Fluorescent tubes Introduction and Index

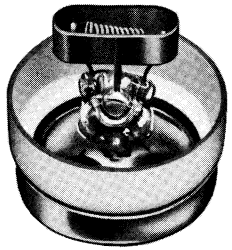
Thorn Lighting has the finest fluorescent tube works in Western Europe making the extensive range of tubes described in this section of the catalogue, including the de luxe colours which are receiving increasing acknowledgment for interior lighting installations where good colour rendering and colour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

Index

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.

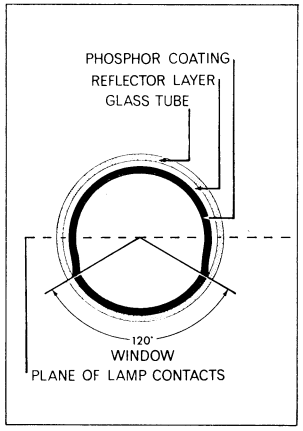
The braided cathode consists of a hollow mesh cylinder which is formed by braiding eight very thin strands of tungsten wire together. This means that the emitter is held within the hollow cylinder thus forming a solid core.
The release of electrons is better controlled than with a coiled coil filament and this results in the braided cathode having approximately 70% greater electron emission.



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.

Reflector Tubes



The reflector fluorescent tubes have an additional highly reflecting coating added between the 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.

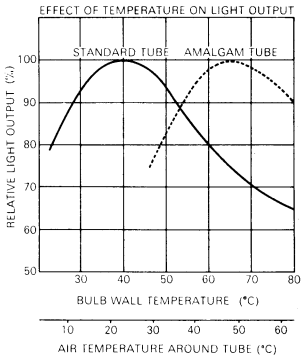
Amalgam Tubes
Many modern enclosed commercial fittings cause standard fluorescent tubes to operate above their optimum temperature thus giving significant reductions in light output.

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.**

For further information, see note on page 6:8.



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.

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.

Marking of Rated Wattage on Tubes
The wattage dissipated by any discharge lamp, including a fluorescent tube, depends mainly on the characteristics of the ballast with which the particular lamp is operated and on the mains supply voltage at any given time.

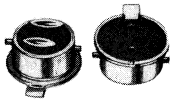
Because of this the marking of a rated wattage on any given fluorescent tube does not necessarily indicate the wattage which the tube is intended to dissipate in any given circuit arrangement.

The appropriate fluorescent tube and associated ballast specifications list the rated or nominal wattage of any given tube type and also the "objective wattage" which is the actual target wattage the tube should dissipate when operated under prescribed conditions in association with a mid-point reference ballast.

Metrication
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
21in lamps are now designated	525mm
18in lamps are now designated	450mm
12in lamps are now designated	300mm
9in lamps are now designated	225mm
6in lamps are now designated	150mm

Bi-pin/BC Adaptor
G. B1515 Adaptor converting bi-pin lamp cap to BC. The overall length of a 1500mm/5ft bi-pin tube with these adaptors does not exceed the length of a BC tube.



Carton Colour Coding
Thorn were the first to operate carton label colour coding on the labels at the ends of tube cartons to assist identification. The coding is as follows:—
White—Buff
Warmwhite—Pink
Daylight—Magenta
Natural—Green
Northlight/Colour matching—Blue
De Luxe Natural—Red
All other colours are coded white.

Fluorescent tube range

	125W 2400mm 8ft 1½in	85W 2400mm 8ft 1½in	85W 1800mm 6ft 1½in	80W 1500mm 5ft 1½in BC	65/80W 1500mm 5ft 1½in	50W 1500mm 5ft 1in	40W 1200mm 4ft 1½in	30W 900mm 3ft 1 and 1½in	40W 600mm 2ft 1½in	20W 600mm 2ft 1½in	15W 450mm 18in 1 and 1½in	13W 525mm 21in ⅝in	8W 300mm 12in ⅝in	6W 225mm 9in ⅝in	4W 150mm 6in ⅝in
White	**AM**	**AM**	**AM**	**A**	**AM**	**AM**	**AM**	**AM†**	**AM**	**AM**	**AM**	**AM**	**AM**	**AM**	**AM**
Warm White	AM	AM	AM	A	AM	AM	AM	AM†	AM	AM	AM	AM	AM	AM	AM
Daylight	AM	AM	AM	A	AM	A	AM	A	AM	AM	A	AM	AM	AM	AM
Natural	**AM**	**AM**	**AM**	**A**	**AM**	**A**	**AM**	**A**	**AM**	**AM**	**A**	—	**A**	**A**	**A**
Home-lite					M		M								
Northlight/Colour Matching	A	A	A	A	A	—	A	—	A	A	A	—	—	—	—
De Luxe Warm White	A	A	—	A	A	—	A	A	A	A	—	—	—	—	—
°Kolor-rite	A	A	A	A	A	A	A	A	A	A	—	—	—	—	—
De Luxe Natural	A	A	A	A	A	A	A	A	A	A	A	—	—	—	—
Artificial Daylight	A	A	A	—	A	—	A	—	—	A	A	—	—	—	—
Reflector Tubes															
White	**A**	**A**	**A**	**A**	**A**	—	**A**	—	—	**A**	—	—	—	—	—
Warm White	A	A	A	A	A	—	A	—	—	—	—	—	—	—	—
Daylight	—	—	A	A	A	—	A	—	—	—	—	—	—	—	—
Natural	—	—	—	—	**A**	—	—	—	—	—	—	—	—	—	—
Amalgam Tubes															
White	—	—	**A**	—	—	—	—	—	—	—	—	—	—	—	—
Warm White	—	—	A	—	—	—	—	—	—	—	—	—	—	—	—
Natural	—	—	**A**	—	—	—	—	—	—	—	—	—	—	—	—
Colours															
Pink, Green, Blue, Red, Gold,	—	—	A*	—	A	—	A	A*	A*	A	—	—	—	—	—
Radar Red	—	—	—	—	A	—	A	—	—	—	—	—	—	—	—
Ultra-Violet (non-filter)	—	—	—	—	A	—	A	—	—	A	A	—	A	—	—
Blacklight blue u-v	—	—	—	—	—	—	A	—	—	—	A	—	A	A	A
Gro-lux	—	—	—	—	A	—	A	A‡	—	A	A‡	A	A	—	—

Circular tubes

(Warm White only) 400mm/16in dia. 60W M
400mm/16in dia. 40W M
300mm/12in dia. 32W M
200mm/8·25in dia. 22W M

New "U" Tube 40W=A (White only)

*Pink only †Mazda in 1in only ‡1in dia. only

Note: Letter A denotes lamps branded atlas letter M those branded mazda

Tube Grades

There are different grades of tube to suit various types of control gear and the correct type must be used to obtain satisfactory starting performance.

GP (General Purpose Quickstart) grade tubes (MCFE/U)

The GP Quickstart tube is manufactured to give satisfactory starting with all switch or switchless start control gear and is now supplied as the standard tube for use in all fittings. For switchless start circuits the metal chassis must extend the full length of the tube and be bonded to earth. The metalwork must not be more than 20mm from the tube. Quickstart, resonant-start and other switchless start circuits must be used only on 200–250V 50 Hz supplies where the neutral conductor is at earth potential.

MS (Metal Strip) grade tubes (MCFA/U)

This tube is necessary only for special conditions, e.g. where earthed metalwork is not adjacent to the tube. It has a metallic conducting strip cemented to the outside of the tube, connected to both caps, which must be earthed.

A limited range of the more popular tubes in 600–1500mm/2–5ft lengths can be supplied with metal strip, to special order.

NOTE: Red and Gold tubes are standard grade only i.e. for use on starter switch circuits and not switchless-start circuits.

Fluorescent tubes Colours & applications

Colours for General Use

In order 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.

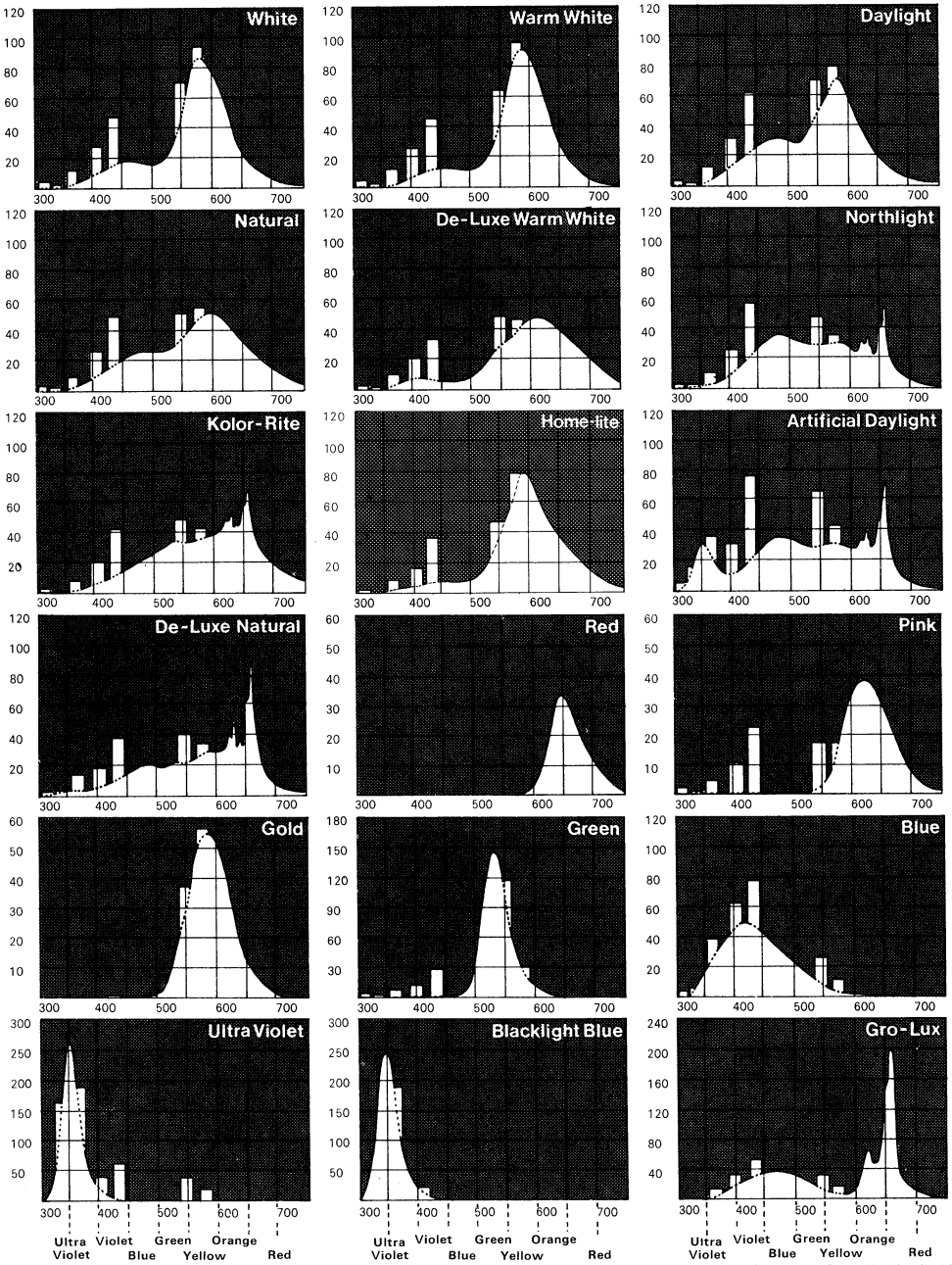
Natural-Good colour rendering tube for commercial and display purposes.

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

Tube colour	Percentage of White Tube lumens	Colour rendering quality	Colour appearance	Application and remarks
Industrial lighting				
White and Warm White	100/98	Fair	Intermediate	General illumination at maximum efficacy.
Daylight	94	Fair	Cool	Buildings requiring artificial illumination to blend with natural daylight. Minimum of 300 lux must be provided to avoid an excessively cold 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 (6500K)
Gold	55	Poor	Warm	For special areas requiring low ultra-violet and violet output.
Commercial lighting				
White and Warm White	100/98	Fair	Intermediate	General and drawing offices requiring maximum lighting efficiency
Natural	70	Good	Intermediate	General office lighting particularly where required to blend with natural daylight. Minimum of 300 lux necessary.
°Kolor-rite	65	Very Good	Intermediate	Offices, showrooms, studios, colleges, hospitals.
De Luxe Warm White	66	Good	Warm	Office buildings requiring a warm effect, flattering to the complexion
Home-lite	80	Good	Warm	Interiors requiring a warmer appearance than filament lamps.
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 requiring filament lamp effect.
Home-lite	80	Good	Warm	Interiors requiring a warmer appearance than filament lamps.
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, 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 filament lamps.
Home-lite	80	Good	Warm	Interiors requiring a warmer appearance than filament lamps.
Pink	25	Poor	Warm	Decorative lighting giving a very warm effect.
Special applications				
Green	95	Poor	Poor	Saturated colours for display, floodlighting, stage lighting. *Note:* Red and Gold tubes should only be used in switchstart circuits.
Gold	55			
Pink	25			
Blue	20			
Red	5			
Gro-lux	30	—	—	This special tube colour has been developed for plant growth purposes, and 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. Colouring of tropical fish, plants and flowers looks especially vivid under Gro-lux tubes.
Ultra violet (Non-filter)	—	—	—	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.
Germicidal U.V.	–	—	—	Special clear glass 1in diameter 3ft 30 watt tubes are available which give short wave ultra-violet (protection of eyes essential with this lamp).
Blacklight Blue	—	—	—	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.
Radar Red	—	—	—	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.

Fluorescent tubes spectral distribution

Horizontal scales are wavelengths in nanometres (10^{-9} metres)
Vertical scales are power in milliwatts per nanometre band width for a 1500mm (5ft) tube at 65W, the Blacklight Blue is for a 40W tube.



Fluorescent tubes colour data

Colour Data
The colour rendering and colour appearance data below is on the same basis as the values specified in BS1853, but there is a trend towards other methods of colour specification, e.g. 6 band values for colour rendering and the CIE uniform chromaticity scale for colour appearance in which the co-ordinates are expressed in u and v values. With this in mind the additional data is provided in table 2.

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 chromacity co-ordinates on a colour chart.
The 'colour temperatures' should not be used as a guide for photographic purposes.

Artificial Daylight	6500K
Northlight/Colour Matching	6500K
Tropical Daylight	6500K
Daylight	4300K
°Kolor-rite	4000K
Natural	**4000K**
De Luxe Natural	3600K
White	**3400K**
Warm White	3000K
De Luxe Warm White	3000K
Home-lite	2600K

Nominal percentage light output for 1500mm (5ft) tubes at 65W

Table 1–8 Bands

CIE Bands	nm	Artificial Daylight	Northlight/ Colour Matching	Daylight	**Natural**	°Kolor-rite	De Luxe Natural	**White**	Warm White	De Luxe Warm White	Home-lite
1. Far Violet	380–420		0·017	0·014	**0·014**	0·017	0·011	**0·010**	0·007	0·017	0·008
2. Violet	420–440	1·06	0·42	0·31	**0·33**	0·13	0·37	**0·26**	0·25	0·30	0·24
3. Blue	440–460		0·65	0·38	**0·37**	0·48	0·39	**0·22**	0·17	0·10	0·120
4. Blue-Green	460–510	9·6	9·7	5·3	**5·6**	7·9	6·1	**3·1**	2·5	2·4	1·800
5. Green	510–560	44·9	44·5	37·2	**38·0**	38·0	38·7	**32·3**	29·5	35·8	29·50
6. Yellow	560–610	33·8	34·1	48·9	**44·1**	39·5	37·5	**54·9**	67·3	45·8	54·70
7. Light Red	610–660	9·9	10·0	7·8	**11·2**	13·0	15·8	**9·1**	10·2	14·9	13·10
8. Dark Red	660–760	0·63	0·63	0·17	**0·69**	1·06	1·2	**0·19**	0·21	0·81	0·52
Ultra-violet (watts per 65W tube, between 300 and 400 nanometres)		1·30	0·47	0·53	**0·41**	0·32	0·42	**0·44**	0·40	0·40	0·36
Colour appearance 'X' and 'Y' colour co-ordinates											
X		0·313	0·317	0·373	**0·378**	0·3804	0·390	**0·414**	0·435	0·437	0·454
Y		0·329	0·324	0·380	**0·365**	0·3767	0·356	**0·397**	0·401	0·400	0·400

Table 2–6 Bands

1. Violet-Blue	400–455	0·79	0·83	0·57	**0·58**	0·435	0·62	**0·41**	0·34	0·36	0·33
2. Blue-Green	455–510	11·2	11·0	5·3	**6·3**	8·03	6·3	**3·3**	2·7	2·6	1·8
3. Green	510–540	23·1	19·9	12·6	**15·0**	19·8	14·8	**9·3**	8·3	13·5	7·7
4. Green-Yellow	540–590	43·7	48·0	59·9	**52·7**	44·7	50·0	**61·3**	60·7	53·2	58·7
5 Orange	590–620	14·4	13·1	17·5	**18·1**	17·7	16·5	**20·7**	22·4	20·6	23·3
6. Red	620–760	6·8	7·2	4·1	**7·3**	9·4	11·8	**4·9**	5·6	9·8	8·1
Colour appearance – Nominal u and v colour co-ordinates CIE uniform chromaticity scale											
u		0·1978	0·203	0·219	**0·228**	0·2251	0·240	**0·239**	0·251	0·252	0·268
v		0·3122	0·311	0·335	**0·031**	0·3344	0·329	**0·343**	0·347	0·347	0·348

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	525mm 21in 13W	300mm 12in 8W	225mm 9in 6W	150mm 6in 4W
White	830	425	290	150
Warm White	830	425	290	150
Daylight	780	400	275	140
Natural	—	325	230	110

Lighting design lumens	525mm 21in 13W	300mm 12in 8W	225mm 9in 6W	150mm 6in 4W
	730	360	240	120
	730	360	240	120
	680	340	230	110
	—	280	190	85

All these tubes are 16mm/0·625in diameter.

FLUORESCENT TUBES

Initial lumens (100 hours)

	2400 mm 8ft 125W	2400 mm Super 8 85W	1800 mm Super 6 85W	1500 mm Super 5 80W*	1500 mm Super 5 65W*	1500† mm 5ft 50W	1200 mm 4ft 40W	900 mm 3ft 30W	900† mm 3ft 30W	600 mm 2ft 40W	600 mm 2ft 20W	450 mm 18in 15W	450† mm 18in 15W
White	**9400**	**7300**	**6600**	**5700**	**5050**	**3700**	**3000**	**2100**	**2400**	**2000**	**1200**	**900**	**950**
Warm White	9300	7200	6500	5600	4950	3650	2950	2100	2400	2000	1200	900	950
Daylight	9000	7000	6250	5450	4800	3600	2900	2000	2300	1900	1150	850	900
Home-lite	—	—	—	4400	4000	—	2450	—	—	—	—	—	—
Natural	**7150**	**5500**	**4800**	**4300**	**3700**	**2800**	**2300**	**1600**	**1800**	**1500**	**900**	**650**	**700**
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	600
De Luxe Natural	5500	4300	3700	3200	2900	2250	1750	1200	1400	1150	700	500	550
Artificial Daylight	4800	3600	3300	2900	2600	—	1500	—	—	—	650	—	500

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
Home-lite	—	—	—	3900	3600	—	2200	—	—	—	—	—	—
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

Note: Amalgam tube lumen outputs as for 6ft 85W ratings above but subject to special ambiant temperature factor, as detailed on page 6:2

Fluorescent tubes light output

REFLECTOR TUBES

Initial lumens (100 hours)

	2400mm 8ft 125W	2400mm 8ft 85W	1800mm 6ft 85W	1500mm 5ft at 80W	1500mm 5ft at 65W	1200mm 4ft 40W	600mm 2ft 20W
White	**8400**	**6500**	**5800**	**5100**	**4500**	**2700**	**1100**
Warm White	8300	6400	5600	4900	4400	2650	—
Daylight	—	—	5500	4700	4200	2600	—
Natural	—	—		**3800**	**3300**	—	—

Lighting design lumens (2000 hours)

White	**7700**	**6000**	**5200**	**4600**	**4200**	**2450**	**1000**
Warm White	7600	5900	5000	4400	4000	2400	—
Daylight	—	—	4900	4200	3800	2350	—
Natural	—	—		**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)

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

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

GRO-LUX

Lighting design lumens (2000 hours)

1500mm 5ft at 80W	1500mm 5ft at 65W	1200mm 4ft 40W	900mm* 3ft 30W	600mm 2ft 20W	450mm* 18in 15W	525mm 21in 13W	300mm 12in 8W
1450	1300	810	530	340	200	180	100

*26mm/1in diameter.

TROPICAL DAYLIGHT

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

CIRCULAR TUBES AND "U" TUBE

Lighting design lumens (2000 hours)
Circular=Warm White only "U"=White only

Tube size (diameter)	400mm 16in	400mm 16in	300mm 12in	200mm 8·25in	600mm x 150mm (diameter)
	60W	40W	32W	22W	40W
	3400	2300	1600	850	2700

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 and similar fittings. (Intermediate section gear).

Tube size	2400mm 8ft	2400mm 8ft	1800mm 6ft	1500mm 5ft	1500mm 5ft	1200mm 4ft	600mm 2ft	600mm 2ft
Diameter	38mm 1·5in	38mm 1·5in	38mm 1·5in	38mm 1·5in	38mm 1·5in	38mm 1·5in	38mm 1·5in	38mm 1·5in
Nominal tube watts	125W	85W	85W	80W	65W	40W	40W	20W
Lamp cap	BP	BP Super 8	BP Super 6	BC or BP	BP Super 5	BP	BP	BP
Actual lamp watts	123	85	84	76	64	39·5	37	19·5
Average tube volts	150	184	120	100	110	102	47	58
Average tube amps	0·94	0·55	0·80	0·87	0·67	0·44	0·88	0·37
Rated life (hours)	7500	7500	7500	7500	7500	7500	5000	5000
SINGLE TUBE SWITCHSTART								
Total circuit watts	144	—	95	94	80	50	58	30
Lagging power factor	0·64‡	—	0·87	0·85	0·85	0·85	0·85	0·34*
Total volt/amps	226	—	108	110	91	60	69	90
Mains current at 240V	0·94	—	0·45	0·46	0·38	0·25	0·29	0·37
Min. starting temperature	0°C	—	+5°C	0°C	0°C	0°C	0°C	0°C
% Harmonics per phase	15%	—	17%	17%	17%	17%	—	—
SINGLE TUBE SWITCHLESS START								
Total circuit watts	154	100	96	99	79	54	100	54
Lagging power factor	0·98	0·99	0·86	0·85	0·91	0·93	0·85	0·85
Total volt/amps	158	100	110	116	87	58	118	63
Mains current at 240V	0·66	0·42	0·46	0·48	0·36	0·24	0·49	0·26
Min. starting temperature	+5°C	+5°C	−5°C	+5°C	−5°C	−5°C	+5°C	+5°C
% Harmonics per phase	8%	7%	25%	17%	25%	25%	—	—
TWIN TUBE SERIES PAIR SWITCHLESS START								
Total circuit watts	—	207	—	—	—	—	94	50
Lagging power factor	—	0·95	—	—	—	—	0·85	0·85
Total volt/amps	—	218	—	—	—	—	110	59
Mains current at 240V	—	0·91	—	—	—	—	0·46	0·25
Min. starting temperature	—	+5°C	—	—	—	—	0°C	0°C
% Harmonics per phase	—	17%	—	—	—	—	—	—

‡2400mm/8ft 125W operates with a series type capacitor at a leading power factor.

*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.

Fluorescent tubes electrical data

Electrical data for 240V 50Hz tube circuits. Average performance tested at 25°C to BS.2818.
The figures below are for control gear used in Popular Pack fittings (slim section gear).

Tube size	8ft	6ft	6ft	6ft	5ft	5ft	4ft	4ft	2ft
Diameter	1½in	1½in	1½in	1½in	1½in	1½in	1½in	1½in	1½in
Nominal tube watts	125	75/85	75	75	65	65	40	40	20
Circuit type	SS	SRS	SS	SS Twin	SS	SRS	SS	SRS	SS
Actual lamp watts	121	82	74	148	64	63	39·6	39	19·5
Average tube volts	153	123	131	131	112	113	103	104	58
Average tube amps	0·92	0·77	0·66	2×0·66	0·67	0·63	0·44	0·42	0·37
Rated life (hours)	7500	7500	7500	7500	7500	7500	7500	7500	5000
Total circuit watts	145*	103*	88*	174*	78*	83*	51*	55*	30*
Mains current amps	0·92	0·50	0·66	0·74	0·39	0·37	0·25	0·24	0·37
Total volt amps	220	120	158	178	93	89	60	58	90
Lagging power factor	0·66‡	0·86	0·56‡	0·98	0·85	0·93	0·85	0·95	0·34**
Min. starting temperature	0°C	−5°C	0°C	+5°C	0°C	−5°C	0°C	−5°C	0°C
% 3rd Harmonics per phase	14%	25%	14%	21%	17%	25%	17%	25%	17%

*The above circuit watts for control gear tested in accordance with BS.2818 may be reduced by up to 3% when operating in some fittings, i.e., the circuit watts reduce as the lamp operating temperature increases.

**Uncorrected value, for single tube operation. ‡Leading power factor.

Electrical data for standard 240V 50Hz tube circuits. Average performance tested at 25°C to BS.2818.
The figures below are for control gear used in Arrow-slim and Minipack fittings (slim section gear).

Tube size	1500mm 5ft	900mm 3ft	450mm 18in	525mm 21in	300mm 12in	225mm 9in	150mm 6in
Diameter	26mm 1in	26mm 1in	26mm 1in	16mm 0·625in	16mm 0·625in	16mm 0·625in	16mm 0·625in
Nominal tube watts	50W	30W	15W	13W	8W	6W	4W
Lamp cap	BP	BP	BP	Min. BP	Min. BP	Min. BP	Min. BP
Actual lamp watts	50	30	15	13	8	6	4
Average tube volts	165	98	57	92	55	43	30
Average tube amps	0·38	0·36	0·34	0·17	0·17	0·16	0·15
Rated life (hours)	5000	5000	5000	5000	5000	5000	5000
SINGLE TUBE SWITCHSTART							
Total circuit watts	—	39	25	19	14	12	10
Lagging power factor	—	0·85	0·31*	0·46*	0·34*	0·31*	0·28*
Total volt/amps	—	46	81	41	41	39	36
Mains current at 240V	—	0·19	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
% Harmonics per phase	—	17%	—	—	—	—	—
SERIES PAIR SWITCHSTART							
Total circuit watts	—	—	40	—	22	18	14
Lagging power factor	—	—	0·85	—	0·52*	0·46*	0·39*
Total volt/amps	—	—	47	—	41	39	36
Mains current at 240V	—	—	0·20	—	0·17	0·16	0·15
Min. starting temperature	—	—	0°C	—	0°C	0°C	0°C

SINGLE TUBE SWITCHLESS START		
Total circuit watts	66	54
Lagging power factor	0·88	0·93
Total volt/amps	91	58
Mains current at 240V	0·38	0·24
Min. starting temperature	+5°C	−5°C
% Harmonics per phase	25%	25%

*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.