

## High Efficiency Lighting Units

Date added to ETL 2001.

### 1. Definition of Technology

High efficiency lighting units are products that are specifically designed to illuminate efficiently particular activities or features of a business.

### 2. Technology Description

High efficiency lighting units (HELUs) are a combination of a light fitting (or luminaire), one or more lamps, and associated control gear that have been assembled into a single packaged unit that can be readily deployed in any sector of industry or business. All three components need to be present to make up a HELU which complies with the ETL.

HELUs have been included in the Enhanced Capital Allowance (ECA) scheme because they offer substantial energy and carbon savings. A wide variety of products are available with a range of performance levels. The ECA scheme aims to encourage the purchase of high efficiency products that meet certain minimum design and performance standards.

Six different categories of HELUs are covered by the ECA scheme:

1	Triphosphor compact fluorescent lamps (CFL) and lighting fittings (including associated control gear)
2	T8 triphosphor linear fluorescent lamp(s) and lighting fittings with associated electronic control gear
3	T5 triphosphor linear fluorescent lamp(s) and lighting fittings with associated electronic control gear
4	High-pressure Sodium 'Plus' lamps, or Metal Halide lamps, and high-bay, low-bay or horticultural lighting fittings with associated control gear
5	High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting
6	Metal Halide lamps and Accent or Display lighting fittings with associated control gear

Investments in HELUs can only qualify for Enhanced Capital Allowances if the product meets the criteria as set out below and if the installation can be classified as plant. A HELU can be classified as plant if it mainly supplies the particular lighting requirements of the business activities carried on in the space where it is installed. Detailed information on the qualification plant should be sought from a company accountant or company tax advisor.

### 3. Eligibility Criteria

To be eligible, products must comply with specific eligibility criteria for the relevant category of High Efficiency Lighting Unit as set out in Tables 1 to 6. These tables include separate criteria for each component of a HELU: namely: the light fitting (or luminaire), lamps and associated control gear. For a product to be eligible, the HELU and each of its components must comply with all relevant eligibility criteria.

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### Performance criteria

Products must deliver the minimum nominal initial lumens per lamp value for the relevant category of High Efficiency Lighting Unit as set out in Tables 1 to 6, whilst not exceeding the corresponding maximum Lighting Fitting Efficiency Code (LFEC) value.

Products must also comply with all relevant performance requirements in respect of their component light fitting, lamps or associated control gear, as set out in Tables 1 to 6.

**Note:** Appendix 1 explains how the LFEC value can be determined.

### Required test procedures

All products must be tested in accordance with the procedures and test conditions in the standards for the category of High Efficiency Lighting Unit as set out in Tables 1 to 6.

Photometry must be undertaken in compliance with either BS 5225-1:1975 or BS EN 13032-1:2004. Lamp lumens are those obtained when operated with the specified control gear.

<b>Table 1</b>	<b>High Efficiency Lighting Units comprising triphosphor compact fluorescent lamps and lighting fittings (including associated control gear) for indoor and outdoor applications.</b>
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<b>SECTION 1A -ELIGIBILITY CRITERIA</b>
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To be eligible under this category of High Efficiency Lighting Unit:

- All CFLs must comply with BS EN 61199:2000 (safety) and BS EN 60901:1996 (performance).
- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- High frequency (HF) control gear must be fitted.

The high frequency (HF) control gear must be either 'dimnable' (regulating) or non-dimnable 'warm start' types. If non-dimnable then 'warm start' versions of HF electronic control gear must be used. This is to avoid potential lamp life problems arising if "cold start" HF electronic controls are used and lighting controls are installed so that lamps are switched on and off fairly frequently.

Where fitted, 'warm start' high-frequency control gear must comply with BS EN 61347-1:2001 (safety) and BS EN 60929:2006 (performance). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).

<b>SECTION 1B -PERFORMANCE THRESHOLDS</b>
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Triphosphor lamps				Lighting fitting	
Type	Watts as labelled	Actual lamp watts when using HF control gear	Required minimum nominal initial (100h) lumens per lamp	Maximum LFEC value	
				General interior lighting fittings	Amenity, display & accent lighting fittings
Compact 2 tubes	18W	16W	1,150	n/a	F2
	24W	22W	1,750	F0	F3
	36W	32W	2,800	F1	F4
	40W	40W	3,500	F1	F4
	55W	55W	4,800	F1	F4
	80W	80W	6,000	n/a	F2
Compact 4 tubes flat	18W	16W	1,100	n/a	F2
	24W	22W	1,700	n/a	F2
	36W	32W	2,800	F1	F4
Compact 4 tubes	10W	9.5W	600	n/a	F1
	13W	12.5W	900	n/a	F1
	18W	16.5W	1,200	n/a	F1
	26W	24W	1,800	n/a	F2
Compact 6 & 8 tubes	18W	16W	1,200	n/a	F1
	26W	24W	1,800	n/a	F2
	32W	32W	2,400	n/a	F2
	42W	42W	3,200	n/a	F2
	57W	57W	4,300	n/a	F2
	70W	70W	5,200	n/a	F2
Compact 2D	10W	9W	590	n/a	F1
	16W	14W	950	n/a	F1
	21W	19W	1,250	n/a	F1
	28W	25W	1,850	F0	F3
	36W	34W	2,580	F0	F3
	55W	55W	3,900	F0	F3

### SECTION 1C -NOTES

1. n/a (not achievable) indicates that the lighting unit is not sufficiently efficient to be eligible for use in general lighting installations. The circuit efficacies of most types/wattage ratings of CFLs are such that it is rarely possible to achieve an acceptable overall Lighting Unit efficiency to allow them to be used for General Lighting applications. However their use in Amenity, Accent, and Display lighting applications is permissible because it provides a more efficient alternative to the frequently used but less efficient options, e.g. tungsten filament or tungsten halogen lamps or CFLs in inefficient lighting fittings with standard 50Hz control gear. Hence there are two sets of LFEC requirements.
2. Some fluorescent lamps are labelled and branded with the wattage (power) consumed when operated on standard 50Hz (i.e. not high-frequency) control gear. When operated on high-frequency control gear the watts consumed are less (see columns 2 & 3 of Table).
3. These High Efficiency Lighting Units comprise non-integral compact fluorescent lamps (i.e. those types that do not incorporate the control gear in the lamp cap) and lighting fittings with high frequency (HF) electronic control gear contained in the lighting fitting or accompanying enclosure.
4. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 1 above.

<b>Table 2 High Efficiency Lighting Units comprising T8 triphosphor linear fluorescent lamp(s), and lighting fitting with associated electronic control gear.</b>					
<b>SECTION 2A -ELIGIBILITY CRITERIA</b>					
To be eligible under this category of High Efficiency Lighting Unit:					
<ul style="list-style-type: none"> <li>• Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of EN 60598.</li> <li>• Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).</li> <li>• Lamps must comply with BS EN 61195:2000 (safety) and BS EN 60081:1998 (performance).</li> <li>• Lamps must have a Colour Rendering Index no lower than Ra85.</li> <li>• High frequency (HF) control gear must be fitted.</li> </ul> <p>The high frequency (HF) control gear must be either 'dimnable' (regulating) or non-dimnable 'warm start' types. If non-dimnable then 'warm start' versions of HF electronic control gear must be used. This is to avoid potential lamp life problems arising if "cold start" HF electronic controls are used and lighting controls are installed so that lamps are switched on and off fairly frequently.</p> <p>Where fitted, 'warm start' high-frequency control gear must comply with BS EN 61347-1:2001 (safety) and BS EN 60929:2006 (performance). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).</p>					
<b>SECTION 2B -PERFORMANCE THRESHOLDS</b>					
<b>T8 Triphosphor fluorescent lamps</b>					<b>Lighting fittings</b>
<b>Watts as labelled</b>	<b>Actual lamp watts when used with HF control gear</b>	<b>Length (m)</b>	<b>Tube diameter (mm)</b>	<b>Required minimum nominal initial (100h) lumens per lamp</b>	<b>Maximum value of LFEC</b>
18	16	0.6	26	1,350	F1
36	32	1.2	26	3,200	F3
58	50	1.5	26	5,000	F3
70	60	1.8	26	6,000	F3
<b>SECTION 2C -NOTES</b>					
1. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 2 above.					

<b>Table 3 High Efficiency Lighting Units comprising T5 triphosphor linear fluorescent lamp(s), and lighting fitting with associated electronic control gear.</b>					
<b>SECTION 3A -ELIGIBILITY CRITERIA</b>					

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- Lamps must have a Colour Rendering Index no lower than Ra85.
- Lamps must comply with BS EN 61195:2000 (safety) and BS EN 60081:1998 (performance).

The high frequency (HF) control gear must be either 'dimnable' (regulating) or non-dimnable 'warm start' types. Where fitted, "Warm start" high-frequency control gear must comply with BS EN 61347-1:2001 (safety) and BS EN 60929:2006 (performance). It must also conform to the appropriate CELMA Class A1, A2 or A3 requirement for maximum input power, if it is included in the current CELMA Guide (2005).

**SECTION 3B -PERFORMANCE THRESHOLDS**

T5 Triphosphor fluorescent lamps				Lighting fittings
Lamp watts as labelled and when used with electronic HF control gear	Length (m)	Tube diameter (mm)	Minimum required nominal initial (100h) lumens per lamp @25°C	Maximum value of LFEC
14	0.55	16	1,200	F2
24	0.55	16	1,750	F1
21	0.85	16	1,900	F3
39	0.85	16	3,100	F2
28	1.15	16	2,600	F3
54	1.15	16	4,450	F2
35	1.45	16	3,300	F3
49	1.45	16	4,300	F2
80	1.45	16	6,150	F1

**SECTION 3C -NOTES**

1. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 3 above.

**Table 4** High Efficiency Lighting Units comprising High-pressure Sodium 'Plus' lamps or Metal Halide lamps and high-bay, low-bay or horticultural lighting fittings with associated control gear.

**SECTION 4A -ELIGIBILITY CRITERIA**

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of EN 60598.
- Light fittings installed indoors must comply with the glare requirements of HSG 38 (1998).
- Lamps must comply with BS EN 62035:2000 (safety).

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 60922:1997 (safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:1997 (performance) and BS EN 61347-2-1 :2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2001, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005, BS EN 60927:1997 and BS EN 60929:2006.

**SECTION 4B -PERFORMANCE THRESHOLDS**

Lamps			Lighting fittings
Type(s)	Watts as labelled	Minimum required nominal initial (100h) lumens per lamp	Maximum value of LFEC
High-pressure sodium 'Plus' versions	150	16,000	F2
	250	30,500	F2
	400	52,000	F2
	600	90,000	F2
Metal Halide	150	12,000	F2
	250	17,000	F2
	400	30,500	F2

**SECTION 4C -NOTES**

1. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.
2. The lamp control gear may be incorporated in the lighting fitting or in a separate accompanying enclosure.
3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and photoelectric controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 4 above.

**Table 5 High Efficiency Lighting Units comprising High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting.**

**SECTION 5A -ELIGIBILITY CRITERIA**

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the relevant Part 2 of EN 60598.
- Lamps must comply with BS EN 62035:2000 (safety).

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 60922:1997 (safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:1997 (performance) and BS EN 61347-2-1 :2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2001, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005, BS EN 60927:1997 and BS EN 60929:2006.

**SECTION 5B -PERFORMANCE THRESHOLDS**

Lamps			Floodlight or Post-top lantern
Type	Watts as labelled	Minimum required nominal initial (100h) lumens per lamp	Maximum value of LFEC
High-pressure sodium 'Plus' tubular lamps	70	6,500	F3
	100	10,000	F3
	150	17,500	F3
	250	33,000	F3
	400	56,500	F3
Metal halide lamps	70	5,300	F3
	150	11,500	F3
	250	17,000	F3
	400	30,500	F3

**SECTION 5C -NOTES**

1. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.
2. The lamp control gear may be incorporated in the lighting fitting or in a separate accompanying enclosure.
3. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and photoelectric controls are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 5 above.

**Table 6 High Efficiency Lighting Units comprising Metal Halide lamps and Accent or Display lighting fittings with associated control gear.**

**SECTION 6A -ELIGIBILITY CRITERIA**

To be eligible under this category of High Efficiency Lighting Unit:

- Light fittings must comply with BS EN 60598-1:2004 and the current Part 2 of EN 60598.
- Lamps must comply with BS EN 62035:2000 (safety).

Where standard 50 Hz control gear is fitted:

- Ballasts must comply with BS EN 60923:2005 (performance) and BS EN 60922:1997 (safety).
- Capacitors must comply with BS EN 61049:1993 (performance) and BS EN 61048:2006 (safety).
- Starting devices must comply with BS EN 60927:1997 (performance) and BS EN 61347-2-1:2001 (safety).

Electronic control gear (where fitted) must comply with BS EN 55015:2001, EN61000-3-2:2006, BS EN 61547:1996, BS EN 61347-2-1:2001, BS EN 61347-2-12:2005, BS EN 60927:1997 and BS EN 60929:2006.

Lamps with integral reflectors (PAR) must comply with the LFEC requirements.

**SECTION 6B -PERFORMANCE THRESHOLDS**

Lamps			Floodlight or Post-top lantern
Type	Watts as labelled	Minimum required nominal initial (100h) lumens per lamp	Maximum value of LFEC
Metal Halide, including ceramic types	35	3,300	F3
	70	6,200	F3
	150	14,000	F4

**SECTION 6C -NOTES**

1. Lighting fittings with either standard 50Hz control gear or electronic control gear are eligible.
2. Lighting fittings that incorporate lighting control devices such as light regulation (dimming) are considered eligible provided that they comply with the other eligibility criteria and the performance thresholds set out in Table 6 above.

**4. Scope of Claim**

Expenditure on the provision of plant and machinery can include not only the actual costs of buying the equipment, but other direct costs such as the transport of the equipment to site, and some of the direct costs of installation. Clarity on the eligibility of direct costs is available from [HMRC](http://www.hmrc.gov.uk).

**APPENDIX 1 - Determining the Lighting Fitting Efficiency Code (LFEC)**

**1.1 LFEC code for indoor lighting fittings from the utilisation factor**

The Lighting Fitting Efficiency Code (LFEC) of a lighting fitting is determined from the Utilisation Factor (UF) normally provided by the manufacturer for a standard room of surface reflectance of 0.7 (ceiling), 0.5 (walls) and 0.2 (floor), and a Room Index of 3.0. The table below gives values of LFEC for different ranges of UF.

**Table 1.1 Lighting Fitting Efficiency Codes (LFEC)**

LFEC Code	'K' or UF
F0	>0.89
F1	0.80 - 0.88
F2	0.72 - 0.79
F3	0.65 - 0.71
F4	0.59 - 0.64
F5	0.53 - 0.58

**1.2 LFEC code for indoor lighting fittings by calculation**

For some types of lighting fitting a manufacturer may be unable to provide a UF table, e.g. recessed 'downlight', 'wall-washer' and amenity lighting fittings as well as outdoor lighting fittings, including floodlights. In such cases they will state, or can provide, what are known as the Light Output Ratios, i.e.

<b>ULOR = Upward light output ratio</b>	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in an upward direction.
<b>DLOR = Downward light output ratio</b>	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in a downward direction.
<b>LOR = Light output ratio</b>	This is the portion of the light produced by the lamp(s) that is emitted from the lighting fitting in all directions.

ULOR + DLOR = LOR which will be less than 1.0 because the lighting fitting does not emit all of the light produced by the lamp(s).

The LFEC can be determined by using this information to calculate an approximation (denoted as 'K') of the UF for reflectance of 0.70, 0.50 & 0.20 and a Room Index of 3.0 in the following manner:

$$K = DLOR + (0.5 \times ULOR)$$

The result of this calculation is used to obtain the LFEC by referring to table AP1.1

Examples:

If DLOR = 0.5 & ULOR = 0.2, then  $K = 0.5 + (0.5 \times 0.2) = 0.6$  (LFEC = F4)

If DLOR = 0.75 & ULOR = 0, then  $K = 0.75 + (0.5 \times 0) = 0.75$  (LFEC = F2)

### 1.3 Outdoor lighting fittings

**Floodlights** are unlikely to be positioned as indoor lighting fittings, i.e. pointing straight down, therefore the ULOR and DLOR value cannot be defined. For floodlight fittings it is acceptable to assume that 'K' = the light output ratio (LOR) value, which is normally quoted for such lighting fittings.

For example, the LOR for a floodlight fitting is stated to be 0.68.

Referring to table 1.1 shows that the LFEC is F3

**Post top outdoor lighting fittings:** DLOR and ULOR values are quoted for such fittings, therefore 'K' can be calculated by the same method as defined in section 1.2, above.