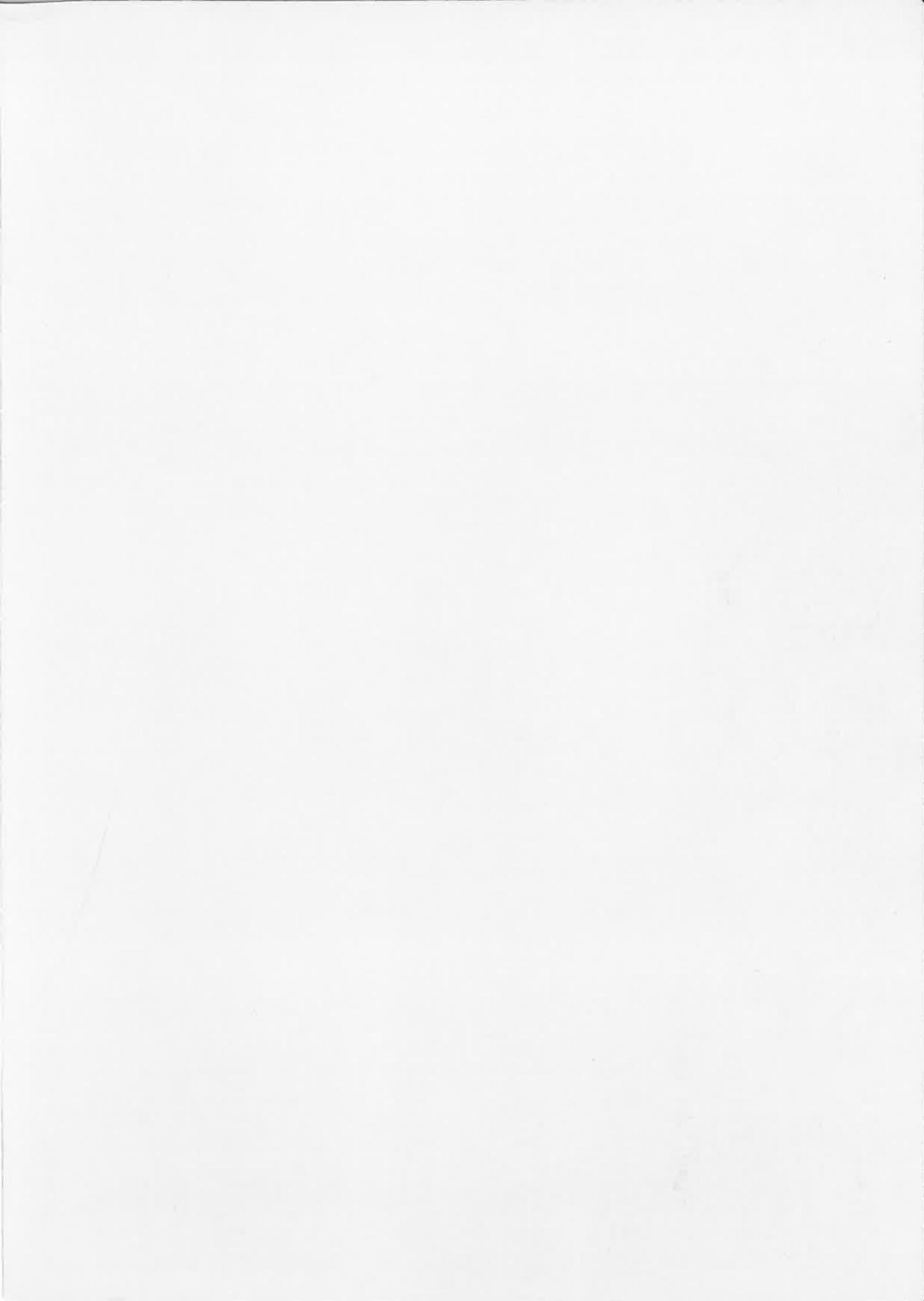


**Osram-GEC**  
**SOLARCOLOUR**

**HIGH PRESSURE SODIUM LIGHTING-  
A COMPREHENSIVE GUIDE.**



**BRINGING NEW ECONOMIES TO LIGHT**



# INTRODUCTION & CONTENTS

In the energy conscious eighties rising costs for lighting and lighting systems is a cause for ever increasing concern. Users throughout the world are in constant need of energy efficient and environmentally appropriate lighting to maximise output whilst minimising expense.

No single manufacturer has been more active in realising your needs than ourselves. Our reputation for the production of high quality, energy efficient lamps and luminaires is well known. And no more so than with our High Pressure Sodium range – Solarcolour.

Since the introduction of this radical new light source in 1966, development has been continuous and we now manufacture what is probably the largest range available anywhere in the world. This wide choice of Solarcolour lamps offers improved efficacy and colour rendering – on a more cost-effective basis than ever before.

This booklet tells the complete Solarcolour story. It shows our concern for detail, from rigorous quality control on the lamps themselves, through to the ingenuity that has gone into providing fittings to cope with a multitude of end user requirements.

The information that follows provides you with a comprehensive background from which to plan or review your lighting needs.

	Page
Quality Control in the making	4-5
Tubular Lamps and Luminaires	6-7
Solarcolour Lamps at work	8-9
Elliptical Lamps and Luminaires	10-11
Solarcolour Plus Lamps	11
Solarcolour De-Luxe Lamps and Luminaires	12-13
Linear Lamps and Luminaires	14
Reflector Lamps and Luminaires	15
Solarcolour Lamps at work	16-17
“Plug-in” Lamps	18
Starters and Control Gear	18
Luminaires Reference Data table	19
Lighting Design Service	19

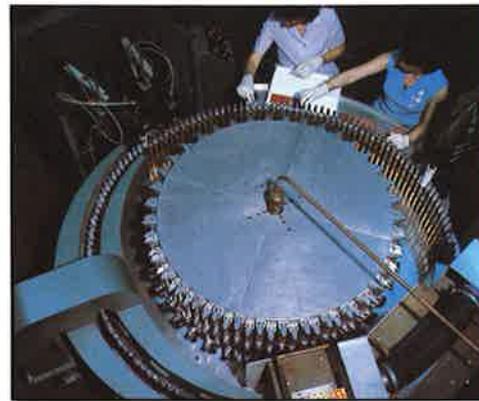
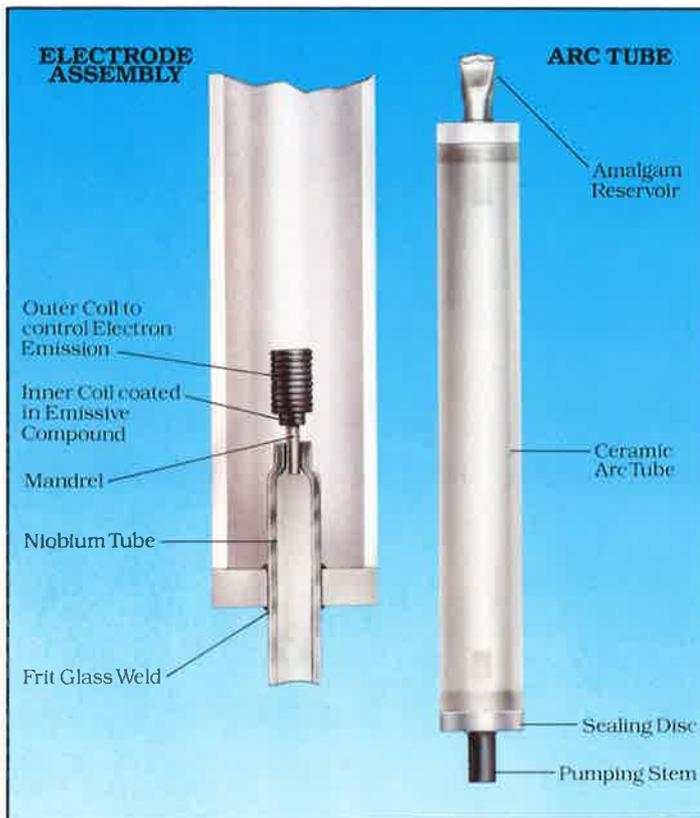
# QUALITY CONTROL IN THE MAKING

that its translucency is of a level sufficient to provide the correct lumen output.

At the same time as these checks are being carried out, the two electrodes which will provide the electrons needed to create the discharge are being assembled.

First a tungsten wire is wound into a helical coil around a mandrel, this is then crimped into the end of a niobium tube. The tungsten rod is then brazed to the niobium in an argon furnace at 1800°C using titanium braze. The coil is coated with an emissive material – an electron rich compound – to ensure that the lamp never runs short of this vital particle.

To control the emission and increase the surface area of the electrode, a second tungsten



This multi-head arc tube sealing machine automatically monitors itself to ensure consistent performance from the finished lamp.



A finished arc tube being tested for impurities using a high frequency arc.

Solarcolour lamps are produced at our manufacturing facility at Shaw, near Oldham, Lancashire.

It is here, under the direction of key experts in the high pressure sodium lighting field, that constant research and development is undertaken to ensure the highest possible product quality for end users.

Many of the techniques used in our high technology manufacturing process are a direct result of our on-site Solarcolour R&D facility. But no matter how exceptional that input may be, without critical quality control, user satisfaction cannot be guaranteed. A constant check is made on constituent parts against specification throughout the production process.

The heart of a Solarcolour lamp is the ceramic arc tube. This is checked prior to commencement of lamp manufacture to ensure

coil is screwed onto the first.

The sealing discs and electrode assemblies are now inserted into the ends of the ceramic tube and sealed into position in a high frequency furnace at 1400°C.

To ensure that perfect seals have been formed, the arc tube is tested with a helium mass spectrometer leak detector. This is prior to inserting a measured dose of an amalgam of sodium and mercury which is enclosed in a stainless steel tube. This mixture is critical to ensure both efficiency, high lumen output and long life.

At this stage, the arc tube is filled with pure xenon gas. The electrode tube is finally sealed off, using high pressure cold welding and argon arc welding.

The tube is checked with a high frequency arc to ensure total purity – the first of four such tests in the manufacturing process. The

amalgam is finally melted in yet another furnace, to bring it into the ceramic arc tube itself – which is now ready for assembly into a support frame, designed to hold it in the correct position within the glass bulb.

In order to prevent mechanical failure, all welds on the frame and electrical connections are checked to ensure elimination of stress. The nearly complete lamp is sealed, evacuated and baked prior to the cap being locked in place with high melting point solder.

Each lamp is then run for a minimum of one hour, during which time the tube voltage is monitored as a check on the final wattage of the lamp. All lamps are inspected for visual appearance and given another operational test before

being packed in impact resistant sleeves and despatched to stores.

Even at this final stage, quality control still remains a key factor.

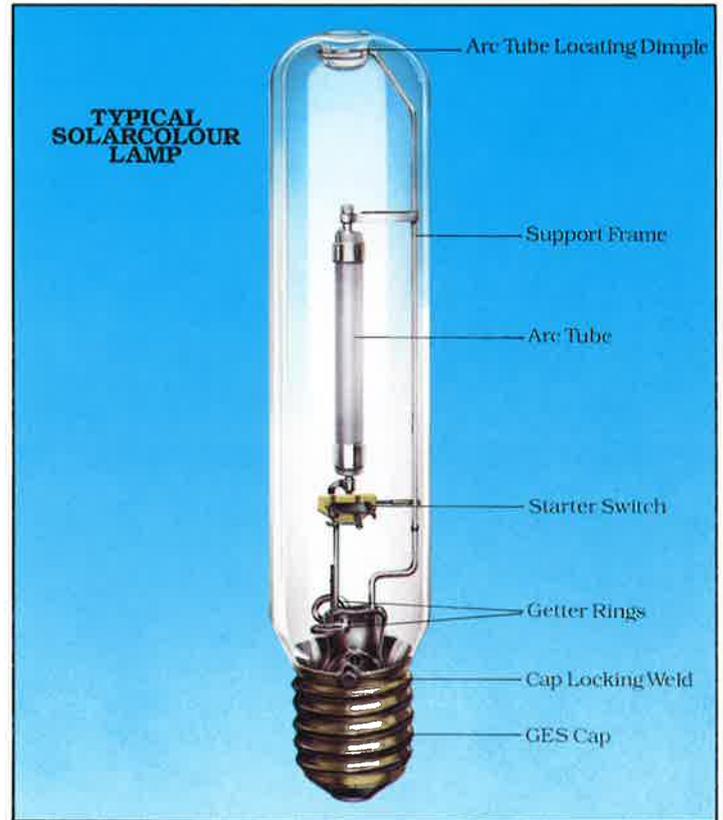
Samples from each production batch are selected at random to be subjected to stringent re-examination in the development laboratory and put on life test. Lumen measurements and electrical characteristics are measured periodically during the first 10,000 hours. The results are tabulated to produce the lumen maintenance and life survival curves illustrated below. Lamps are also monitored for life over a longer period in a variety of realistic user situations, to assess their effect on the satisfactory operation of the complete installations.



Visual inspections are carried out at every stage of assembly to ensure mechanical strength and accurate alignment of the arc tube.



Finished lamps undergoing their initial test run during which the electrical characteristics are checked.



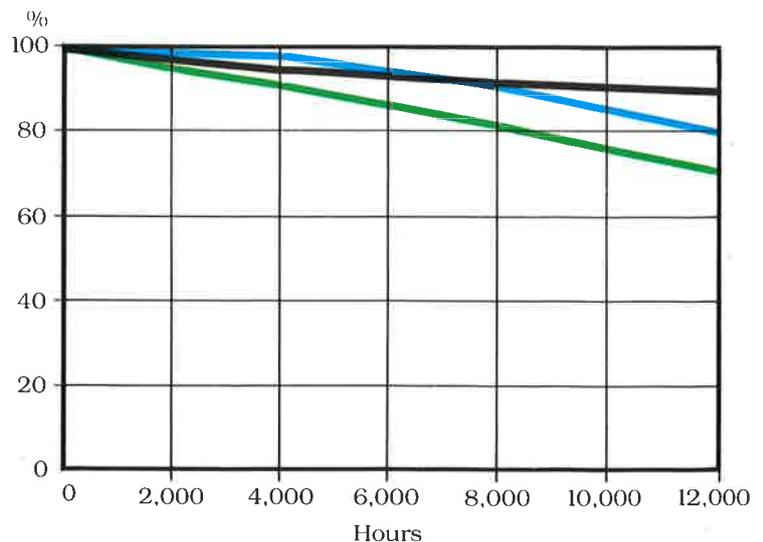
## Lumen maintenance, survivors and economy curves.

**Lumen Maintenance Curve (Black).** This curve shows the percentage of the initial lumen output remaining at various intervals up to 12,000 hours. It is the average from tests carried out on a large number of Solarcolour lamps of various types.

**Life Survival Curve (Blue).** This curve shows the average percentage of lamps surviving up to 12,000 hours – as tested in controlled laboratory conditions.

**Economic Life Curve (Green).** This curve shows the cumulative effect of the other two curves. For example, if no lamps are replaced during the first 8,000 hours then approximately 90% will still be working and providing 92% of their initial output. This would result in an installation originally operating at 400 LUX, now only providing 328 LUX or 82% of the original. This does not allow for dirt deposited on the lamp or luminaire – which would further reduce the lighting level.

A correctly designed lighting scheme should make allowances for some of these factors. This is usually achieved by applying a "Maintenance Factor" to the Lumen Method calculation.



# TUBULAR LAMPS

## Solarcolour SON-T- Efficiency with Flexibility.

The widest section of the Solarcolour range, SON-T, represents versatility combined with the highest possible lumen output. Produced with a clear outer bulb, this compact light source ensures that a very precise optical control can be provided when combined with appropriate fittings.

SON-T is a totally flexible light source, It is suitable for a variety of industrial applications



from factory and warehousing through to floodlighting, security, and perimeter lighting. It is ideal for a vast range of street lighting – from secondary roads through to high-mast and motor-way systems. And, of course, SON-T's warm golden light can be both attractive and particularly efficient for the decorative lighting and illumination of public buildings, swimming pools and so forth.

This comprehensive range has been developed with purpose designed luminaires and control gear, to ensure optimum performance in every application. Whatever the job.

### Standard Tubular Lamps\*\* (SON-T Clear)

Watts	Light Output	
	Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
120†	10,500	10,000
150	16,000	15,250
220*	24,000	22,500
250	<u>28,000</u>	<u>26,500</u>
310*	36,500	35,000
360*	42,500	40,500
400	<u>48,500</u>	<u>47,000</u>
600 w High/Low Volt	70,000	65,000
1,000 w High Volt	130,000	125,000
1,000 w Low Volt	<u>128,000</u>	<u>123,000</u>

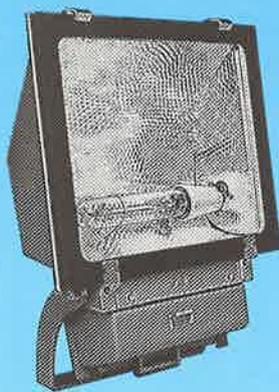
†Elliptical bulb shape

\*Plug-in versions: see page 18

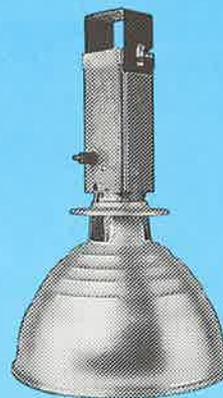
\*\*For Plus and Deluxe versions: see pages 11 & 12

Also available without internal starter.  
High volt=380-440 v  
Low volt=200-250 v

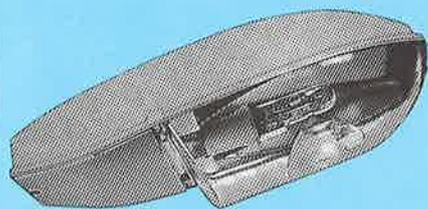
# LUMINAIRES



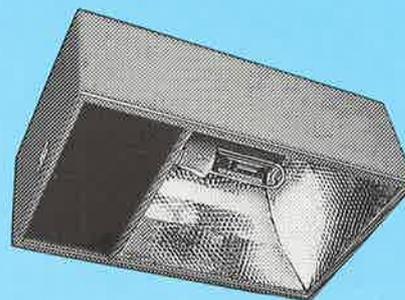
**Solarflood.** Cast aluminium high efficiency floodlights which are available with integral or remote gear as an option.



**Hi-Saver.** High bay luminaires with integral gear for easy installation and maintenance. Additional features include self-cleaning reflectors.



**Streetlighting Lantern.** Latest of our wide range of road lighting equipment, this GRP bodied lantern has been specifically designed to use tubular lamps.



**Harrier.** Developed for low mounting height applications, Harrier is easy to install and maintain, providing high efficiency lighting with low glare for comfort.

## Precise optical control from SON-T luminaires.

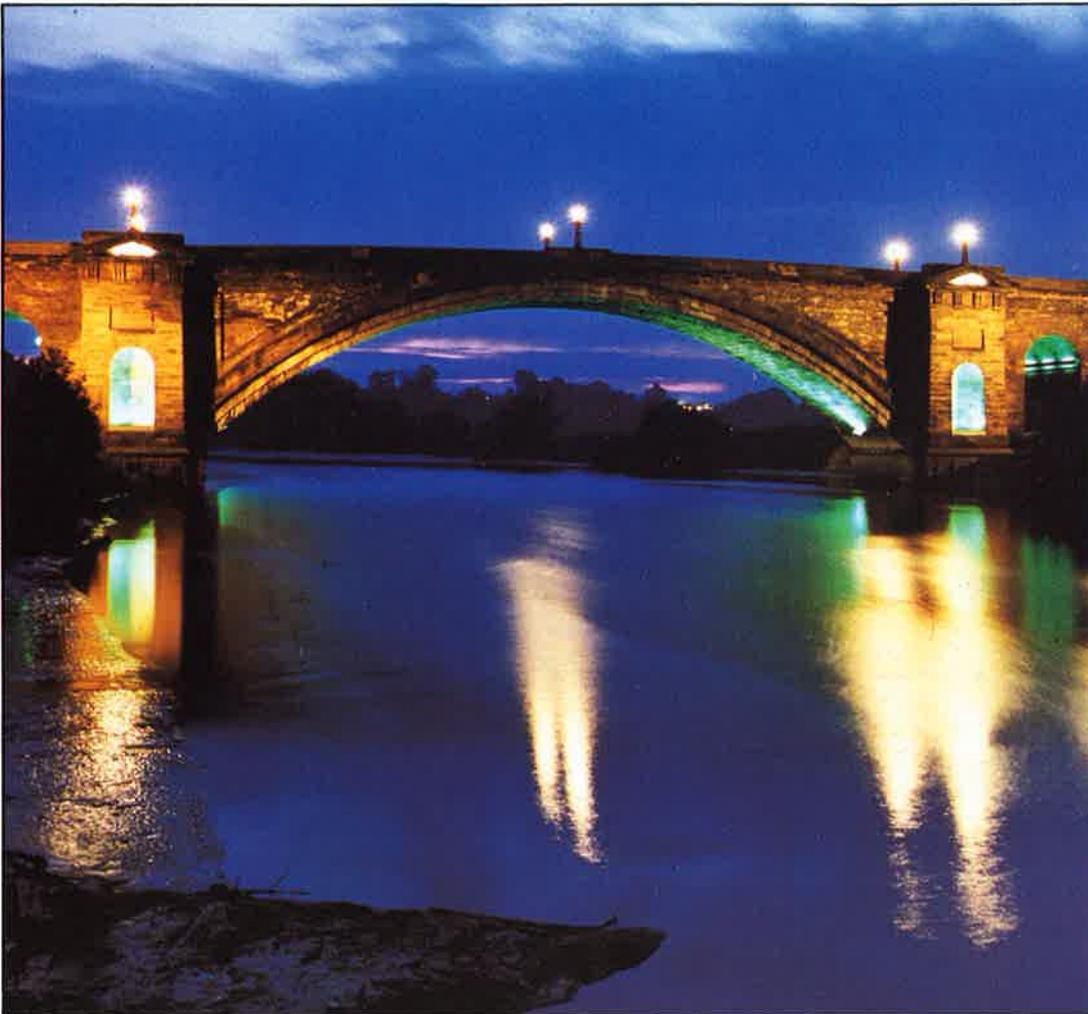
Our reputation for producing high quality lamps is only equalled by that gained for the manufacture of our extensive range of luminaires.

As with lamp production, our attention to detail in terms of quality and design is evident across the range.

All units are subjected to rigorous quality control procedures and conform to a high level of specification to ensure maximum durability and efficiency. Special features designed into our luminaires also aid rapid installation and minimise downtime during maintenance.

SON-T is suitable for a wide variety of luminaires including those for low or high bay applications, floodlighting and streetlighting.

The luminaires shown here are merely a selection of those suitable for use in conjunction with SON-T. Details, including catalogue numbers, of the range available can be found on page 19 of this booklet.



### Grosvenor Bridge, Chester.

An example of the use of Solarcolour lamps to modernise an attractive lighting installation and also to highlight an interesting architectural feature.

400W Green MBI lamps used for special effects under bridge arches.



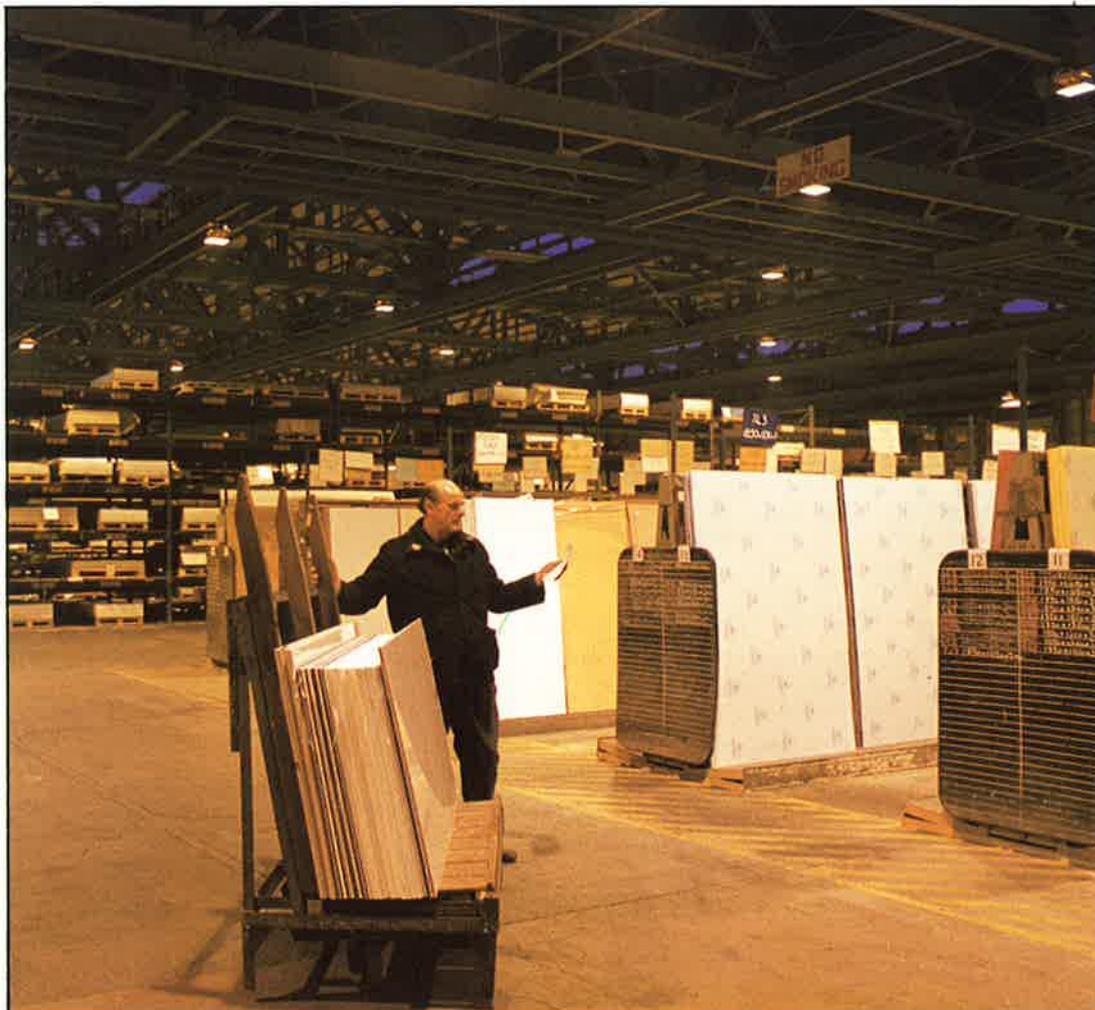
### Robinson Young Ltd, Bury St Edmunds.

This grocery wholesaler needed a high level of glare free lighting on the vertical surfaces of the merchandise, stored on the high racking to maximize space utilization. Champion luminaires with 250 watt SON-E lamps were used to provide the required effect.



### Shieldhall Sewage Works, Glasgow.

Strathclyde Regional Council use 400W SON-T Solarcolour lamps in GEC Street-lighting High Mast Lanterns. Mounted at a height of 30m for operational lighting, they provide good colour rendition and overall coverage – essential for this application.



### ICI Limited, Squires Gate, Blackpool.

The UK's largest plastic sheet manufacturers used 92 Champion luminaires with 250 watt Solarcolour Plus lamps to light this 16,000m<sup>2</sup> warehouse. This reduced the lighting load by 47% while at the same time improved the lighting level.

# ELLIPTICAL LAMPS

## Solarcolour SON-E. Providing greater efficiency from conventional luminaires.

The availability of diffused Solarcolour SON-E lamps provides you with the opportunity to benefit from associated higher levels of lighting, from luminaires primarily designed to take conventional mercury type lamps.

Solarcolour SON-E has similar optical characteristics to mercury (MBF) lamps, and can be incorporated into installations using a common range of luminaires.

Compared with mercury, Solarcolour SON-E can produce either greater performance with the same running costs or a performance equal to that achieved with MBF lamps. This results in reduced running costs achieved by the installation of lower wattage lamps.

Suitable for a wide range of industrial and floodlighting applications, Solarcolour SON-E can bring you great advantages with minimal outlay.

### Standard Elliptical Lamps\*\* (SON-E Diffused)

Watts	Light Outputs	
	Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
70	6,000	5,500
120	10,000	9,500
150	15,250	14,500
220*	22,500	20,500
250	26,000	24,500
310*	34,500	33,000
360*	40,000	38,000
400	47,000	45,000

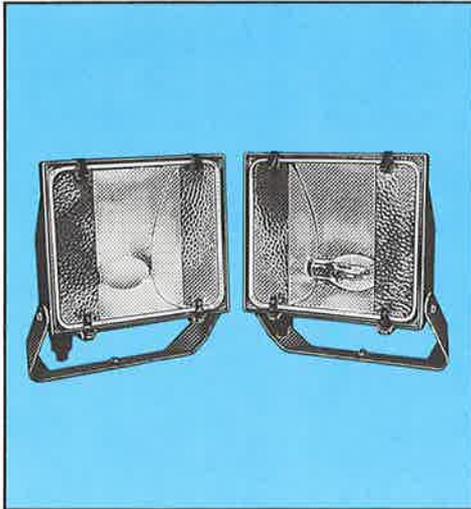
\*\*For Plus versions, see opposite.

\*Plug-in versions, see page 12.

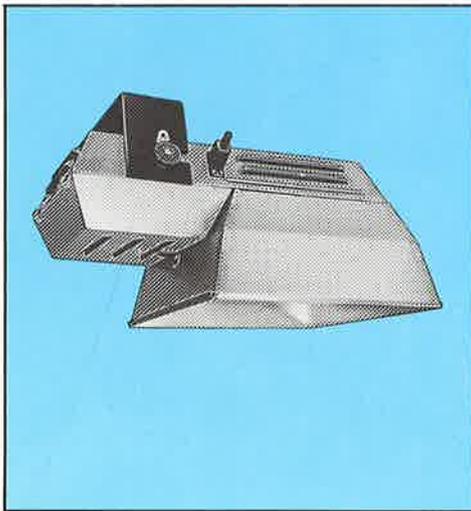
For Deluxe versions, see page 18.

Also available without internal starter.

# LUMINAIRES



**Solarbeam 70/120.** Alloy bodied floodlights with an IP65 rating, our two Solarbeam units feature integral gear and easy mains wiring.



**Champion** Optimum performance, from a luminaire where a shallow depth fitting is required. Champion has been specifically designed to ensure rapid installation and maintenance.

## Luminaires for total SON-E versatility.

As we have already mentioned, SON-E is ideal for incorporation into a common range of luminaires designed for mercury lamps and so is particularly effective for a wide range of internal and external applications.

SON-E can be used in conjunction with many of our extensive range of high quality luminaires. This maximises cost efficiency in a number of areas including: general factory lighting, low bay installations, small scale flood-lighting and street lighting.

# PLUS LAMPS

## Solarcolour Plus (SONP). Greater lighting levels through advanced technology.

The Solarcolour Plus range has been specifically developed to provide you with even higher levels of lumen output from an advanced arc tube design.

Providing up to 20% more light output than standard Solarcolour, Solarcolour Plus comprises 4 wattages in both tubular and elliptical forms. They are ideal for specification for new installations where fewer luminaires will be needed, or for existing installations where higher levels of light output are required. In this instance, luminaires must be equipped with electronic starters.

Another possibility with an existing HPS installation is to use a lower wattage PLUS lamp than currently in use, this could result in a saving of up to 35% in running costs. For example an installation designed to use a 400W High Pressure Sodium lamp could have the control gear changed and the lamp replaced by a 250W Solarcolour Plus lamp. Naturally the resulting change in illumination level will depend on the lumen output of the original lamps for which the installation was designed.

Plus Lamps (SONP)			
Lamp-Type	Watts	Light Output	
		Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
Tubular (SONP-T Plus Clear)	150	17,500	17,000
	250	33,000	32,000
	310	40,500	39,500
	400	55,500	54,000
Elliptical (SONP-E Plus Diffused)	150	16,000	15,500
	250	30,000	29,000
	310	37,000	36,000
	400	51,500	50,000

# DELUXE LAMPS

## Solarcolour SONDL. When colour rendering counts.

Although offering tremendous cost savings, there are certain applications which have not been able to benefit from conventional HPS lamps due to problems created through inaccurate colour rendering.



Now with Solarcolour De-Luxe this really is a problem of the past. Providing all the expected cost saving benefits associated with HPS lamps, our De-Luxe range now provides a lighting quality acceptably similar to that achieved with fluorescents.

Available in both tubular and elliptical versions, Solarcolour De-Luxe is suitable for a variety of commercial lighting installations such as offices, shops, and of course, working areas where accuracy of colour rendering is crucial. De-Luxe lamps must be used in luminaires incorporating an electronic starter.

De-Luxe Lamps (SON DL)			
Lamp Type	Watts	Light Output	
		Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
Tubular (SONDL-T De-Luxe Clear)	150	12,500	11,500
	250	<input type="checkbox"/> 23,750	<input type="checkbox"/> 22,000
	400	38,500	35,500
Elliptical (SONDL-E De-Luxe diffused)	150	11,500	10,500
	250	<input type="checkbox"/> 21,750	<input type="checkbox"/> 20,000
	400	36,000	33,000

Also available with internal starters.

# LUMINAIRES

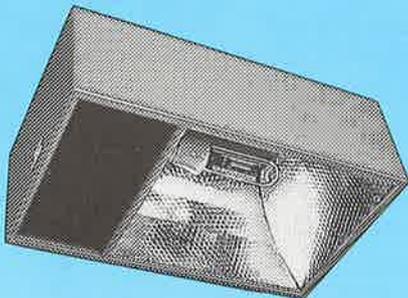
## Prestige luminaires for prestige applications

The nature of Solarcolour De-Luxe is such that it tends to be used for the most prestigious of applications. It is, therefore, important that the aesthetic appearance of the luminaires reflect the importance of the subject matter to be lit. Our range of luminaires does this beautifully, but retains the quality and durability expected from luminaires designed for more heavy duty applications.

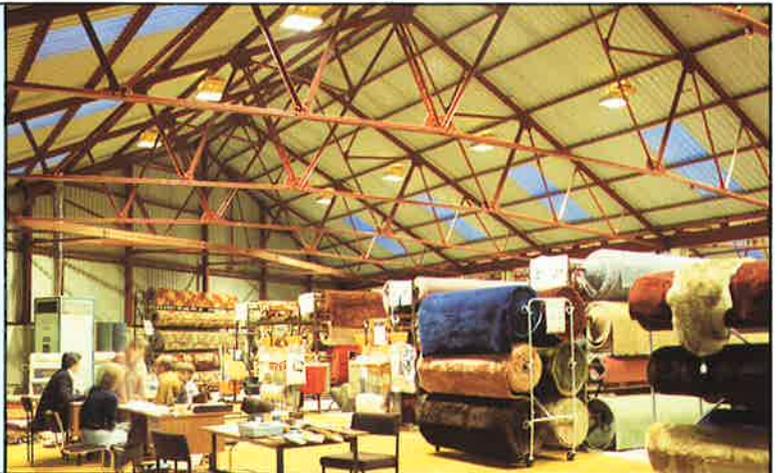
The pictures below show some typical applications for De-Luxe lamps.



**Uplighter.** An example of one of a wide range of Uplighters available to special order. Various shapes and colours can be supplied to suit the environmental conditions required.



**Harrier.** Used with De-Luxe lamps. Harrier is suitable for lighting offices, shops and other commercial areas.



**Precinct Light.** Typical of the range of decorative post-top lanterns available for the exterior lighting of precincts, gardens and other amenity areas.



# LINEAR LAMPS

# LUMINAIRES



**Solarbeam-L.**  
Designed to maximise the benefits of linear Solarcolour lamps, this durable unit is fitted with a unique quick-fit gear tray.

## Solarstream SON-L. Lower running costs with higher lumen output.

Solarstream has been developed to act as a replacement for Linear Tungsten Halogen lamps and offers high light outputs, lower running costs combined with longer life, thus reducing maintenance costs.

Designed for use with electronic starters, its advanced construction incorporates a slim quartz outer jacket with an electrical connection at each end. These have a large electrical contact area to ensure reliability related to high voltage start pulses.

Solarstream SON-L is available in three wattages, making it an ideal option for a wide variety of floodlighting installations.

## New low windage area luminaires.

Whilst suitable for halogen lamp replacement SON-L's design characteristics have enabled us to develop new high performance low-windage area luminaires to maximise lamp performance and reduce stress on the mounting surface.

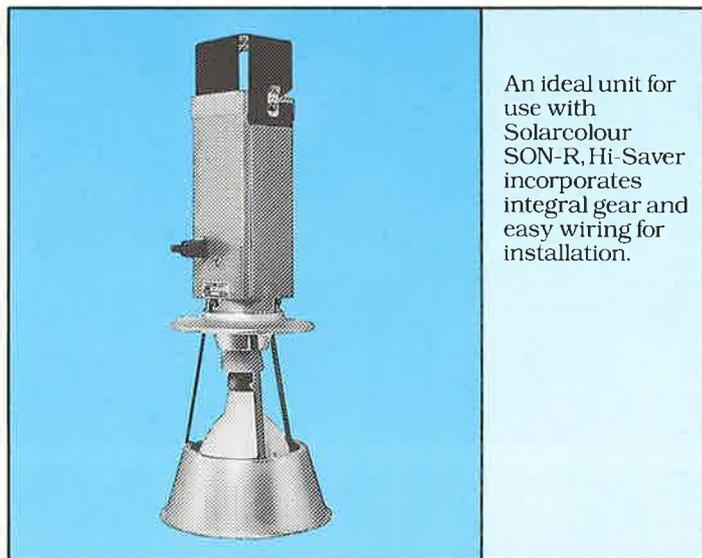
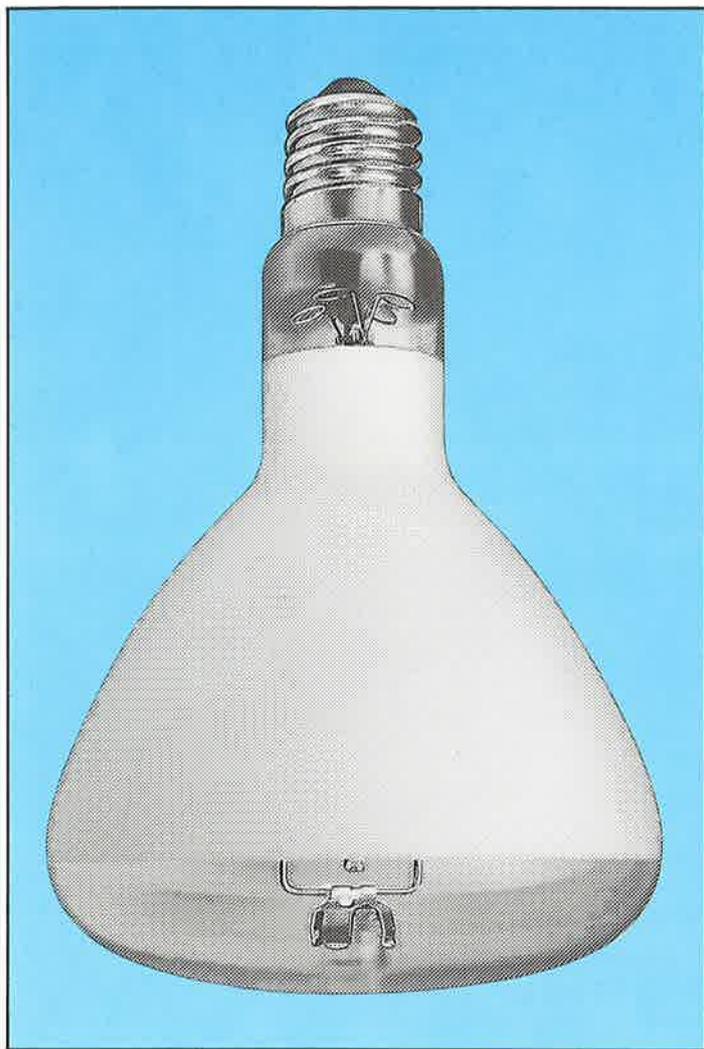
The combination of lamp and luminaire provides extremely cost effective lighting for car parks, factory yards and sports arenas and can be the answer for security zones, such as storage areas.

**Linear Lamps (SON-L)**

Watts	Light Outputs	
	Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
250	27,500	26,000
310	36,500	35,000
400	48,000	46,500

# REFLECTOR LAMPS

# LUMINAIRES



An ideal unit for use with Solarcolour SON-R, Hi-Saver incorporates integral gear and easy wiring for installation.

## Solarcolour SON-R. A clear winner in dirty conditions.

The design of our Solarcolour SON-R range ensures that even in dusty or dirty environments, its benefits come shining through.

It is evident that in certain applications, light output can suffer from the need to regularly clean the lamp and luminaire. Not so with Solarcolour SON-R. Its built-in reflector means that performance is unaffected by the build up of dust and dirt so common in many industrial applications. An ideal replacement for mercury reflector lamps, Solarcolour SON-R can provide increased lighting levels for existing installations, with no increase in energy consumption.

## Luminaires for the toughest conditions.

Suitable for installation in luminaires designed for conventional mercury (MBFR) lamps, Solarcolour SON-R lamps provide exceptional performance when used in conjunction with such purpose built units as Hi-Saver. They are ideal for use in a multitude of high bay installations where regular cleaning may be impractical.

### Reflector Lamps (SON-R)

Watts	Light Output	
	Initial Lumens (100 hrs)	Lighting Design Lumens (2,000 hrs)
250	22,500	20,500
310*	31,000	28,500
360*	36,000	33,000
400	41,000	37,500

\*\*"Plug-in" versions: see page 18.



### Wellington Swimming Pool, Telford.

The lighting of the water, surround and spectator area is provided by 400 watt Solarcolour SON-L lamps in Solarbeam L luminaires. These are wall mounted to ease maintenance and aimed upwards to reflect the light off the timber ceiling.



### Ham Baker & Co Ltd, Oldbury.

Dust and dirt in the atmosphere can be a major problem in a foundry. This major manufacturer of valves for the water and sewerage industry used SON-R lamps in Hi-Saver luminaires to reduce cleaning costs and to maintain lighting levels.



### Hotel D'Angleterre, Copenhagen.

This landmark in the city centre is opposite the Opera House. It was therefore important to ensure an attractive night time appearance. De-Luxe Solarcolour SONDL-T lamps were used in the New Solarflood to produce this outstanding example of decorative flood-lighting.



### Weir Pumps Ltd, Glasgow.

Precision engineering as carried out in this workshop, requires good lighting conditions. Here it is provided by Champion luminaires together with Solarcolour SON-E lamps.

# PLUG-IN TYPES

## STARTERS & CONTROL GEAR

### “Plug-In” Solarcolour

“Plug-In” lamps enable Solarcolour to be used in existing mercury luminaires. This is especially useful when updating older installations on a limited budget. Cost savings can be achieved together with increased light output for negligible capital outlay.

It is easy to update an existing mercury installation. You should, however, check with GEC that the present control gear is suitable. Refer to your supplier to ensure the ballast type and lampholder are suitable. Also ensure that the wiring is in a satisfactory condition.

Mercury Lamp	Control Gear	Suitable “Plug-In” Type	Electricity Savings†	Illumination Increase
250 W MBF/U		220 W SON-T	9%	96%
400 W MBF/U	Tapped	310 W SON-T*	21%	67%
400 W MBF/U	Untapped	360 W SON-T*	8%	90%
250 W MBF/U		220 W SON-E	9%	78%
400 W MBF/U	Tapped	310 W SON-E*	21%	57%
400 W MBF/U	Untapped	360 W SON-E*	8%	81%
400 W MBFR/U	Tapped	310 W SON-R*	21%	58%
400 W MBFR/U	Untapped	360 W SON-R*	8%	83%

†Including control gear losses.

\*Dual wattage lamp (310/360 W) – will operate at 310 W on tapped ballast or at 360 W on untapped ballast.

### Timesaver Control Gear Boxes

These pre-wired boxes save valuable installation time and prevent errors in the wiring of complex lighting circuits.

Suitable for interior or exterior use, the aluminium and GRP boxes come complete with all components needed for the reliable operation of a wide range of Solarcolour lamps (starters and fuses are included where applicable). They are also suitable for use in corrosive atmospheres, having stainless steel screws,



F69700 Series.



GT Series.

galvanised mounting brackets and nylon cable glands.

All components are fixed and inter-wired in our factory where the complete circuit is checked and tested – so avoiding expensive rectification costs.

For details of the range available to operate Solarcolour lamps see opposite page. Other versions are available for mercury and MBI lamps.

### Starters.

Most Solarcolour lamps are fitted with an exclusive internal snap starter. This device provides similar starting time to a mercury lamp whilst saving the extra cost of an electronic starter.

External electronic starters, for use with existing or new installations, are essential for Solarstream (SON-L), Solarcolour Plus (SON P) and Solarcolour DeLuxe (SON DL) and certain standard Solarcolour lamps (now available without an internal starter). They can also be used with other Solarcolour lamps to provide virtually instant hot re-strike for some or all of the lamps in an installation in the event of a short interruption of the electricity supply.



The standard range of starters operates on 220/240v or 380/440v supplies at 50/60 Hz. An additional range is available with a built-in timing circuit, that will disable the starter in the event of a lamp failing to strike. This ‘cut-out’ prevents the ballast being unduly stressed by the high voltage pulses if a failed lamp is not replaced, and prevents radio interference.

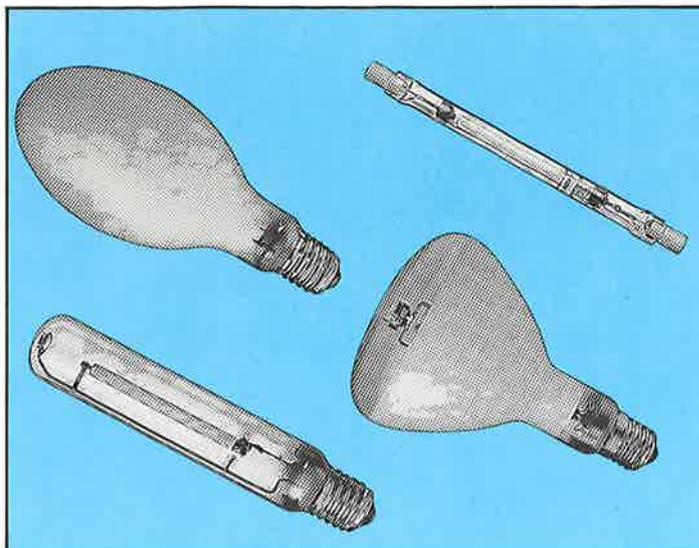
Considerable savings can be achieved using GEC starters, as they can be used in conjunction with single voltage tapped ballasts. Once the lamp has started, no current passes through the device. Overall circuit watt loss is reduced, circuit reliability improved and wiring simplified.

### Electronic Starter Range.

Lamp Wattage	Nominal Supply Volts 50/60Hz	Standard Starter	Starter With Timer
70W, 120W	220 240	OSL 30	OSL 20 OSL 40
150, 220, 250 310, 310/360, 400, 600*1Kw*	220 240	OSH 30	OSH 20 OSH 40
600, 1Kw	380/440	OSH 15	OSH 80

\*Single phase lamps only. Starters for use on other supply voltages can be produced. All GEC Starters terminate in two 350 mm long leads (blue and white for 220/240V and brown and white for 380/440V). They are suitable for use up to 50 metres from the lamp (with suitable intermediate cabling).

# LUMINAIRE DATA TABLE



Solarcolour Lamp Type	Page Number	70W	120W	150W	250W	310W	400W	600W LV & HV	1000W LV & HV
<b>Catalogue Numbers</b>									
<b>Tubular (SON-T)</b>									
Solarflood	7			F69215	F69225	F69231	F69244	F69600*	
Hi-Saver	7			HAGU150S	HAGU250S	HAGU310S	HAGU400S	HBTCN*	HBTCN*
Streetlighting									
Lantern	7	Z8832/70		Z8611/150T	Z8611/250T				
Harrier	7			HR150S	HR250S				
<b>Elliptical (SON-E)</b>									
Solarbeam 70/120	11	F69170	F69220						
Champion	11			CH150	CH250	CH310	CH400		
<b>DeLuxe (SONDL)</b>									
Precinct Light	13	3/ZD4542*	2/ZD4542*	5/ZD4542*					
Harrier	13			HR150S	HR250S				
<b>Linear (SON-L)</b>									
Solarbeam L	14				F69425	F69431	F69440		
<b>Reflector (SON-R)</b>									
Hi-Saver	15				HRAGU250S	HRAGU310S	HRAGU400S		
<b>Control Gear</b>									
F69700 Series	18			F69715	F69725	F69731	F69740		
GT Series								GT600SP	GTIKWSP
LV								GT6003P	GTIKW3P
HV	18								

\*For use with remote control gear

# LIGHTING DESIGN SERVICE

## A complete survey from our engineers.

Osram offer a professional consultancy service to both existing and potential customers. Our lighting engineers will visit your premises and conduct a comprehensive and detailed survey of your lighting needs. A complete report is provided detailing:

- \* The ideal combination of Solarcolour lamps and appropriate luminaires to suit particular needs.
- \* Running costs of the proposed Solarcolour installation compared with the current installation (if appropriate).
- \* All capital costs explained.
- \* The projected payback period.

This service is available throughout the UK with prompt attention assured from one of our regional offices. See the back of this booklet for your nearest office.

# GUARANTEE

The Solarcolour range is manufactured to very stringent standards for every component and process. Should a lamp fail however, Osram guarantee to replace the product on this basis:

\* If a lamp fails within the first 4,000 hours of its operating life, it will be replaced completely free of charge on a one for one basis.

\* If a lamp fails between 4,000 and 8,000 hours operating life, a replacement will be provided on a pro rata basis of the time expired compared with 8,000 hours.

This guarantee covers all Solarcolour lamps in the range.

The guarantee does not affect statutory consumer rights.

## OSRAM-GEC AREA OFFICES

### **Southern**

P.O. Box 17, East Lane, Wembley HA9 7PG  
01-904 4321 Telex: 22418

### **South West and South Wales**

Concorde Road, Patchway,  
Bristol BS12 5TF 0272-696641

### **North East**

E138 Team Valley Trading Est.  
Gateshead NE11 0UE 0632-878575

### **North West, Yorkshire and North Wales**

Lea Green Road, St Helens,  
Merseyside WA9 4QQ 0744-812221

### **Midlands**

Erdington Ind. Park, Chester Road, Erdington,  
Birmingham B24 0RE 021-350 0011

### **Scotland**

77 Grove Park Street, Glasgow G20 7PA  
041-332 7011

### **Northern Ireland**

Linfield Industrial Estate, 47 Linfield Road,  
Belfast BT12 5GL 0232-238125

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## **Osram-GEC**

lighting the way