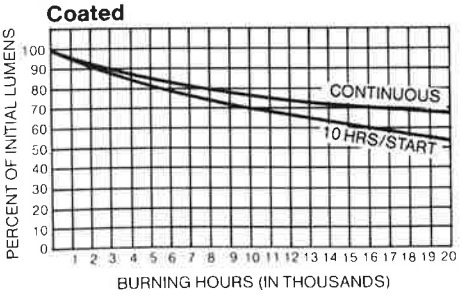
MS400/BU
MS400/BD

Clear

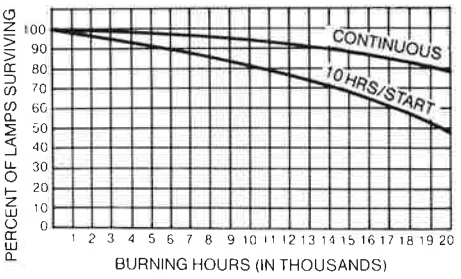


MS400/C/BU
MS400/C/BD

Coated



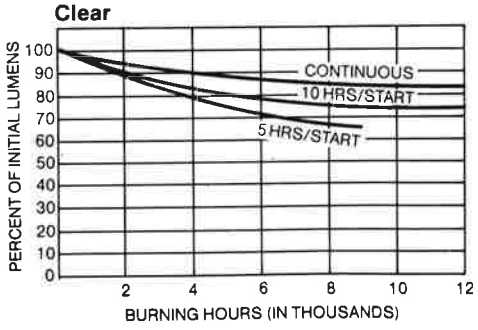
Lamp Lumen Maintenance



Lamp Survival

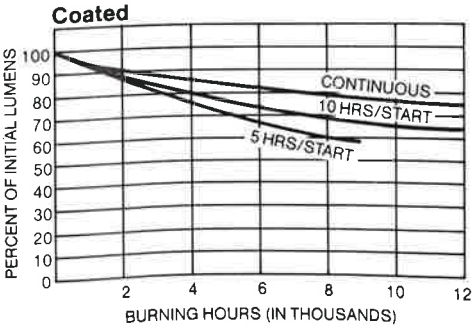
MS1000/BU
MS1000/BD

Clear

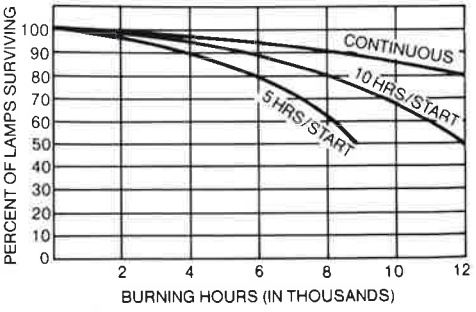


MS1000/C/BU
MS1000/C/BD

Coated



Lamp Lumen Maintenance



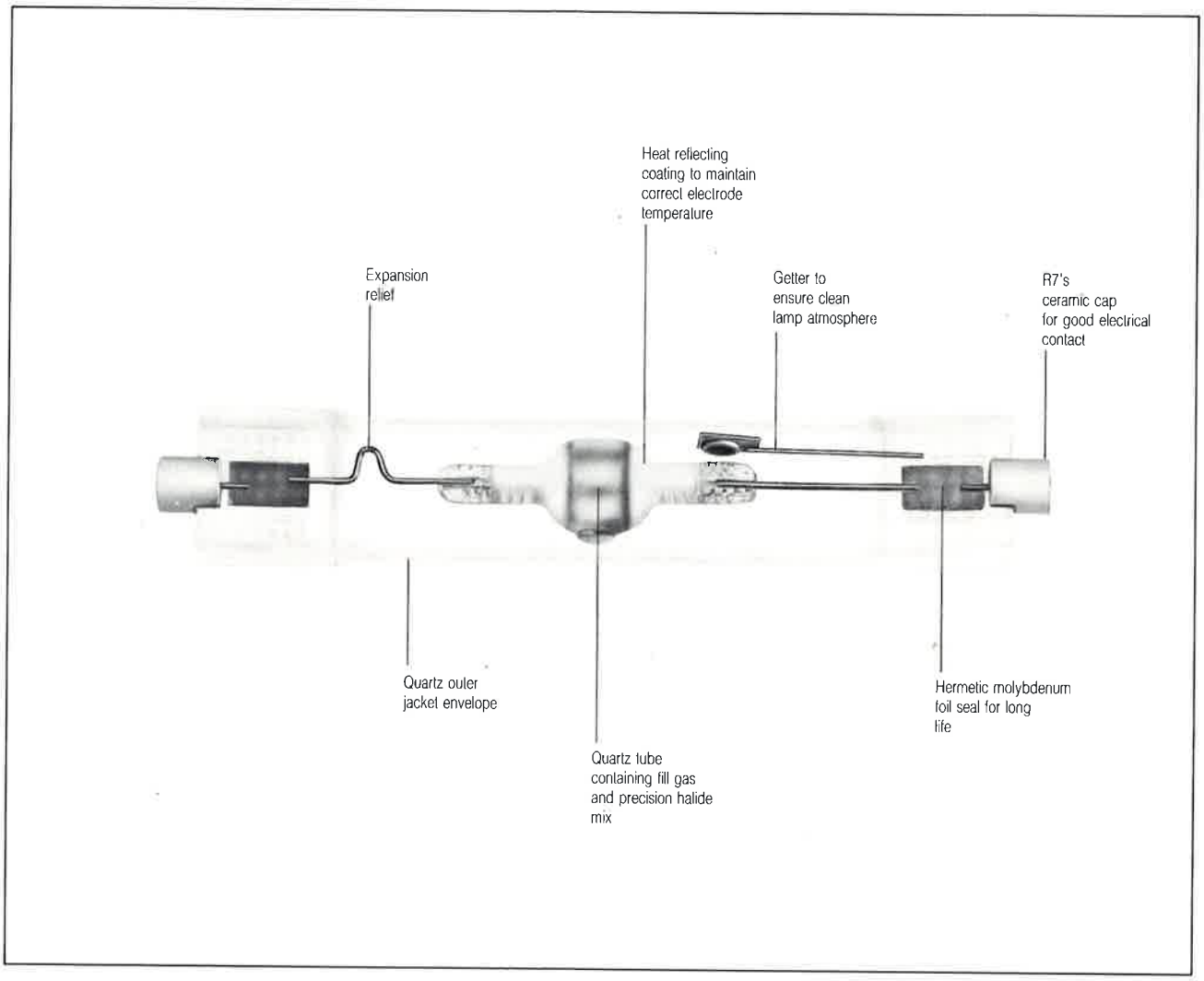
Lamp Survival

Discharge Lamp Product Information

Description Metalarc Metal Halide Lamps — 3000K, Clear Tubular D/E

HSI/T

3.5.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	70 W	150 W						
Type Description	HSI-T/70	HSI-T/150						
Mechanical Data								
Bulb Shape	Tubular	Tubular						
Bulb Finish	Clear	Clear						
Bulb Diameter mm	20	23						
Overall Length mm	114	132						
Arc Length mm	—	—						
Light Centre Length mm	57	69						
Cap	2XR7S	2XR7S						
Illumination Characteristics								
Light Output (2000 hr) lm	5000	11250						
Efficacy lm/W	67	75						

Features
- Small, compact dimensions to aid fixture designers
- Warm, incandescent-like light colour
- High efficiency and long service life

Discharge Lamp Product Information

Description

Metalarc Metal Halide Lamps — 3000K, Clear Tubular D/E

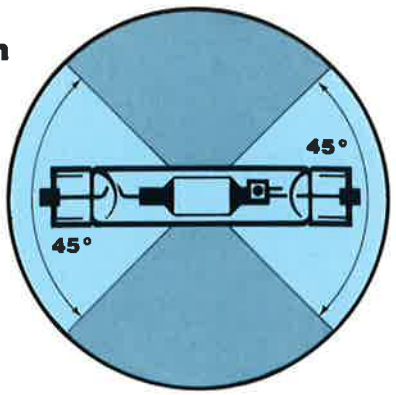
HSI/T

3.5.1b

Applications

- Interior lighting for:
  - — exhibitions, showrooms
  - — shop window displays
  - — commercial reception areas

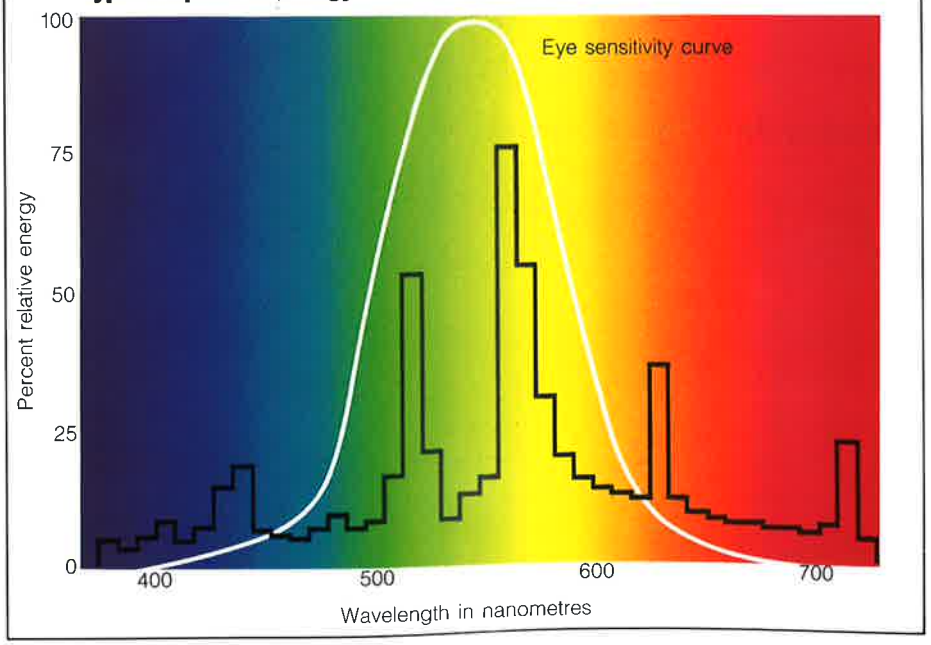
Burning Position



Electrical Data									
Lamp Rating	75 W (4)	150 W							
Arc Tube Voltage V	100	100							
Arc Current A	1,0	1,80							
Starter Type (1)	E	E							
Peak Starting Voltage	2,3 kV	2,3 kV							
PF Capacitor mfd	12	20							
Min. Supply Voltage V	210	210							

Ordering Data								
Code No	20581	20582						
Type Description	HSI-T/70 W	HSI-T/150 W						
Packing Quantity	12	12						

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin): 3000 (70W)
4000 (150W)

x : —

y : —

Colour Rendering Index (ra8): 75

Special Notes (1) External ignitor only. (2) Fixtures must be fitted with a cover glass.
(3) Ensure lamp jacket is cleaned of finger prints before burning lamp.
(4) Actual lamp wattage for 70 W is 75 W.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

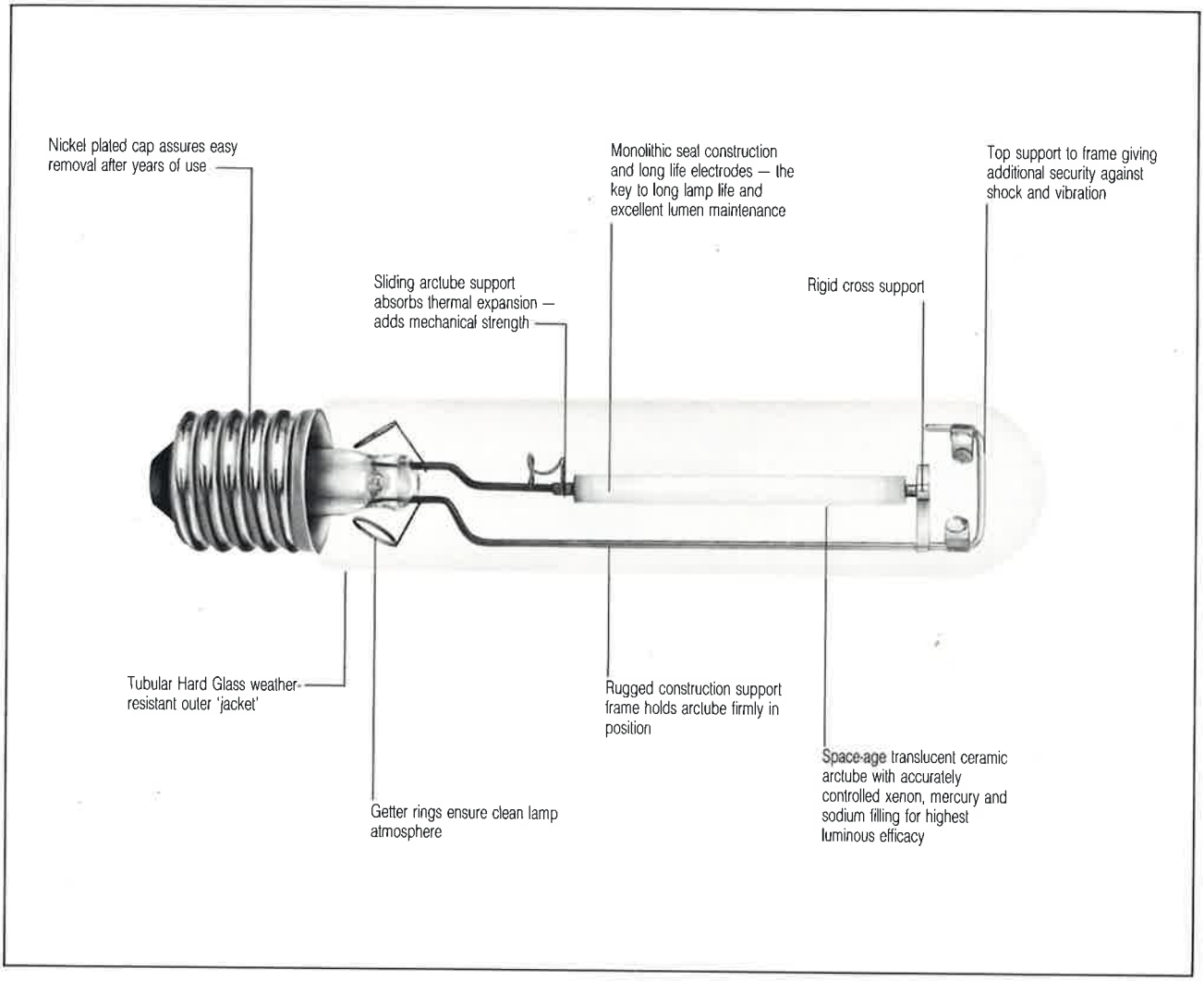
Discharge Lamp Product Information

Description Low Wattage High Pressure Sodium Lamps — Clear Tubular

(E)

SON-T (SHP/T)

3.6.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	35 W	50 W	70 W	100 W				
Type Description	SHP-T/35/CL/E	SHP-T/50/CL/E	SHP-T/70/CL/E	SHP-T/100/40				
Mechanical Data								
Bulb Shape	Tubular	Tubular	Tubular	Tubular				
Bulb Finish	Clear	Clear	Clear	Clear				
Bulb Diameter mm	38	38	38	47				
Overall Length mm	156	156	156	211				
Arc Length mm	35	35	35	35				
Light Centre Length mm	105	105	105	127				
Cap	E27/30	E27/30	E27/30	E40/45				
Illumination Characteristics								
Light Output (2000 hr) lm	2000	3200	5700	9500				
Efficacy lm/W	57	64	81	95				

Features

- Compact construction, minimising fixture design dimensions
- White golden light for better colour rendition outdoors
- Suitable for electronic ignitor — 1 minute hot restrike
- Ideal for small floodlights

Discharge Lamp Product Information

Description

Low Wattage High Pressure
Sodium Lamps — Clear Tubular

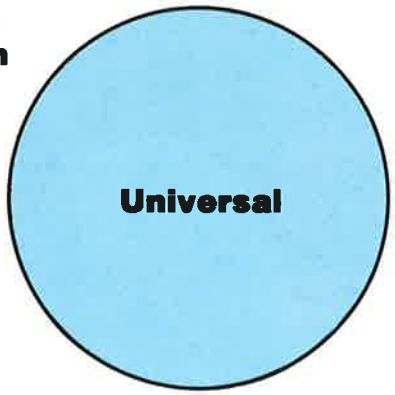
SON-T (SHP/T)

3.6.1b

Applications

- Pedestrian Zones - Indoors and Outdoors
- Residential Street Lighting
- Parks, Gardens
- Small Area Floodlighting

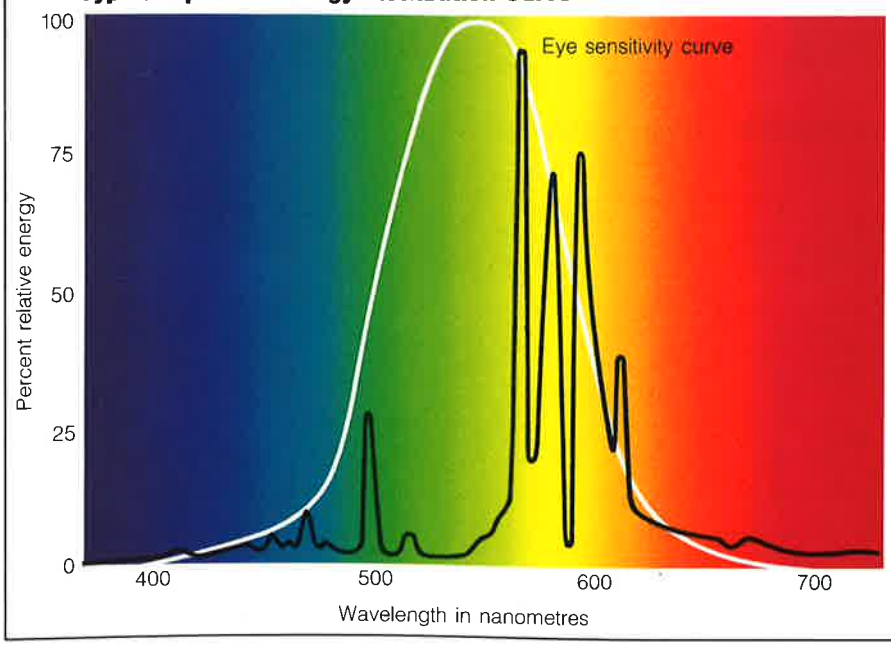
Burning Position



Electrical Data								
Lamp Rating	35 W	50 W	70 W	100 W				
Arc Tube Voltage V	85	85	92	100				
Arc Current A	0,54	0,75	1,00	1,20				
Starter Type (1)	E	E	E	E				
Peak Starting Voltage	2,3 kV	2,3 kV	2,3 kV	2,3 kV				
PF Capacitor mfd	6	8	10	12				
Min. Supply Voltage V (3)	190	190	190	190				

Ordering Data								
Code No	20451	20455	20457	20565				
Type Description	SHP-T/35/CL/E	SHP-T/50/CL/E	SHP-T/70/CL/E	SHP-T/100/40				
Packing Quantity	10	10	10	12				

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2050

x : 0,50

y : 0,42

Colour Rendering Index (ra8): 20

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) For 240 V ballast.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

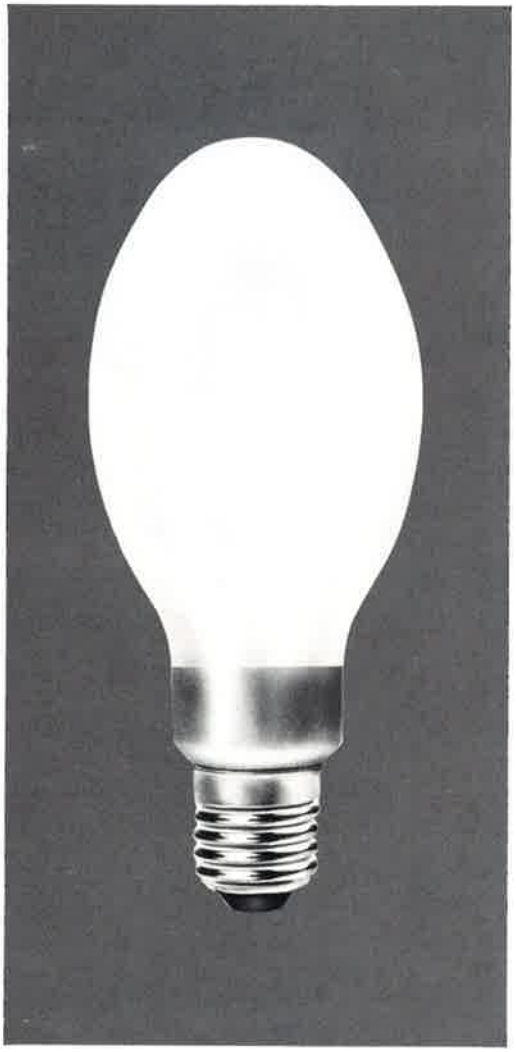
Discharge Lamp Product Information

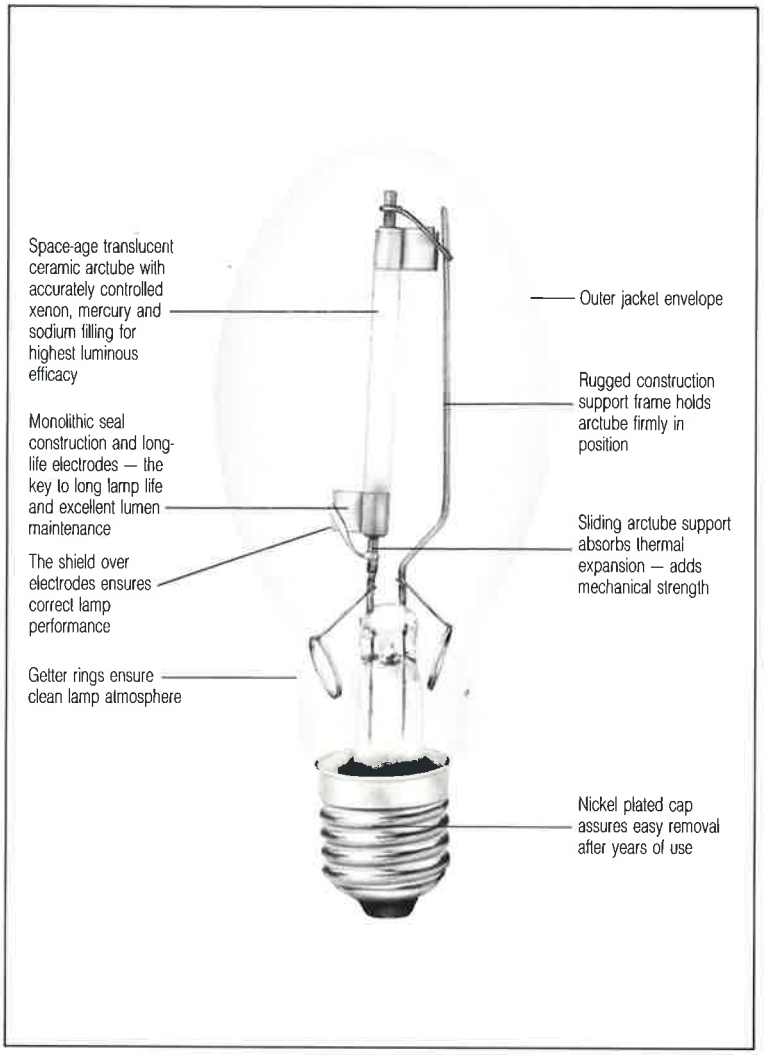
Description Low Wattage High Pressure Sodium Lamps — Ovoid Coated and Clear

△E

SON (SHP)

3.6.2a





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	35 W	50 W	50 W	70 W	70 W	100 W		
Type Description	SHP35/CO/E	SHP50/CO/E	SHP50/CL/E	SHP70/CL/E	SHP70/CO/E	SHP100/40		
Mechanical Data								
Bulb Shape	Ovoid	Ovoid	Ovoid	Ovoid	Ovoid	Ovoid		
Bulb Finish	Coated	Coated	Clear	Clear	Coated	Coated		
Bulb Diameter mm	72	72	72	72	72	76		
Overall Length mm	156	156	156	156	156	177		
Arc Length mm	—	—	—	—	—	—		
Light Centre Length mm	—	—	—	—	—	—		
Cap	E27	E27	E27	E27	E27	E40/45		
Illumination Characteristics								
Light Output (2000 hr) lm	1900	3100	3300	5800	5500	9000		
Efficacy lm/W	54	62	66	83	78	90		

Features ● Dispersive-coated ovoid bulb to minimise glare ● White golden light for better colour rendition outdoors ● Suitable for electronic ignitor — 1 minute hot restrike ● Ideal for post-top lanterns and roadlighting from 3-5 metre columns ● Clear lamp for accurate optical control ● Clear bulb for special fixtures, e.g. SYLVANIA "ALLEYKAT"

Discharge Lamp Product Information

Description Low Wattage High Pressure Sodium Lamps — Ovoid Coated (E) and Clear

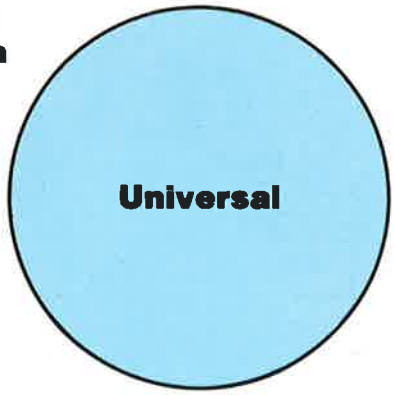
SON (SHP)

3.6.2b

Applications

- Residential Street Lighting
- Old Town Centre / Pedestrian Zones
- Parks / Gardens
- Security / Safety Lighting

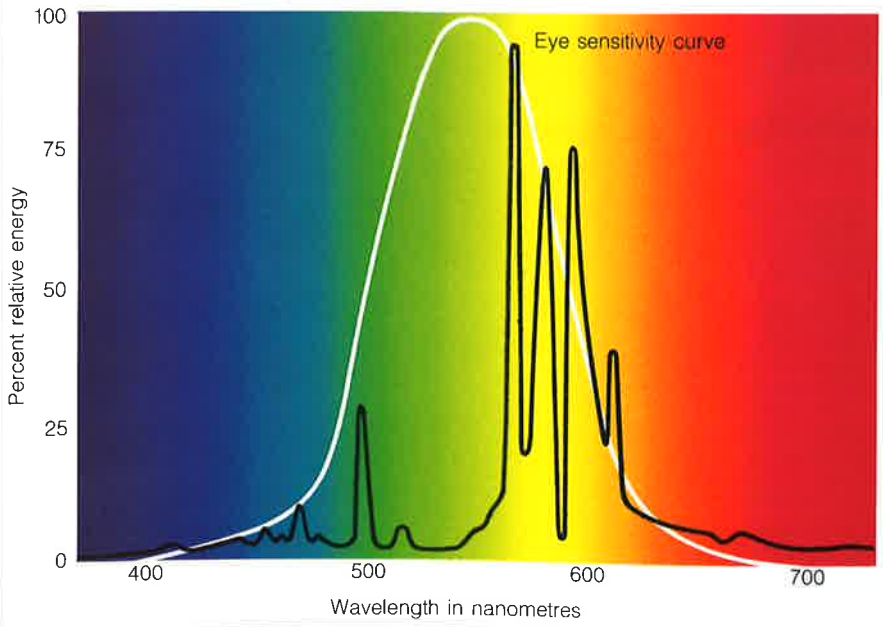
Burning Position



Electrical Data								
Lamp Rating	35 W	50 W	50 W	70 W	70 W	100 W		
Arc Tube Voltage V	85	85	85	92	92	100		
Arc Current A	0,54	0,75	0,75	1,00	1,00	1,20		
Starter Type (1)	E	E	E	E	E	E		
Peak Starting Voltage	2,3 kV	2,3 kV	2,3 kV	2,3 kV	2,3 kV	2,3 kV		
PF Capacitor mfd	6	8	8	10	10	12		
Min. Supply Voltage V (3)	190	190	190	190	190	190		

Ordering Data								
Code No	20448	20554	20556	20557	20555	20564		
Type Description	SHP35/CO/E	SHP50/CO/E	SHP50/CL/E	SHP70/CL/E	SHP70/CO/E	SHP100/40		
Packing Quantity	10	40	40	40	40	12		

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2050

x : 0,52

y : 0,42

Colour Rendering Index (ra8): 20

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) For 240V ballast.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

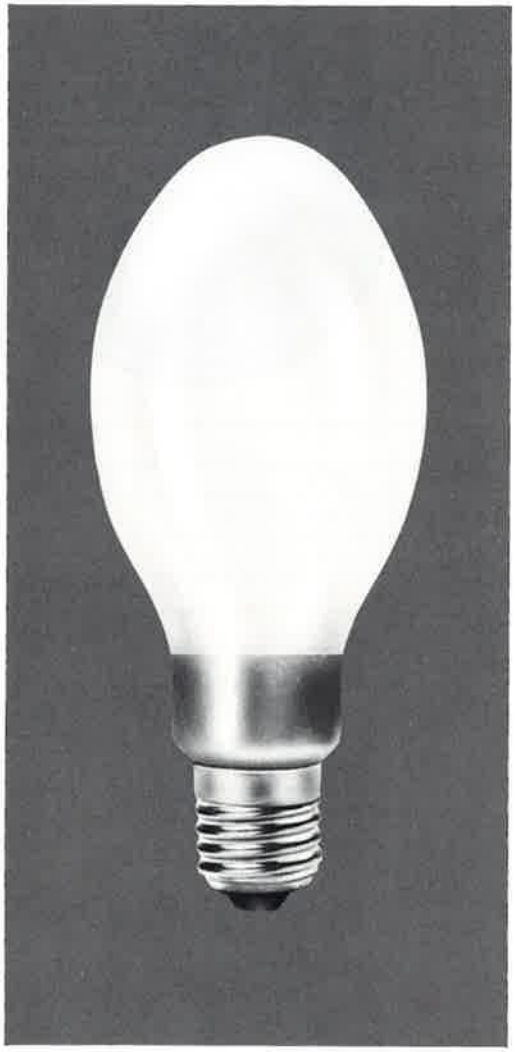
SYLVANIA GTE

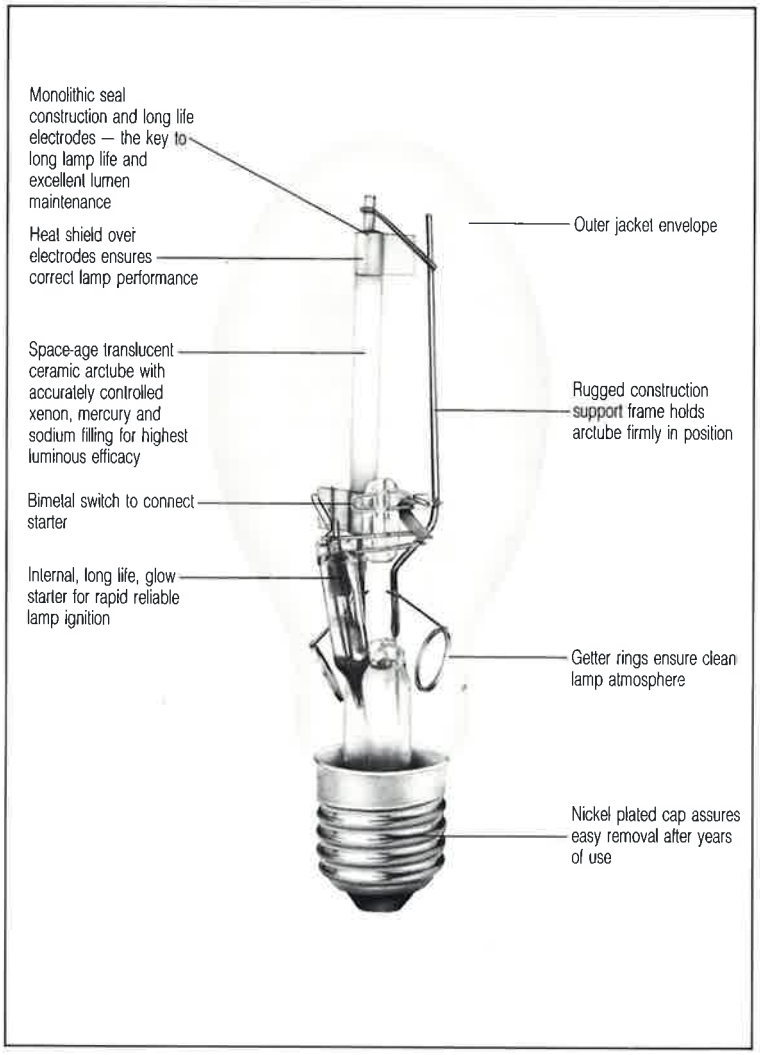
Discharge Lamp Product Information

Description Low Wattage Self-Starting High Pressure Sodium Lamps — Ovoid Coated and Clear

SON (SHP)

3.6.3a





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	50 W	50 W	70 W	70 W				
Type Description	SHP50/CO/I	SHP50/CL/I	SHP70/CO/I	SHP70/CL/I				
Mechanical Data								
Bulb Shape	Ovoid	Ovoid	Ovoid	Ovoid				
Bulb Finish	Coated	Clear	Coated	Clear				
Bulb Diameter mm	72	72	72	72				
Overall Length mm	156	156	156	156				
Arc Length mm	—	35	—	35				
Light Centre Length mm	—	105	—	127				
Cap	E27/30	E27/30	E27/30	E27/30				
Illumination Characteristics								
Light Output (2000 hr) lm	3100	3200	5500	5700				
Efficacy lm/W	62	64	79	81				

Features

- Choice of clear or dispersive-coated ovoid bulb to minimize glare
- White golden light for better colour rendition outdoors
- Built-in starter to simplify control circuit
- Ideal for post-top lanterns and road lighting from 3-5 metre columns

Description Low Wattage Self-Starting High Pressure Sodium Lamps — Ovoid Coated and Clear

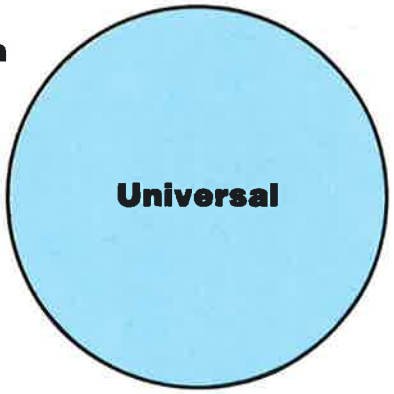
SON (SHP)

3.6.3b

Applications

- Residential Street Lighting
- Old Town Centre / Pedestrian Zones
- Parks / Gardens
- Security / Safety Lighting

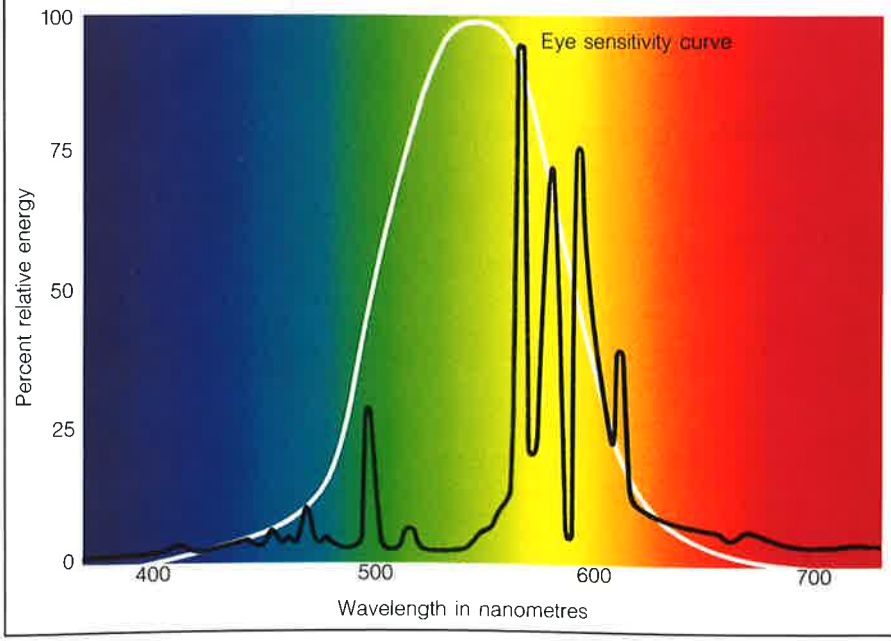
Burning Position



Electrical Data								
Lamp Rating	50 W	50 W	70 W	70 W				
Arc Tube Voltage V	85	85	92	92				
Arc Current A	0,75	0,75	1,00	1,00				
Starter Type (1)	I	I	I	I				
Peak Starting Voltage	2,3 kV	2,3 kV	2,3 kV	2,3 kV				
PF Capacitor mfd	8	8	10	10				
Min. Supply Voltage V	200	200	200	200				

Ordering Data								
Code No	20550	20552	20551	20553				
Type Description	SHP50/CO/I	SHP50/CL/I	SHP70/CO/I	SHP70/CL/I				
Packing Quantity	40	40	40	40				

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2050

x : 0,52

y : 0,42

Colour Rendering Index (ra8): 20

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) Hot restrike delay for type "I" lamps - 5/6 minutes

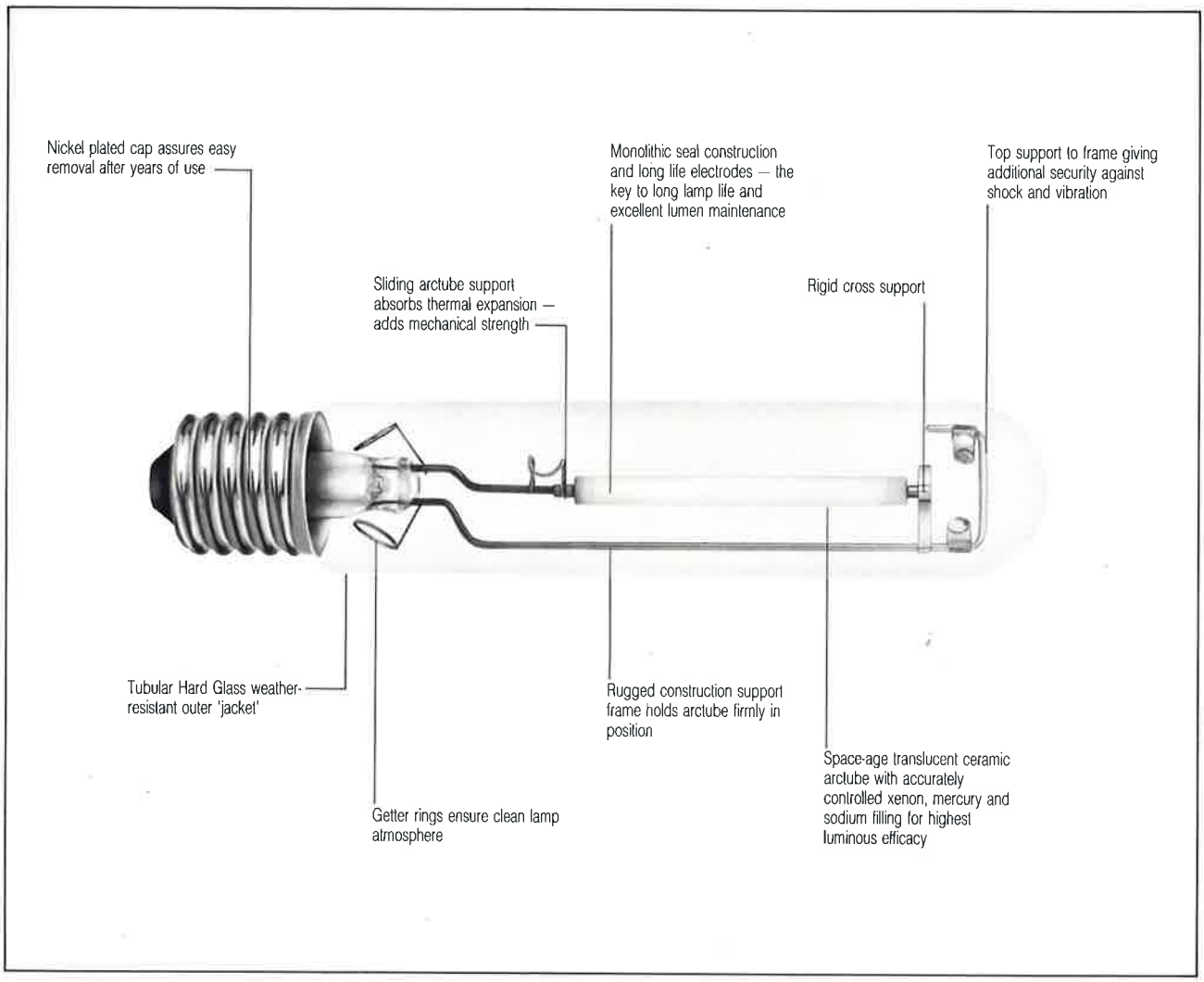
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

Discharge Lamp Product Information

Description High Pressure Sodium Lamps — Clear Tubular

SON-T (SHP/T)

3.7.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	150 W	250 W	400 W					
Type Description	SHP-T/150	SHP-T/250	SHP-T/400					
Mechanical Data								
Bulb Shape	Tubular	Tubular	Tubular					
Bulb Finish	Clear	Clear	Clear					
Bulb Diameter mm	48	48	48					
Overall Length mm	209	257	283					
Arc Length mm	58	75	90					
Light Centre Length mm	132	158	175					
Cap	E40/45	E40/45	E40/45					
Illumination Characteristics								
Light Output (2000 hr) lm	14000	25000	46500					
Efficacy lm/W	93	100	116					

Features

- High energy-efficiency light sources (up to 130 LPW)
- Ideal for floodlighting luminaires and super-critical photometric fixture designs
- Suitable for electronic ignitors — 1 minute hot restrike
- Golden white light for better colour rendition and visual clarity

Discharge Lamp Product Information

Description High Pressure Sodium Lamps — Clear Tubular

SON-T (SHP/T)

3.7.1b

Applications

- Hi-mast multi-level junction lighting
- Safety / security / amenity floodlighting
- Heavily-trafficked through-road lighting
- Hi-bay industrial indoor lighting

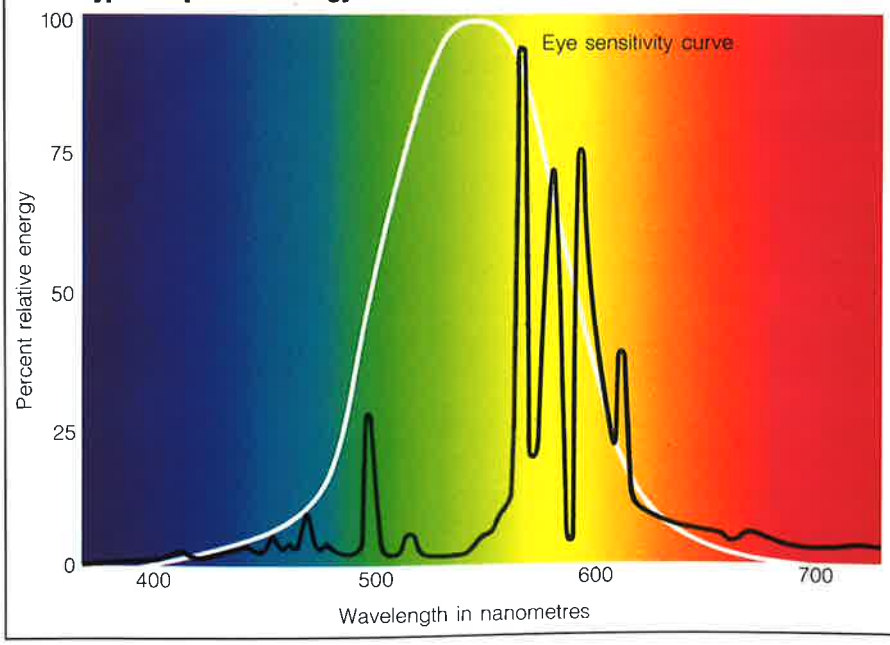
Burning Position

Universal

Electrical Data								
Lamp Rating	150 W	250 W	400 W					
Arc Tube Voltage V	100	100	105					
Arc Current A	1,80	3,00	4,45					
Starter Type (1)	E	E	E					
Peak Starting Voltage	4,5 kV	4,5 kV	4,5 kV					
PF Capacitor mfd	20	40	45					
Min. Supply Voltage V	200	200	200					

Ordering Data								
Code No	20480	20482	20485					
Type Description	SHP-T/150	SHP-T/250	SHP-T/400					
Packing Quantity	12	12	12					

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2050

x : 0,52

y : 0,42

Colour Rendering Index (ra8): 25

Special Notes (1) AUX = Auxilliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC 662.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

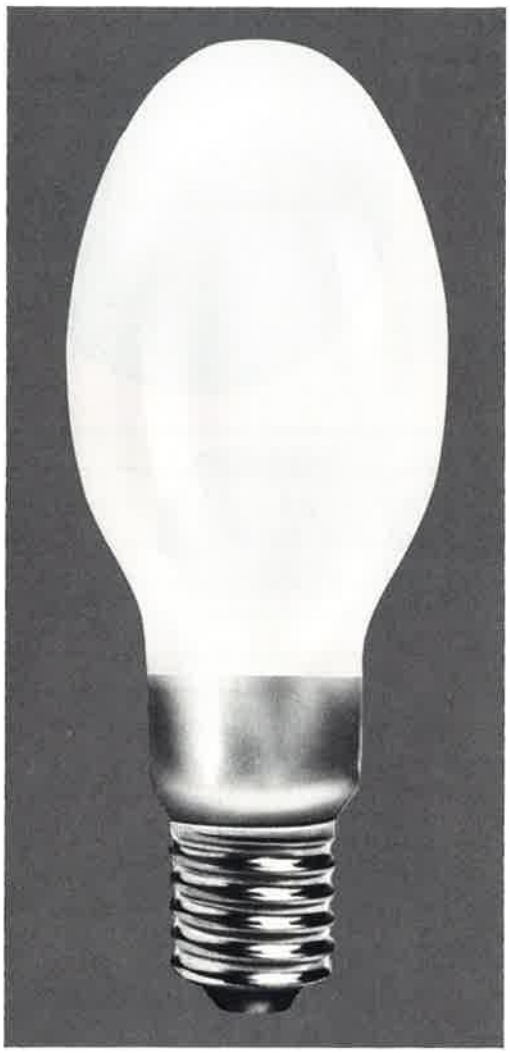
SYLVANIA GTE

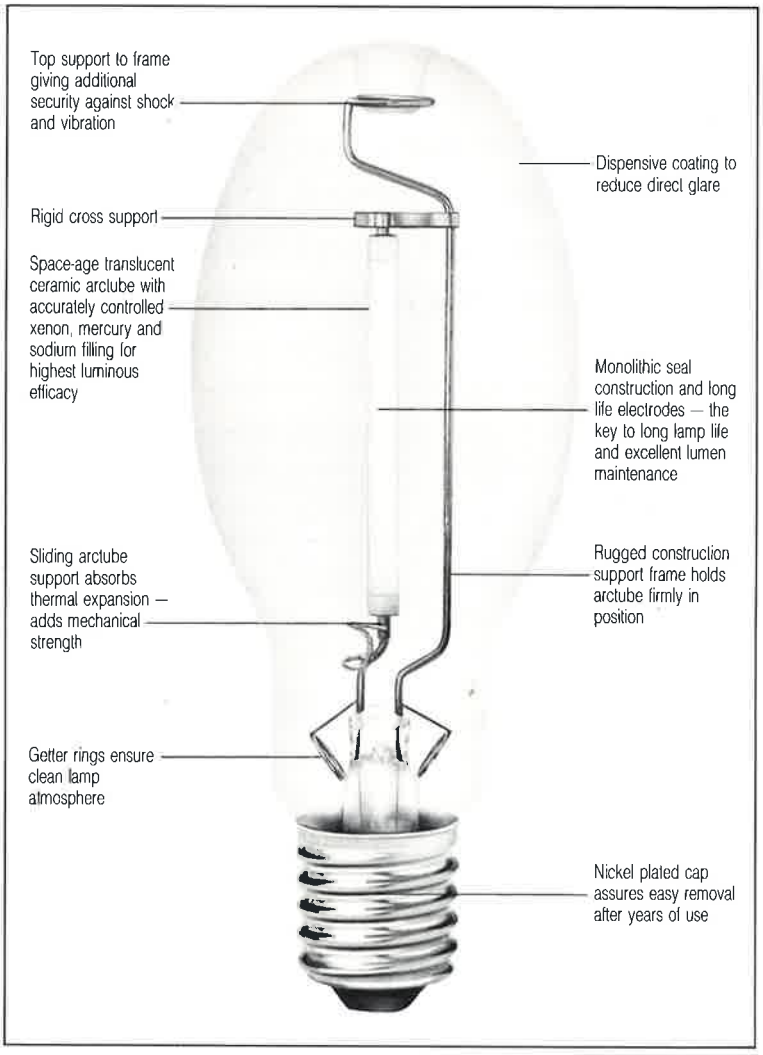
Discharge Lamp Product Information

Description High Pressure Sodium Lamps — Ovoid Coated

SON (SHP)

3.7.2a





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	150 W	250 W	400 W					
Type Description	SHP 150	SHP 250	SHP 400					
Mechanical Data								
Bulb Shape	Ovoid	Ovoid	Ovoid					
Bulb Finish	Coated	Coated	Coated					
Bulb Diameter mm	91	91	122					
Overall Length mm	226	226	292					
Arc Length mm	—	—	—					
Light Centre Length mm	—	—	—					
Cap	E40/45	E40/45	E40/45					
Illumination Characteristics								
Light Output (2000 hr) lm	13500	24000	45000					
Efficacy lm/W	90	96	112					

Features
- High energy-efficient light sources (up to 118 LPW)
- Ideal for roadlighting fixtures
- Coated dispersive bulb to minimise glare
- Golden white light for better colour rendition and visual clarity
- Suitable for electronic ignitor — 1 minute hot restrike

SYLVANIA GTE

Discharge Lamp Product Information

Description High Pressure Sodium Lamps — Ovoid Coated

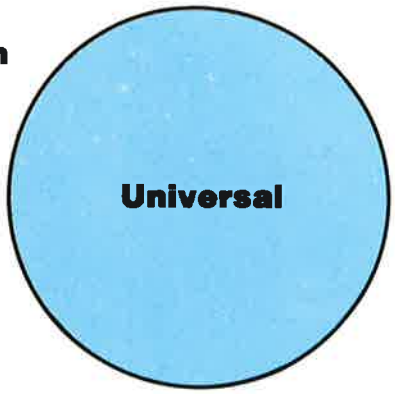
SON (SHP)

3.7.2b

Applications

- Heavily trafficked road lighting in towns
- Pedestrian crossings
- Floodlighting of stockyards, railway yards, docks, monuments
- Industrial workshops of all types

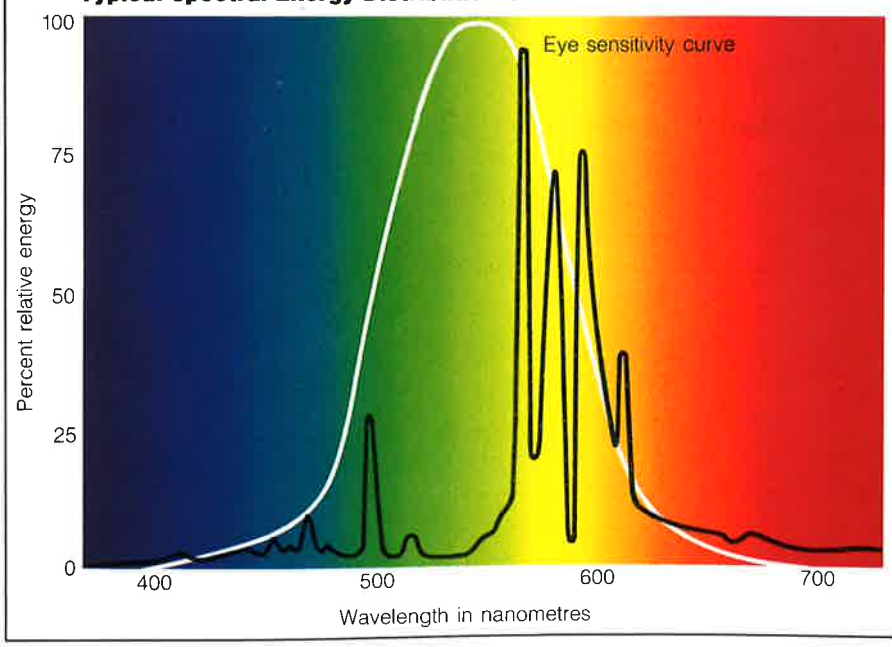
Burning Position



Electrical Data								
Lamp Rating	150 W	250 W	400 W					
Arc Tube Voltage V	100	100	105					
Arc Current A	1,80	3,00	4,40					
Starter Type (1)	E	E	E					
Peak Starting Voltage	4,5 kV	4,5 kV	4,5 kV					
PF Capacitor mfd	20	40	45					
Min. Supply Voltage V	200	200	200					

Ordering Data								
Code No	20479	20481	20484					
Type Description	SHP 150	SHP 250	SHP 400					
Packing Quantity	12	12	12					

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2050

x : 0,52

y : 0,42

Colour Rendering Index (ra8): 25

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC 662 as relevant.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

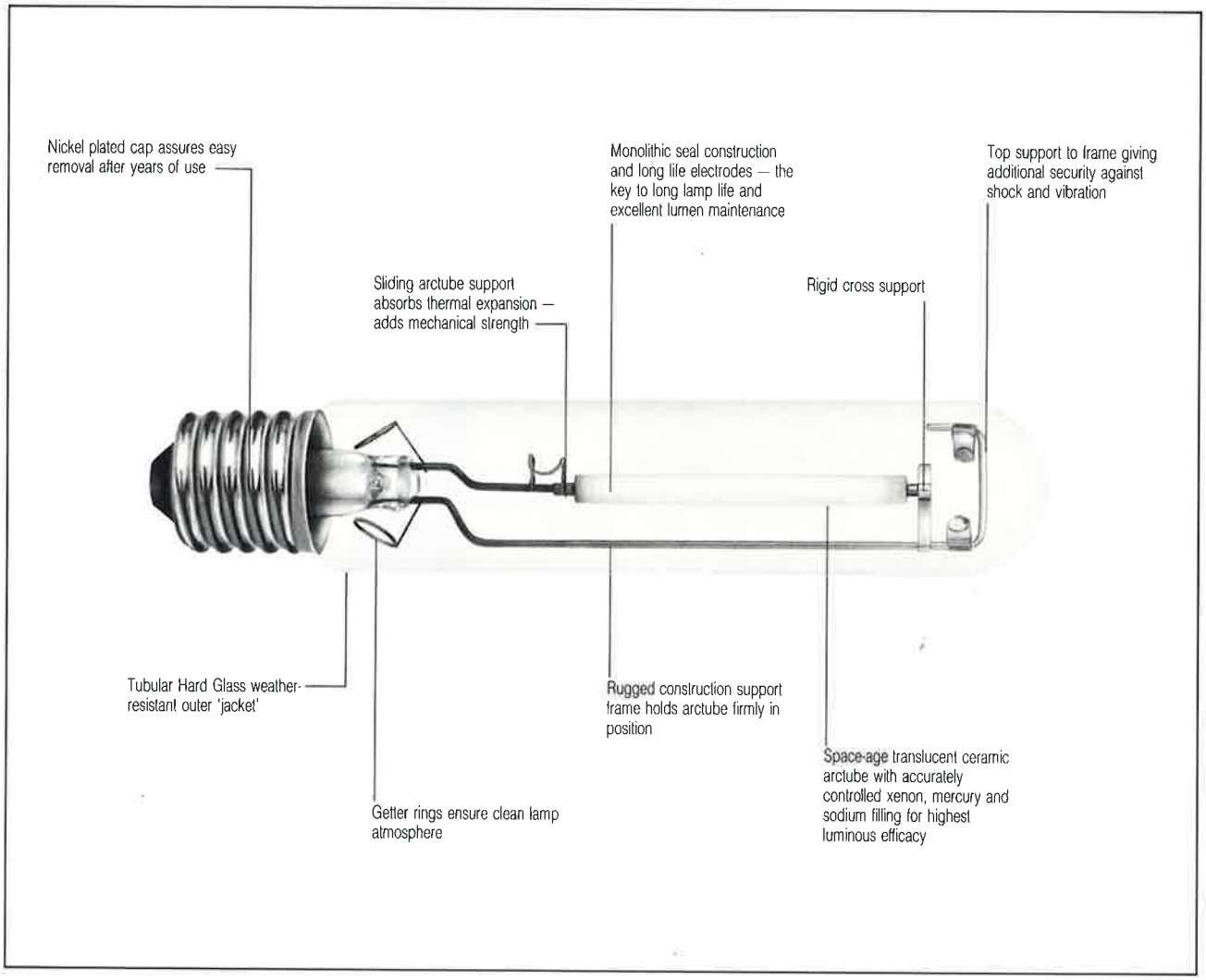
SYLVANIA GTE

Discharge Lamp Product Information

Description High Colour Rendering High Pressure Sodium Lamps
"Colour-Deluxe"

SON DL-T (SHP/T HCR

3.7.



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	250 W	400 W						
Type Description	SHP-T/250W-E	SHP-T/400W-E						
Mechanical Data								
Bulb Shape	Tubular	Tubular						
Bulb Finish	Clear	Clear						
Bulb Diameter mm	48	48						
Overall Length mm	257	295						
Arc Length mm	75	90						
Light Centre Length mm	158	175						
Cap	E40/45	E40/45						
Illumination Characteristics								
Light Output (2000 hr) lm	22500	39000						
Efficacy lm/W	90	97						

Features
- Enhanced colour rendering versus standard High Pressure Sodium — Sunlight at night and indoors
- Operates on standard High Pressure Sodium control gear
- Fully replaces standard SHP/T lamps

Discharge Lamp Product Information

Description High Colour Rendering High Pressure Sodium Lamps — Clear Tubular
"Colour de Luxe"

SON DL-T (SHP/T HCRI)

3.7.3b

Applications

- High quality indoor commercial / Industrial lighting
- Indoor office lighting by uplighters
- Prestige high mast lighting for city centres
- Flood lighting of architecturally important locations

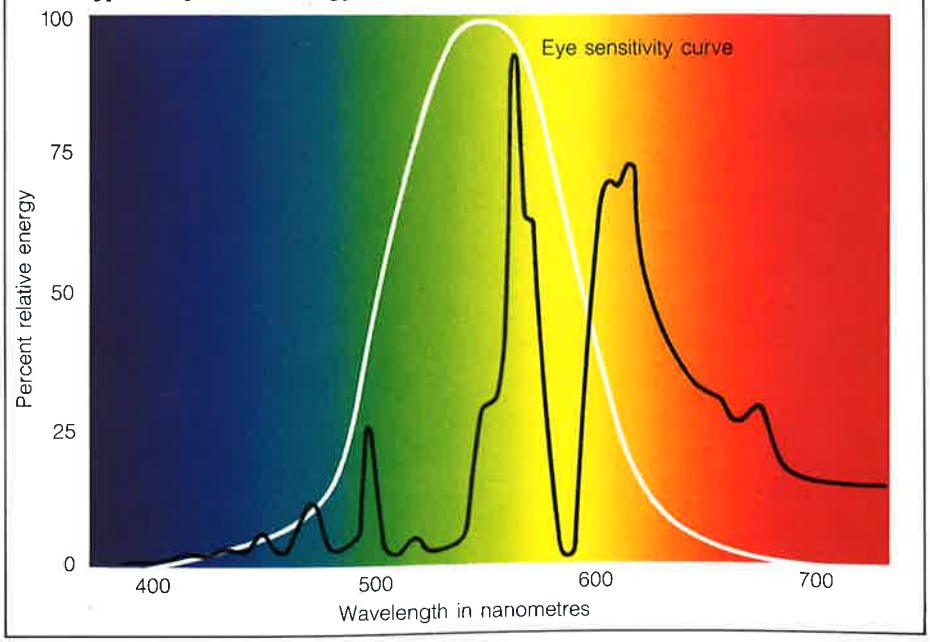
Burning Position

Universal

Electrical Data									
Lamp Rating	250 W	400 W							
Arc Tube Voltage V	95(−10, +20 V)	95(−10, +20 V)							
Arc Current A	3,10	4,60							
Starter Type (1)	E	E							
Peak Starting Voltage	4,5 kV	4,5 kV							
PF Capacitor mfd	36	45							
Min. Supply Voltage V	200	200							

Ordering Data								
Code No	20503	20549						
Type Description	SHP-T/250W-E	SHP-T/400W-E						
Packing Quantity	12	12						

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2200

x : 0,506

y : 0,412

Colour Rendering Index (ra8): 65 Avg.

Special Notes (1) AUX = Auxilliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) Actual CRI value obtained depends on mains voltage, ballast characteristics and interaction with the fixture.

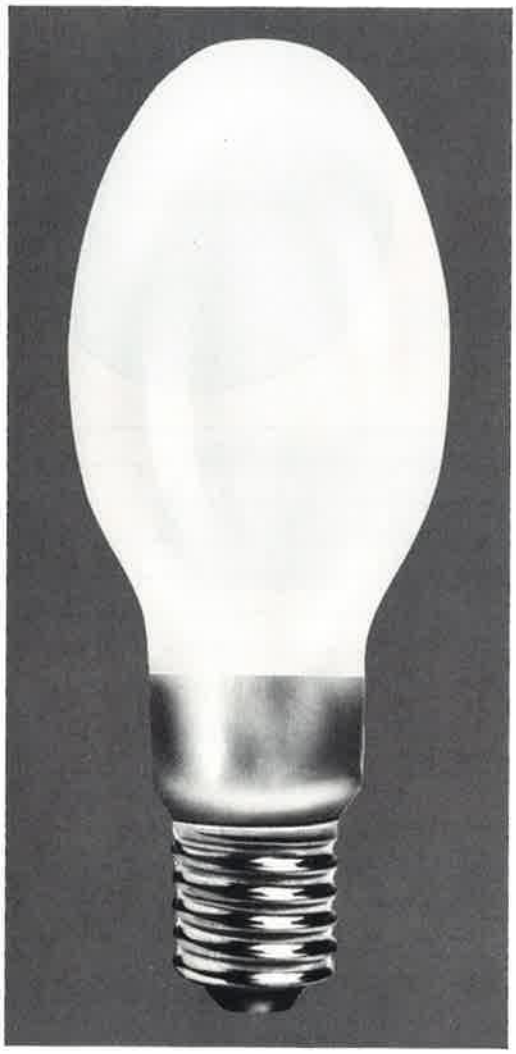
Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

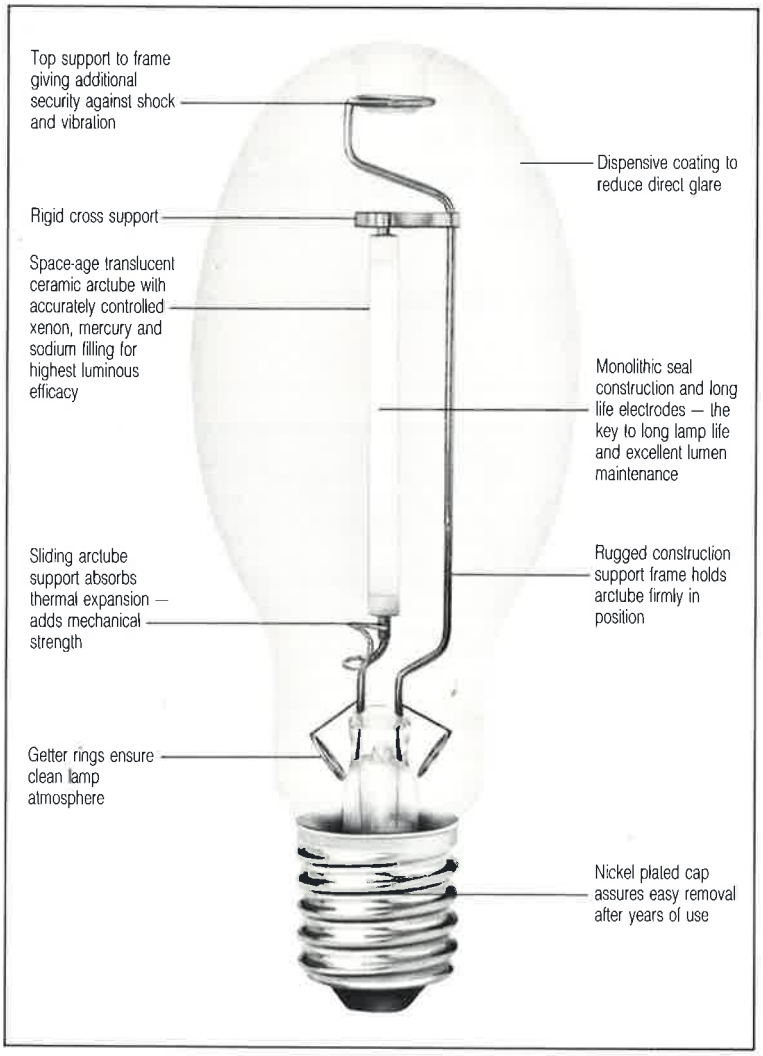
Discharge Lamp Product Information

Description High Colour Rendering High Pressure Sodium Lamps — Ovoid Coated

SON DL (SHP-HCR

3.8.





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	250 W	400 W						
Type Description	SHP 250W-E	SHP 400W-E						
Mechanical Data								
Bulb Shape	Ovoid	Ovoid						
Bulb Finish	Coated	Coated						
Bulb Diameter mm	91	122						
Overall Length mm	227	292						
Arc Length mm	—	—						
Light Centre Length mm	—	—						
Cap	E40/45	E40/45						
Illumination Characteristics								
Light Output (2000 hr) lm	22000	37000						
Efficacy lm/W	88	93						

Features ● Enhanced colour rendering versus standard High Pressure Sodium — Sunlight at night and indoors ● Operates on standard High Pressure Sodium control gear ● Fully replaces standard SHP lamps ● Coated ovoid bulb to minimize glare

Discharge Lamp Product Information

Description High Colour Rendering High Pressure Sodium Lamps — Ovoid Coated
"Colour de Luxe"

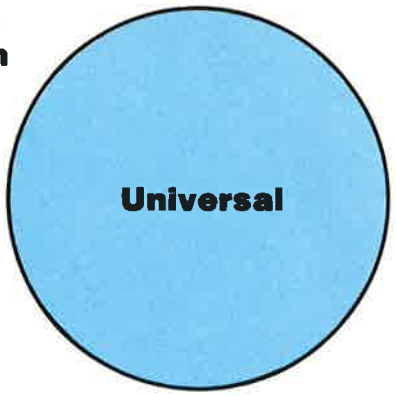
SON DL (SHP-HCRI)

3.8.1b

Applications

- High quality hi-bay industrial lighting
- Indoor office lighting by uplighters or recessed ceiling fixtures
- Prestige roadlighting for city centres

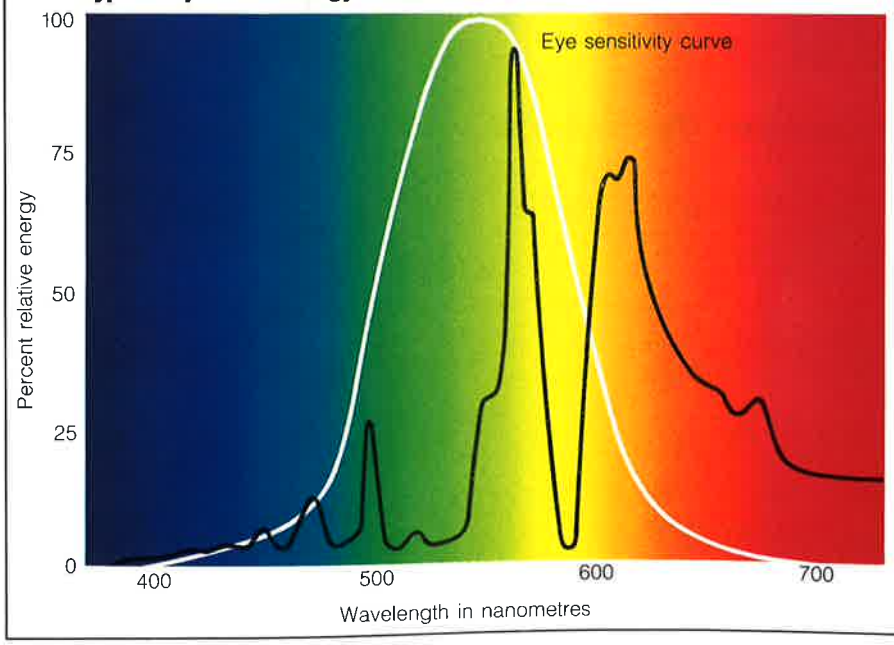
Burning Position



Electrical Data									
Lamp Rating	250 W	400 W							
Arc Tube Voltage V	95(−10, +20 V)	95(−10, +20 V)							
Arc Current A	3,10	4,60							
Starter Type (1)	E	E							
Peak Starting Voltage	4,5 kV	4,5 kV							
PF Capacitor mfd	40	45							
Min. Supply Voltage V	200	200							

Ordering Data								
Code No	20567	20548						
Type Description	SHP 250W-E	SHP 400W-E						
Packing Quantity	12	12						

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin) : 2200

x : 0,506

y : 0,412

Colour Rendering Index (ra8): 65 Avg.

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) Actual CRI value obtained depends on mains voltage, ballast characteristics and interaction with the fixture.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

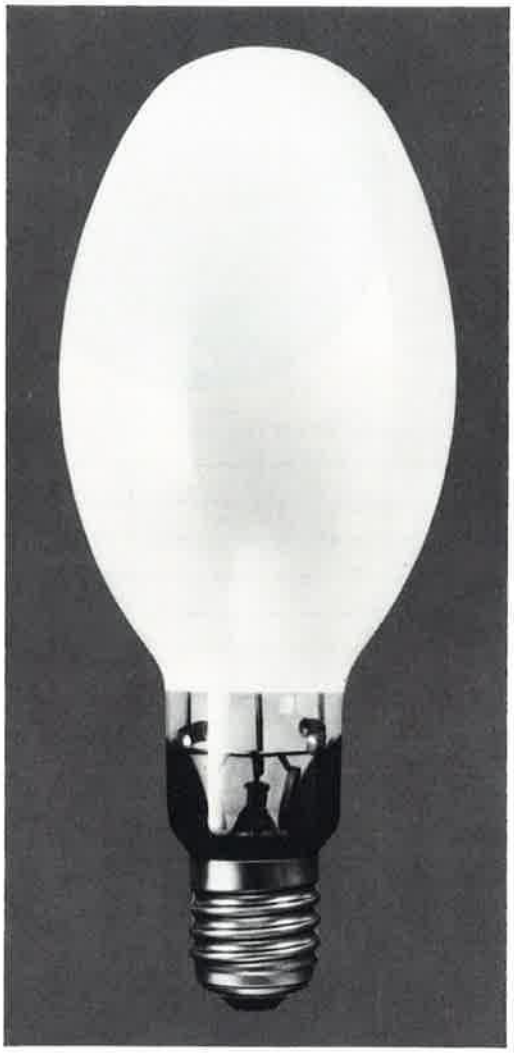
SYLVANIA GTE

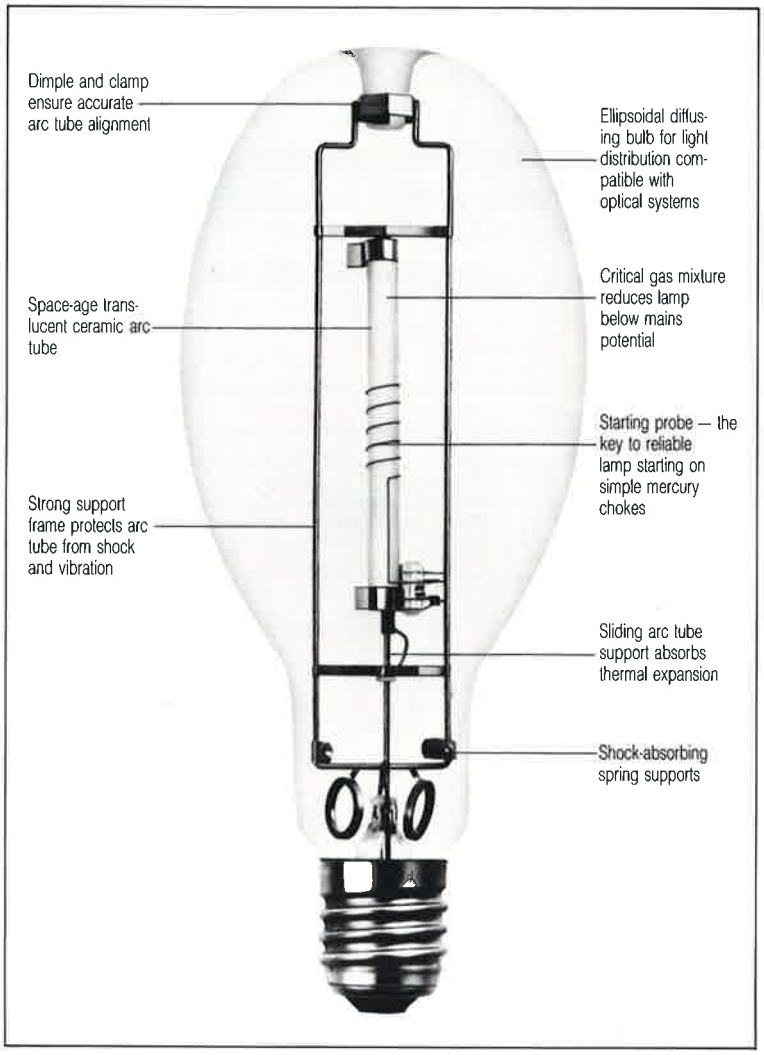
Discharge Lamp Product Information

Description SHX Plug-in High Pressure Sodium Lamps — Ovoid Coated

SHX

3.9.1a





Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	110 W	210 W	350 W					
Type Description	SHX 110 W	SHX 210 W	SHX 350 W					
Mechanical Data								
Bulb Shape	Ovoid	Ovoid	Ovoid					
Bulb Finish	Coated	Coated	Coated					
Bulb Diameter mm	76	91	122					
Overall Length mm	177 max	226 max	292 max					
Arc Length mm	—	—	—					
Light Centre Length mm	—	—	—					
Cap	E27/30	E40/45	E40/45					
Illumination Characteristics								
Light Output (2000 hr) lm	7600	17100	32300					
Efficacy lm/W	69	81	92					

Features

- Directly replaces corresponding Mercury (HSL) lamp without circuit modification
- SHX lamps provide up to 40% more light saving up to 15% in electrical power
- Photometrically compatible with Mercury lamp replaced
- Starting system which does not damage the ballast

Discharge Lamp Product Information

Description

SHX Plug-in High Pressure Sodium Lamps — Ovoid Coated

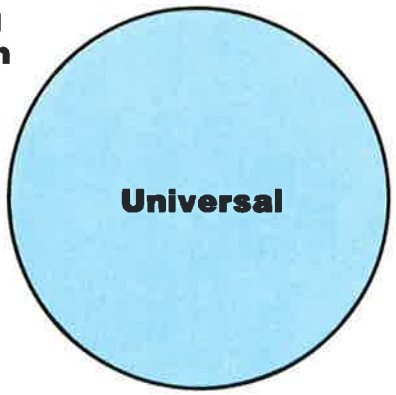
SHX

3.9.1b

Applications

- 110 W SHX replaces 125 W MBF/U
- 210 W SHX replaces 250 W MBF/U
- 350 W SHX replaces 400 W MBF/U
- Suitable for all road lighting / industrial applications using above type Mercury lamps

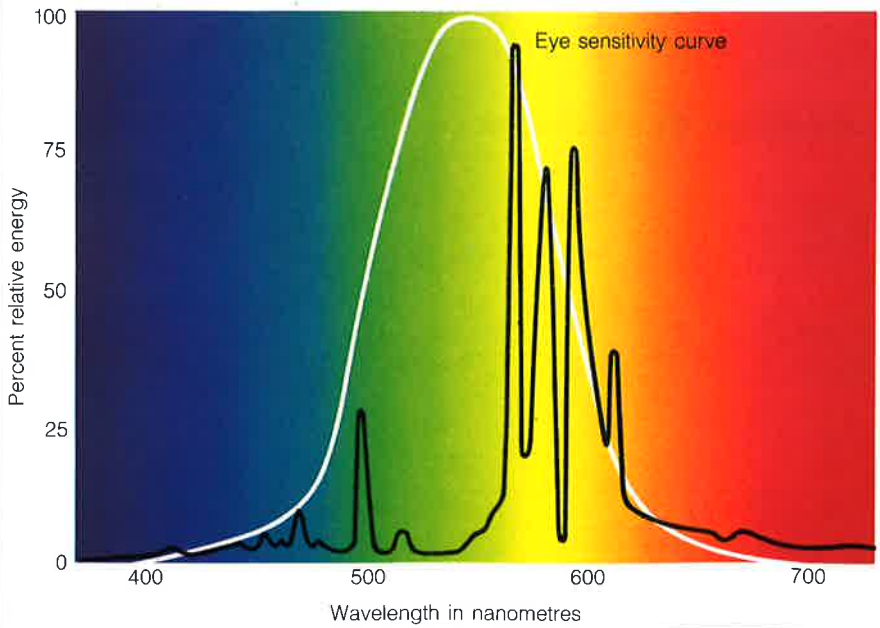
Burning Position



Electrical Data								
Lamp Rating	110 W	210 W	350 W					
Arc Tube Voltage V	110	117	117					
Arc Current A	1,15	2,25	3,65					
Starter Type (1)	I	I	I					
Peak Starting Voltage	(3)	(3)	(3)					
PF Capacitor mfd	10	18	25					
Min. Supply Voltage V (4)	190	190	190					

Ordering Data								
Code No	20560	20488	20490					
Type Description	SHX 110 W	SHX 210 W	SHX 350 W					
Packing Quantity	40	12	12					

Typical Spectral Energy Distribution Curve



Reference Colour Data

	SHX 110 W	SHX 210/ 350 W
Tc (Kelvin):	2000	2000
x :	0,546	0,527
y :	0,391	0,408
Colour Rendering Index (ra8) :	20	25

Special Notes

(1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC as relevant.
(3) Not recommended for operation on leading power factor circuits. No external high voltages during starting.
(4) For Mercury ballast at 240 V.

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

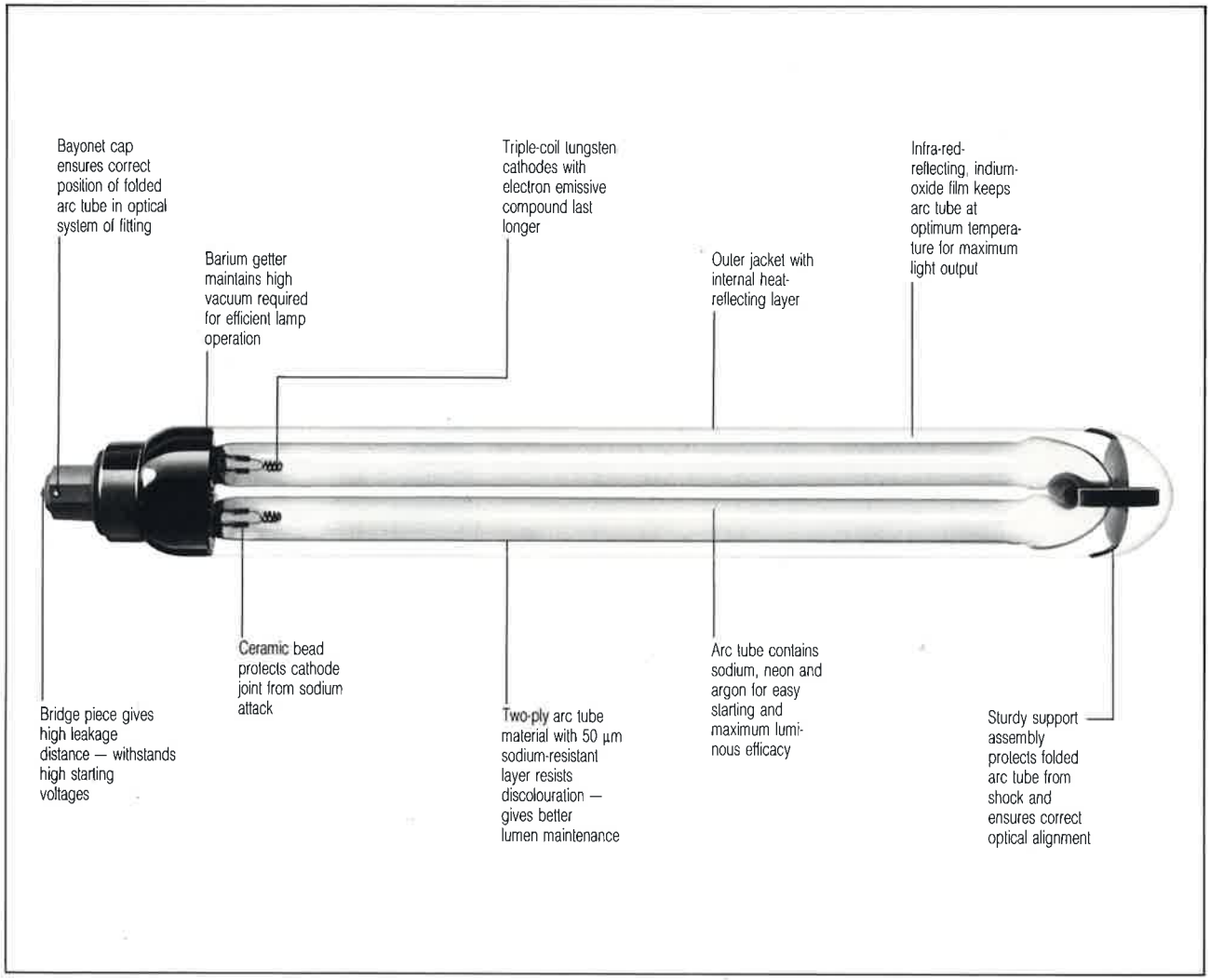
Discharge Lamp Product Information

Description

Low Pressure Sodium Lamps

SOX (SLP)

3.10.1a



Mechanical Data and Illumination Characteristics

General Information								
Lamp Rating	18 W	35 W	55 W	90 W	135 W	180 W		
Type Description	SLP 18	SLP 35	SLP 55	SLP 90	SLP 135	SLP 180		
Mechanical Data								
Bulb Shape	Tubular	Tubular	Tubular	Tubular	Tubular	Tubular		
Bulb Finish	Indium Oxide Coated	Indium Oxide Coated	Indium Oxide Coated	Indium Oxide Coated	Indium Oxide Coated	Indium Oxide Coated		
Bulb Diameter mm	54	51	51	65	65	65		
Overall Length mm	216	310	425	528	775	1120		
Arc Length (3) mm	90	196	311	408	659	1004		
Light Centre Length mm	56	170	230	280	405	575		
Cap	BY22d	BY22d	BY22d	BY22d	BY22d	BY22d		
Illumination Characteristics								
Light Output (2000 hr) lm	1750	4300	7150	12250	21200	31500		
Efficacy lm/W	97	123	130	136	157	175		

Features

- The highest efficacy discharge lamp available (up to 183 lumens/watt)
- Radiates light energy in the most effective part of the visible spectrum to enable good revealing of objects, vehicles and obstructions
- Available in 6 ratings from 18 W to 180 W

SYLVANIA GTE

Discharge Lamp Product Information

Description

Low Pressure Sodium Lamps

SOX (SLP)

3.10.1b

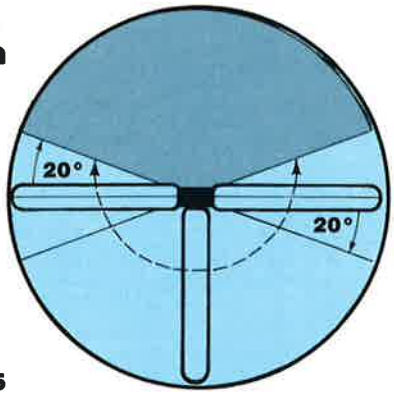
Applications

- All roadlighting applications needing maximum light on the road and minimal energy costs
- Safety and security lighting
- Pedestrian crossing lighting where the main light source is Mercury or Fluorescent

Burning Position

SLP
90
135
180
—

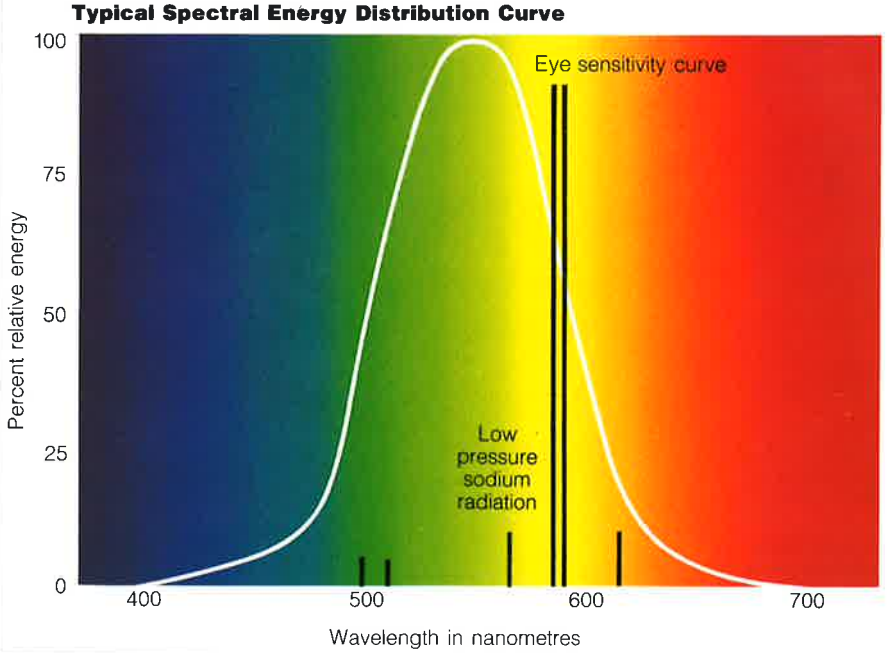
SLP 35, 55
— — — —



Electrical Data								
Lamp Rating	18 W	35 W	55 W	90 W	135 W	180 W		
Arc Tube Voltage V	57	70	109	112	164	240		
Arc Current A	0,35	0,60	0,60	0,95	0,95	0,91		
Starter Type (1)	—	—	—	—	—	—		
Peak Starting Voltage	—	—	—	—	—	—		
PF Capacitor mfd	—	20	20	26	45	40		
Min. Supply Voltage V	200	200	200	200	200	200		

Ordering Data								
Code No	20528	20495	20496	20497	20498	20499		
Type Description	SLP/18	SLP/35	SLP/55	SLP/90	SLP/135	SLP/180		
Packing Quantity	20	12	9	9	9	1		

Typical Spectral Energy Distribution Curve



Reference Colour Data

Tc (Kelvin): —

x : —

y : —

Colour Rendering Index (ra8): MONOCHROMATIC YELLOW

Special Notes (1) AUX = Auxiliary Electrode E = External Electronic I = Internal Starter
(2) Conforms to IEC 192 as relevant.
(3) Arc tube folded length

Sylvania reserves the right to change data and specifications without notice. Data for guidance only.

SYLVANIA GTE

GENERAL CONDITIONS OF SALE

1. GENERAL

a) All orders are accepted and executed on the understanding that the Purchaser is bound by the following General Conditions of Sale. Where there is any inconsistency between these General Conditions of Sale and any conditions which the Purchaser seeks to impose these General Conditions of Sale shall prevail.
b) Where there is a distributorship agreement between the Company and the Purchaser subsisting at the date of the contract and there is any conflict between the provisions of that agreement and such contract the provisions of such distributorship agreement shall prevail.
c) No waiver, alteration or modification of any of the provisions of the contract shall be binding on the Company unless in writing signed by one of its officers.

2. QUOTATIONS AND PRICES

a) A quotation will normally remain open for acceptance for a period of 14 days from the date of quotation. However the Company reserves the right to refuse the purchaser's acceptance of any quotation.
b) The published prices of and the discounts applicable to the Company's products are those ruling on the date of publication and are subject to alteration without notice.
c) Unless specifically stated to the contrary all quoted prices are exclusive of Value Added Tax which will be charged at the rate operative at the date of delivery.

3. PAYMENT

a) Unless otherwise agreed in writing payment in full is due in respect of goods delivered (whether comprising the whole or part of any order) by the end of the calendar month following that in which the goods are delivered.
b) The company shall have the right to discontinue delivery and also at its discretion to determine the contract in respect of any undelivered goods if the purchaser defaults in payment but in either event the purchaser shall remain liable to pay for such goods as have already been delivered.
c) This Company reserves the right to withhold the supply of goods which have been accepted on order in those instances where there is reason to believe that payment for the goods would not be forthcoming within these terms of trading if goods were supplied.
d) New accounts – where a credit account is desired a bank reference and two trade references are required.
e) The Company reserves the right to charge interest on overdue accounts at the rate of 4% per annum above base lending rate.

4. PACKING AND CARRIAGE

a) Unless otherwise specified by the Company goods are delivered carriage paid on the mainland only on orders over the minimum stated in our discount structure. When special delivery arrangements are requested the difference in cost between standard and special delivery will be charged to the purchaser.
b) A charge for delivery may be made where the Company is requested to deliver to a third party on behalf of the purchaser at his request.
c) By prior arrangement with our Head Office, goods can be collected by purchasers.
d) A signature by an employee of the consignee on a carrier's delivery sheet or delivery note shall constitute proof of delivery.
e) If by reason of instructions or lack of instructions from the purchaser despatch in accordance with the contract is delayed for more than 14 days after the purchaser has been notified that the goods are ready for despatch, the purchaser shall be liable to take delivery or arrange for storage and for the purposes of Clause 3 (Payment) the goods shall thereupon be deemed to have been delivered. If and for so long as its storage facilities permit (but without being obliged to) the Company may store the goods and the purchaser shall be liable to pay a reasonable charge therefor.

5. LOSS OR DAMAGE IN TRANSIT

a) Clear receipts should be given only if goods have been examined, as an unqualified signature may react to the disadvantage of the purchaser if the consignment should become the subject of a claim. No claim in respect of short delivery or damage in transit will be accepted unless the Company and its carriers are advised in writing within 7 days of receipts of the goods, irrespective of condition of packing, goods and packing should be held for inspection by the Company and its carriers before return. After inspection the Company will arrange for the goods to be collected. The following details should be sent to the Company:

Advice Note Number
Carrier's name (if other than the Company)
Condition of packages
Date consignment received
Date carrier advised
Extent of damage or shortage

In the event of non-delivery, carriers and the Company should be advised within three days of date of invoice. The Company will not be responsible for goods lost or damaged in transit unless the above conditions are observed.

6. DELAY IN DELIVERY

Delay in delivery or, in the case of a contract for delivery by instalments, delay in the delivery of an instalment, shall not give rise to any liability on the Company, whether or not any time or date is given in this respect, unless a guarantee of delivery has been given in writing by the Company expressly stating that the Company guarantees delivery within a specified time.

7. RISK AND PROPERTY

a) Subject to the purchaser complying with the provisions of Clause 5, risk in the goods shall only pass to the purchaser upon delivery to him by the Company or its carriers or upon his collecting the goods from the Company.
b) The property and ownership of any goods collected by or delivered to a Purchaser shall not pass to the Purchaser until payment in full has been received for the same by the Company. In the event of the Purchaser's default the Company expressly reserves the right to rescind the sale and the Purchaser shall deliver up the goods to the Company.

8. DEFECTS AFTER DELIVERY

a) The Company will make good by repair or, at the Company's option, by the supply of replacements, defects which, under proper use, appear in the goods after delivery within the product guarantee period stated in our current published catalogue and which arise solely from faulty design (other than a design made, furnished or specified by the Purchaser for which we have disclaimed responsibility in writing), materials or workmanship provided the goods concerned have been stored and used in a proper manner and have been returned to our stores carriage paid and adequately packed and provided further that in respect of parts or components not of the Company's manufacture, the Company will pass on to the purchaser the benefit of any guarantee which the Company may have received from the supplier of such parts or components but will have no further or other liability in respect thereof whatsoever. Save as aforesaid and as provided in Clauses 5 and 6 the Company shall not be under any liability in respect of defects in goods delivered or for any injury, damage or loss whatsoever resulting directly or indirectly from such defects or from any work done in connection therewith and its liability under this clause, shall be in lieu and to the exclusion of liability under all warranties and conditions whether express, implied or statutory and whether written or verbal.

b) Goods returned as defective but found on inspection to be in good order will be returned to the purchaser subject to a handling charge of:

£0.50 per unit with a nett purchase price of more than £5.00.
£0.10 per unit with a nett purchase price of more than £0.50 but less than £5.00
£0.01 per unit for units with a nett purchase price of less than £0.50.

c) Units out of guarantee or those used outside an approved manner will normally be scrapped unless the Company has had specific disposal instructions.
Where a specific test report is required, this must be requested in writing prior to the goods being returned.

9. RETURN OF GOODS

a) In no circumstances may goods supplied against a firm order be returned without the purchaser having first applied for and obtained the written consent of the Company. A handling charge amounting to not more than 10 per cent of the invoice value of the returned goods may be deducted from any credit allowed unless the goods are returned pursuant to the provisions of Clauses 5 and 8 hereof or because of any error on the part of the Company.

DESCRIPTIVE MATTER AND ILLUSTRATIONS

All descriptive and forwarding specifications, drawings and particulars of weights and dimensions issued by the Company are approximate only, and are intended only to present a general idea of the goods to which they refer and shall not form part of any contract. The right is reserved to change specifications without prior notification or public announcement.

11. PATENTS

a) In the event of any claim being made or action being brought against the purchaser in respect of infringement of patents by the use or sale of goods supplied hereunder, the purchaser shall not settle or compromise such claim or action but shall notify the Company immediately and the Company shall be at liberty with Purchaser's assistance if required, but at the Company's expense, to conduct through the Company's own Lawyers and Experts all negotiations for the settlement of the same or any litigation that may arise therefrom, subject to compliance with the above provisions and provided that no such goods, or any part thereof shall be used for any purpose other than that for which the Company supply them, the Company will indemnify the purchaser in respect of any such claims.

12. DELIVERIES AGAINST ORDER SCHEDULES

a) Orders on non-standard lines (including specially branded units) will be delivered to within plus or minus 10% of order quantity.
b) On standard lines the Company requires 6-8 weeks notice of a change in requirements where a delivery date is brought forward or a quantity amended.
c) On non-standard lines (including specially branded units) the Company requires 8-12 weeks notice of change in requirements where a delivery date is brought forward or quantity amended.
d) Scheduled quantities may be subject to a variation where necessary to bring them into line with the nearest boxed quantity.

13. EXPORT

Goods purchased on the Home Market must not without the written consent of the Company be offered or sold for Export outside the Europe Economic Community and any enquiries or orders for such export must be placed directly with the Export Department of the Company with indication of the Country of Destination.

14. EXCLUSIONS

Save as provided by these General Conditions and save for the Company's implied undertakings as to title etc. contained in S.12 of the Sale of Goods Act 1893 all conditions and warranties express or implied, statutory or otherwise and, except as provided in S.2 of the Unfair Contract Terms Act 1977 (liability for death or personal injury resulting from negligence) all other obligations and liabilities whatsoever of the Company whether in contract or in tort or otherwise are excluded.

15. DIRECT, INDIRECT OR CONSEQUENTIAL LOSS OR DAMAGE

Except as provided in S.2 of the Unfair Contract Terms Act 1977 (liability for death or personal injury resulting from negligence), the Company accepts no responsibility in any circumstances for any direct, indirect or consequential loss or damage, however arising, which the Purchaser may sustain in connection with goods supplied under the contract whether such goods are of the Company's own manufacture or not.

16. FORCE MAJEURE

a) If the performance of the contract shall be delayed by any circumstances or conditions beyond the control of the Company including (but without prejudice to the generality of the foregoing) war, industrial disputes, strikes, lock-out, riots, malicious damage, fire, storm, Act of God, accidents, non-availability or shortage of materials or labour, any statute, rule, bye-law, order or requisition made or issued by any Government or Government Department, local or other duly constituted, then the Company shall have the right to suspend further performance of the contract until such time as the cause of the delay shall no longer be present.
b) If the performance of the contract by the Company shall be prevented by any such circumstances or conditions beyond the control of the Company, then the Company shall have the right to be discharged from further performance of and liability under the contract. If the Company exercises such right the buyer shall thereupon pay the contract price less a reasonable allowance for what has not been performed by the Company.

17. ARBITRATION

Any dispute, difference or question which shall at any time arise between the parties to the contract as to the construction, meaning or affect of these Conditions of Sale or the rights and liabilities of the parties or otherwise howsoever relating thereto shall be referred to the decision of a single arbitrator to be nominated in the event of disagreement between the parties by the President for the time being of the London Chamber of Commerce and such reference shall be deemed to be an arbitration agreement within the meaning of the Arbitration Act 1950 or any statutory re-enactment thereof.

18. LAW

The contract shall be subject to and interpreted in accordance with the laws of England.

SYLVANIA GTE

Efficient Lighting Solutions