

Fluorescent tubes Introduction and Index

Thorn Lighting has the finest fluorescent tube works in Western Europe making the extensive range of tubes described in this section of the catalogue, including the de luxe colours which are receiving increasing acknowledgment for interior lighting installations where good colour rendering and colour appearance are important.

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Fluorescent tubes general information

Braided Cathode

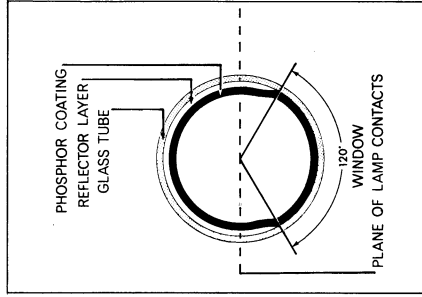
The braided cathode filament—British Patent 131059—is now being used in 1500mm/5ft 65/80W and 80W BC, 1800mm/6ft 85W and 2400mm/8ft 85W and 125W tubes.

These exclusive braided cathodes give more efficient operation, fewer early failures and longer life than the conventional coiled coil cathode.

The braided cathode consists of a hollow mesh cylinder which is formed by braiding eight very thin strands of tungsten wire together. This means that the emitter is held within the hollow cylinder thus forming a solid core.

The release of electrons is better controlled than with a coiled coil filament and this results in the braided cathode having approximately 70% greater electron emission.

Reflector Tubes



The reflector fluorescent tubes have an additional highly reflecting fluorescent powder and the inside of the glass tube. In this way the majority of light is radiated through an aperture of 120° from the lamp centre in the preferred direction. This lamp is particularly useful in the following applications:

Lighting in dusty atmospheres: Dust collection on an ordinary tube and fitting rapidly reduces light output. With a reflector tube, light re-direction is independent of dust, and light output is better maintained.

Display lighting

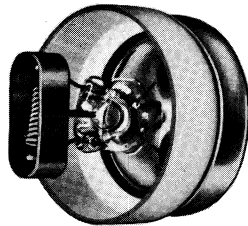
This lamp is useful where space is restricted as in showcases where it is difficult to put an external reflector.

High intensity lighting

Reflector lamps enable tubes to be mounted in banks where an external reflector may not be convenient or effective. Replacement lamps can be used in old fittings which have deteriorated, so as to give an increase in useful light output.

Replacement

Lamps can be used in old fittings which have deteriorated, so as to give an increase in useful light output.



Cathode Shields

Cathode shields are incorporated on the high loading tube range (600mm/2ft 40W, 1500mm/5ft 65/80W, 1800mm/6ft 85W, 2400mm/8ft 85W and 125W).

This shield traps evaporation from the cathode during life, preventing black marks from forming at the end of the tube. In addition, cathode shields reduce flicker which may sometimes be noticeable from commercial fittings.

Fluorescent tubes general information

Colours for General Use

To encourage rationalisation of the range of fluorescent tube colours available, two colours have been chosen by Thorn as being suitable for the majority of installations:

White—The highest efficacy tube available for general lighting purposes.

Natural—Good colour rendering tube for commercial and display purposes.

These colours are identified in **bold type** in this catalogue and it is recommended that they be used for general lighting purposes.

Colour Temperatures for Fluorescent Tubes

The term 'colour temperature' should strictly be applied only to spectral distributions close to the black body distributions. Thus in fluorescent tube colours the colour temperature is merely an indication of the location of the chromaticity co-ordinates on a colour chart.

The colour temperatures should not be used as a guide for photographic purposes.

Artificial Daylight	6500°K
Northlight/Colour Matching	6500°K
Tropical Daylight	6500°K
Daylight	4300°K
%Kolor-rite	4000°K
Natural	4000°K
De Luxe Natural	3600°K
White	3400°K
Warm White	3000°K
De Luxe Warm White	3000°K

Metriation

Fluorescent lamps are now designated in nominal lengths in millimetres. The table below shows how these relate to their former designations.

8ft lamps are now designated	2400mm
6ft lamps are now designated	1800mm
5ft lamps are now designated	1500mm
4ft lamps are now designated	1200mm
3ft lamps are now designated	900mm
2ft lamps are now designated	600mm
2ft lamps are now designated	600mm
18in lamps are now designated	450mm
12in lamps are now designated	300mm
9in lamps are now designated	225mm
6in lamps are now designated	150mm

Rated Life and Group Replacement

The rated life of all 1200mm/4ft, 1500mm/5ft, 1800mm/6ft and 2400mm/8ft, 38mm/1½in diameter tubes is 7500 hours. The rated life of all other ratings is 5000 hours. In many situations it is advantageous to replace tubes in bulk (Group Replacement) rather than as individual lamps fail.

Among the benefits of Group Replacement are:
A saving in initial cost.
A higher average level of lighting.
More uniform lighting.
Less interruption of work.
A saving in running costs.

Further information on Group Replacement is available from Regional Offices.

Guarantee

Any fluorescent tube failing within 12 months from the date of purchase by the user (or prior to 3000 hours burning whichever is the shorter), except through misuse, will be replaced free of charge.

British Standards

Fluorescent tubes described in this catalogue conform to British Standard 1853:1967 and International Standard IEC81 where applicable.

Thorn Lighting holds Licence no. 5247 for the manufacture of fluorescent tubes to BS.1853.

Fluorescent Tube Packing Quantities

Circles: 12
2400mm/8ft 20
Blacklight Blue: 24
All others: 25

Miniature Fluorescent Tubes

Miniature fluorescent tubes give high lumen output with low power consumption (equivalent to a filament lamp five times the wattage). Their long life, low temperature and slim shape make them particularly suitable for signs, bollards, displays, bulkheads and appliances.

Amalgam Tubes

Many modern enclosed commercial fittings cause standard fluorescent tubes to operate above their optimum temperature thus giving significant reductions in light output.

Amalgam control of the mercury vapour pressure in a tube allows efficient operation at higher temperatures. The quoted lumen output of a standard tube is measured at an ambient temperature of 25°C, corresponding to a surface temperature of 40–45°C. As the temperature rises, lumen output falls. The same rating of amalgam lamp gives a similar lumen output at an ambient temperature of 50°C, corresponding to a surface temperature of 65°C. Gains in light output of up to 20% over standard tubes can be achieved in multi-lamp enclosed commercial fittings.

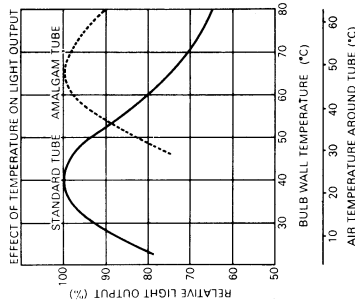
Amalgam tubes are directly interchangeable with standard tubes.

Note: Amalgam tubes only give advantages at air temperatures above 40°C. Standard tubes give better performance below this temperature.

Ratings available

1800 mm/6ft 85W **White**, Warm **White**, **Natural**.

Further information is available from Regional Offices.



Fluorescent tube range

Fluorescent tubes Colour & applications

Colours for General Use

In order to encourage rationalisation of the range of fluorescent tube colours available, two colours have been chosen by the Board as being suitable for the majority of installations.

White—The highest efficacy tube available for general lighting purposes.

Natural—Good colour rendering tube for commercial and display purposes.

These colours have been identified in bold type in this catalogue and it is recommended that they be used for general lighting purposes.

Tube colour	Or White Tube lumens	rendering quality	Colour appearance	Application and remarks
Industrial lighting				
White and Warm White Daylight	100/98 94	Fair Fair	Intermediate Cool	General illumination at maximum efficacy. Buildings requiring artificial illumination to blend with natural daylight. Minimum of 300 lux must be provided to avoid an excessively good appearance.
Artificial Daylight	41	Very Good	Cool	Areas where accurate colour matching is carried out. A minimum of 900 lux must be provided. Conforms to BS950:Part One
Commercial lighting				
White and Warm White	100/98 70	Fair Good	Intermediate Intermediate	General and drawing offices requiring maximum lighting efficiency
Natural				General office lighting particularly where required to blend with natural daylight. Minimum of 300 lux necessary.
*Kolor-rite De Luxe Warm White	65 66	Very Good Good	Intermediate Warm	Offices, showrooms, studios, colleges, hospitals. Office buildings requiring a warm effect, flattering to the complexion
Display lighting Northlight/ Colour Matching	59	Good	Cool	Tailors (Colour matching areas), furriers and for wintry effects. Minimum of 600 lux necessary to avoid an excessively cold appearance.
Natural	70	Good	Intermediate	Jewellery, glassware, china, hardware, tailors (main shop areas), summer frocks and department stores. Minimum of 300 lux necessary.
De Luxe Natural	49	Very Good	Intermediate	Florists, fishmongers, butchers, grocers, supermarkets and brightly coloured merchandise.
*Kolor-rite	65	Very Good	Intermediate	The first choice where true reproduction of colour is required, gives the effect of a sunny day.
De Luxe Warm White	66	Good	Warm	Furniture, restaurants, lounges and for domestic settings; tungsten filament lamp effect.
White	100	Fair	Intermediate	General display lighting requiring maximum light output, but without the need for good colour quality.
Colours	—	Poor	Poor	Green, gold, blue, red, pink, peach, for special effects.
Domestic lighting				
White or Warm White	100/98	Fair	Warm	Rooms requiring maximum light output.
De Luxe Warm White	66	Good	Warm	Rooms requiring a warmer colour light blending with tungsten filament lamps.
Pink	25	Poor	Warm	Decorative lighting giving a very warm effect.
Peach	65			
Special applications				
Green	95			
Peach	60			
Gold	55			
Pink	25	Poor	Poor	Saturated colours for display, floodlighting, stage lighting.
Blue	20			<i>Note:</i> Red and Gold tubes should only be used in switchstart circuits.
Red	5			
Gro-lux	30	—	—	This special tube colour has been developed for plant growth purposes, i.e., its spectral energy is ideally suited to seed germination and rapid plant growth. It is also ideal for aquarium lighting where it stimulates aquatic plant growth. Gro-lux tubes have a lavender colour appearance with a strong red and blue rendering effect. Although yellows are poor, foliage has a rich green appearance. Colouring of tropical fish, plants and flowers looks especially vivid under Gro-lux tubes.
Ultra-violet (Non-filter)	—	—	—	For further information see 'Gro-lux Fluorescent Tubes' Leaflet No. TLL009.
Blacklight Blue	—	—	—	The Ultra-violet tube emits a large proportion of its energy as invisible ultra-violet radiation between 300 and 400 nanometres. The tube also emits a small amount of visible light at the blue end of the spectrum. Available 65/80W, 40W, 20W, 15W and 8W.
Radar Red	—	—	—	Ultra-violet tubes as above (but with black glass bulb) which transmit ultra-violet only filtering out the visible light. Available 40W (1200mm), 15W, 8W, 6W and 4W.
				A bright magenta red colour with a higher light output than Red – originally used for radar rooms but also gives a strong red effect to meat and bacon displays.
				Available 65/80W and 40W.

Section 6:4

Section 6:5

Fluorescent tubes light output

Lumen outputs

The lumen outputs quoted in this catalogue are measured at 25°C in accordance with BS:1853.

Initial lumens
Initial lumens are measured after 100 hours operation.

Lighting design lumens

Lighting design lumens are the lamp outputs at 2000 hours and are recommended as a guide to lighting engineers planning scheme layouts.

Lumen output beyond 2000 hours decreases by 2% to 3% per 1000 hours use according to the colour and loading

Colours for general use

The colours identified in bold type are recommended for general lighting purposes.

MINIATURE FLUORESCENT TUBES

Initial lumens		Lighting design lumens									
		525mm	300mm	225mm	150mm	525mm	300mm	225mm	150mm		
		21in	12in	9in	6in	21in	12in	9in	6in		
		13W	8W	6W	4W	13W	8W	6W	4W		
White		830	425	290	150	730	360	240	120		
Warm White		830	425	290	150	730	360	240	120		
Daylight		780	400	275	140	680	340	230	110		
Natural		—	325	230	110	—	280	190	85		

All these tubes are 16mm/0.623in diameter.

FLUORESCENT TUBES

Initial lumens (100 hours)		2400	2400	1800	1500	1500	1200	900	900†	600	600	450	450†
		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
		8ft	8ft	Super 8	Super 6	Super 5	4ft	3ft	3ft	2ft	2ft	18in	18in
		125W	85W	85W	80W*	65W*	50W	30W	30W	40W	20W	15W	15W
White		9300	7200	6500	5700	5050	3700	3000	2400	2000	1200	900	950
Warm White		9300	7200	6500	5600	4950	3650	2950	2100	2400	2000	1200	900
Daylight		9000	7000	6250	5450	4800	3600	2900	2000	2300	1900	1150	850
Natural		7150	5500	4800	4300	3700	2800	2300	1600	1800	1500	900	650
De Luxe Warm White		6800	5300	—	4100	3600	—	2150	1500	1700	1400	850	600
*Kolor-rite		6300	4800	4300	3800	3350	2550	2000	—	1550	1300	850	—
Northlight/Colour Matching		5800	4500	4000	3400	3000	—	1900	1300	1500	1250	800	550
De Luxe Natural		5500	4300	3700	3200	2900	2250	1750	1200	1400	1150	700	500
Artificial Daylight		4800	3600	3300	2900	2600	—	1500	—	—	—	650	—

Lighting design lumens (2000 hours)

White	8700	6800	6300	5200	4700	3300	2750	1850	2150	1700	1100	750	800
Warm White	8600	6700	6100	5100	4600	3250	2700	1850	2150	1700	1100	750	800
Daylight	8400	6500	5750	4950	4450	3200	2650	1750	2050	1600	1050	700	750
Natural	6500	5000	4350	3900	3400	2400	2100	1400	1600	1300	800	550	600
De Luxe Warm White	6200	4700	—	3500	3100	—	1950	1250	1450	1200	750	500	—
*Kolor-rite	5700	4400	3850	3400	3000	2200	1800	—	1300	1100	750	—	—
Northlight/Colour Matching	5300	4100	3600	3100	2700	—	1700	1050	1250	1050	700	450	500
De Luxe Natural	4800	3800	3200	2700	2500	1850	1500	900	1100	900	600	400	450
Artificial Daylight	3800	3000	2600	2300	2100	—	1200	—	—	—	500	—	400

†These tubes are 26mm/1in diameter. All others are 38mm/1.5in diameter.

*The Super 5 tube is a dual purpose 65/80W tube suitable for use in all 65W or 80W bi-pin fittings

1500mm/5ft 80W BC tubes are still available in a limited range of standard colours

Fluorescent tubes light output

REFLECTOR TUBES

Initial lumens (100 hours)											
		2400mm	2400mm	1500mm	1800mm	1500mm	1500mm	1200mm	1200mm	600mm	600mm
		8ft	8ft	5ft at	6ft	5ft at	5ft at	4ft	4ft	2ft	2ft
		125W	85W	85W	85W	65W	65W	40W	40W	20W	20W
White		8400	6500	5800	5100	4500	4500	2700	2700	1100	1100
Warm White		8300	6400	5600	4900	4400	4400	2650	2650	—	—
Daylight		—	—	5500	4700	4200	4200	2600	2600	—	—
Natural		—	—	—	4200	3800	3300	—	—	—	—

Lighting design lumens (2000 hours)											
		7700	6000	5200	4600	4200	4200	2450	2450	1000	1000
Warm White		7600	5900	5000	4400	4000	4000	2400	2400	—	—
Daylight		—	—	4900	4200	3800	3350	—	—	—	—
Natural		—	—	—	3700	3300	2900	—	—	—	—

COLOURED TUBES

Six standard colours – Red, Blue, Green, Gold, Peach and Pink – are available. These are primarily designed for decorative and effect lighting purposes.

Lighting design lumens (2000 hours)

Lighting design lumens (2000 hours)											
		1800mm	1500mm	1200mm	1200mm	900mm	900mm	600mm	600mm	600mm	600mm
		6ft	5ft at	4ft	4ft	3ft	3ft	2ft	2ft	2ft	2ft
		85W	80W	65W	40W	30W	30W	40W	40W	20W	20W
Pink		1600	1400	1250	750	550	550	500	500	290	290
Red*		—	250	230	140	—	—	—	—	50	50
Gold*		—	2700	2400	1450	—	—	—	—	550	550
Green		—	5200	4600	2800	—	—	—	—	1100	1100
Blue		—	1300	1150	700	—	—	—	—	270	270
Peach		—	3200	2900	1750	—	—	—	—	700	700

*Red and Gold tubes should be used only in switchstart circuits.

GRO-LUX

Lighting design lumens (2000 hours)											
		1500mm	1500mm	1200mm	900mm*	600mm	450mm*	525mm	300mm	300mm	300mm
		5ft at	5ft at	4ft	3ft	2ft	18in	21in	12in	12in	12in
		80W	65W	40W	30W	20W	15W	13W	8W	8W	8W
T450		1300	810	530	340	200	180	180	100	100	100

*26mm/1in diameter.

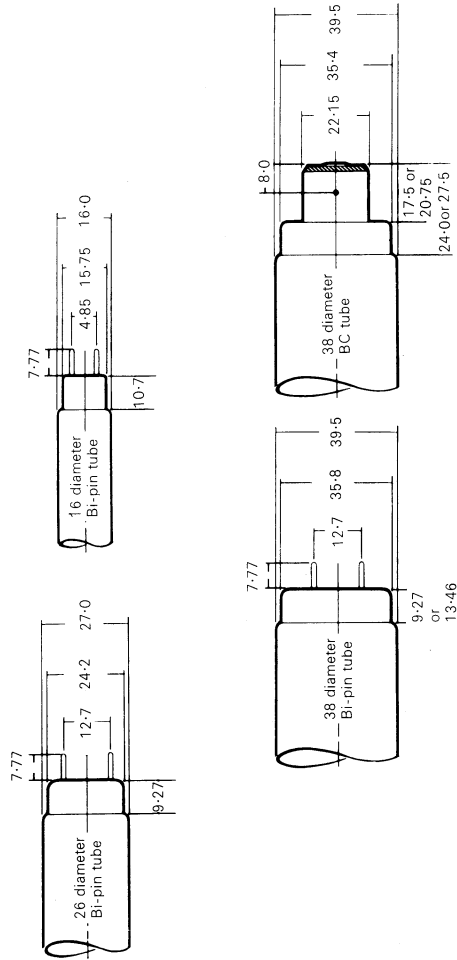
TROPICAL DAYLIGHT

Lighting design lumens (2000 hours)
450mm/18in 15W: 550

CIRCULAR TUBES

Lighting design lumens (2000 hours)									
Warm White only									
		400mm	400mm	300mm	200mm				
Tube size (diameter)		16in	16in	12in	8.25in				
		60W	40W	32W	22W				
		3400	2300	1600	850				

Fluorescent tubes dimensions



Maximum dimensions (mm)

STRAIGHT TUBES

Rated wattage	Nominal dimensions mm*	Length, base face to face (mm)		Length, base face to end of opposite cap pins		Length overall	
		cap	max.	min.	max.	min.	max.
125	2400 × 38	96 × 1 1/2	2374.9	2382.0	2378.4	2389.1	—
85	2400 × 38	96 × 1 1/2	2374.9	2382.0	2378.4	2389.1	—
85	1800 × 38	72 × 1 1/2	1763.8	1770.9	1768.4	1778.0	—
65/80	1500 × 38	60 × 1 1/2	1500.0	1507.1	1504.8	1514.3	—
80	1500 × 38	60 × 1 1/2	—	—	—	1517.6	—
50	1500 × 26	60 × 1	1500.0	1507.1	1504.8	1514.3	—
40	1200 × 38	48 × 1 1/2	1119.4	1206.5	1204.1	1213.6	—
40	600 × 38	24 × 1 1/2	589.8	596.9	594.5	604.0	—
30	900 × 38	36 × 1 1/2	894.6	901.7	899.3	908.8	—
30	900 × 26	36 × 1	894.6	901.7	899.3	908.8	—
20	600 × 38	24 × 1 1/2	589.8	596.9	594.5	604.0	—
15	450 × 38	18 × 1 1/2	437.4	444.5	442.1	451.6	—
15	450 × 26	18 × 1	437.4	444.5	442.1	451.6	—
13	525 × 16	21 × 3/8	516.8	523.9	521.5	531.0	—
8	300 × 16	12 × 3/8	288.2	295.3	292.9	302.4	—
6	225 × 16	9 × 3/8	212.0	219.1	216.7	226.2	—
4	150 × 16	6 × 3/8	135.8	142.9	140.5	150.0	—

CIRCULAR TUBES

Lamp watts	Nominal diameter mm	Inside lamp diameter/ glass mm		Inside lamp diameter/ base mm		Outside lamp diameter/ mm		Bulb diameter mm	
		min.	max.	min.	max.	min.	max.	min.	max.
22	200	81	160.4	151.1	155.6	150.8	215.9	203.2	30.9
32	300	12	245.6	237.3	246.1	239.7	311.2	298.5	34.1
40	400	16	346.9	338.9	347.7	341.3	412.8	400.0	34.1
60	400	16	346.9	338.9	347.7	341.3	412.8	400.0	34.1

*Base and glass dimensions the same

Fluorescent tubes electrical data

Electrical data for standard 240V 50Hz tube circuits. Average performance tested at 25°C to BS.2818
The figures on this page are for control gear used in Atlantic, Format, Invincible and similar fittings.

Tube size	2400mm 8ft	2400mm 8ft	1800mm 6ft	1500mm 5ft	1500mm 5ft	1200mm 4ft	900mm 3ft	900mm 3ft
Diameter	38mm 1.5in	38mm 1.5in	38mm 1.5in	38mm 1.5in	26mm 1in	38mm 1.5in	38mm 1.5in	26mm 1in
Nominal tube watts	125W	85W	85W	80W	65W	50W	30W	30W
Lamp cap	BP	BP	BP	BP	BP	BP	BP	BP
Actual lamp watts	123	85	84	76	64	50	29.5	30
Average tube volts	150	184	120	100	110	165	102	85
Average tube amps	0.94	0.55	0.80	0.87	0.67	0.38	0.44	0.39
Rated life (hours)	7500	7500	7500	7500	7500	5000	5000	5000
SINGLE TUBE SWITCHSTART								
Total circuit watts	144	—	95	94	80	62	39	39
Lagging power factor	0.64†	—	0.87	0.85	0.85	0.69†	0.85	0.85
Total volt/amps	226	—	108	110	91	60	46	46
Mains current at 240V	0.94	—	0.45	0.46	0.38	0.25	0.19	0.19
Min. starting temperature 0°C	—	—	+5°C	0°C	0°C	+5°C	0°C	0°C
% Harmonics per phase	15%	—	17%	17%	17%	17%	17%	17%
SINGLE TUBE SWITCHLESS START								
Total circuit watts	154	100	96	99	79	—	53	42
Lagging power factor	0.98	0.99	0.86	0.85	0.91	—	0.85	0.85
Total volt/amps	158	100	110	116	87	—	62	50
Mains current at 240V	0.66	0.42	0.46	0.48	0.36	—	0.26	0.21
Min. starting temperature +5°C	—	+5°C	+5°C	+5°C	+5°C	—	+5°C	+5°C
% Harmonics per phase	8%	7%	25%	17%	25%	—	17%	17%
TWINSTART								
Total circuit watts	—	207	—	—	—	—	—	—
Lagging power factor	—	0.95	—	—	—	—	—	—
Total volt/amps	—	218	—	—	—	—	—	—
Mains current at 240V	—	0.91	—	—	—	—	—	—
Min. starting temperature —	—	+5°C	—	—	—	—	—	—
% Harmonics per phase	—	17%	—	—	—	—	—	—

†2400mm/8ft 125W and 1500mm/5ft 50W starter switch circuits operate with a series type capacitor at a leading power factor.

The above circuit watts for control gear tested in accordance with BS.2818 may be reduced by up to 5% when operating in some fittings as the circuit watts reduce as the lamp operating temperature rises.

Fluorescent tubes electrical data

Tube size	600mm 2ft	600mm 2ft	450mm 18in	450mm 18in	525mm 21in	300mm 12in	225mm 9in	150mm 6in
Diameter	38mm 1.5in	38mm 1.5in	38mm 1.5in	26mm 1in	16mm 0.625in	16mm 0.625in	16mm 0.625in	16mm 0.625in
Nominal tube watts	40W	20W	15W	15W	13W	8W	6W	4W
Lamp cap	BP	BP	BP	BP	Min. BP	Min. BP	Min. BP	Min. BP
Actual lamp watts	37	19.5	15	15	13	8	6	4
Average tube volts	47	58	48	57	92	55	43	30
Average tube amps	0.88	0.37	0.36	0.34	0.17	0.17	0.16	0.15
Rated life (hours)	5000	5000	5000	5000	5000	5000	5000	5000

SINGLE TUBE SWITCHSTART

Total circuit watts	58	30	25	25	19	14	12	10
Lagging power factor	0.85	0.34*	0.30*	0.31*	0.46*	0.34*	0.31*	0.28*
Total volt/amps	69	90	85	81	41	41	39	36
Mains current at 240V	0.29	0.37	0.36	0.34	0.17	0.17	0.16	0.15
Min. starting temperature	0°C	0°C	0°C	0°C	0°C	0°C	0°C	0°C

SERIES PAIR SWITCHSTART

Total circuit watts	94	50	40	40	—	22	18	14
Lagging power factor	0.85	0.85	0.85	0.85	—	0.52*	0.46*	0.39*
Total volt/amps	110	59	47	47	—	41	39	36
Mains current at 240V	0.46	0.25	0.20	0.20	—	0.17	0.16	0.15
Min. starting temperature	0°C	0°C	0°C	0°C	—	0°C	0°C	0°C

SERIES PAIR QS SWITCHLESS START

Total circuit watts	100	54	44	44	—	—	—	—
Lagging power factor	0.85	0.85	0.85	0.85	—	—	—	—
Total volt/amps	118	63	52	52	—	—	—	—
Mains current at 240V	0.49	0.26	0.22	0.22	—	—	—	—
Min. starting temperature	+5°C	+5°C	+5°C	+5°C	—	—	—	—

*Uncorrected value. Allow 0.85 if power factor capacitor is fitted

The above circuit watts for control gear tested in accordance with BS.2818 may be reduced by up to 5% when operating in some fittings as the circuit watts reduce as the lamp operating temperature rises.