

## High Efficiency Lighting units

### Current Eligibility Criteria

Various combinations of Lighting Fitting with Associated Control Gear and Lamp(s) meet the criteria for a High Efficiency lighting Unit. For ease of reference all such compliant combinations have been divided into the sections shown below.

Sections 1 - 6 contain specifications for each component part of a High Efficiency lighting Unit. However to achieve compliance with the ETL all the component parts must meet the respective specifications within a given section and must be installed together in order to constitute a High Efficiency lighting Unit. This ensures the energy savings will be realised in use.

Neither lamps nor light fittings alone can be said to "comply with the ETL".

Section	Compliant Unit Type
1	Triphosphor 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

**Section 1: Details of eligible High Efficiency Lighting Units comprising triphosphor compact fluorescent lamps (CFLs) and lighting fittings (including associated control gear) for indoor and outdoor applications.**

These High Efficiency Lighting Units comprise non-integral compact fluorescent lamps (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.

HF control gear must be either 'dimmable' (regulating) or non-dimmable 'warm start' types. If non-dimmable 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.

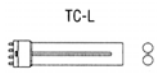
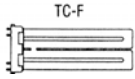
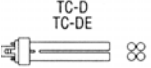
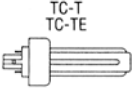
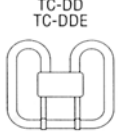
Table 1 states the minimum LFECs values for lighting fittings suitable for use with each of the lamp types listed.

Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are eligible provided that they comply with the performance and other stated specifications.

**NOTE 1:** 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, Effect, 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.

**NOTE 2:** Required minimum nominal initial lumen values of triphosphor compact fluorescent lamps included in the Lighting Units defined in Table 1 of the Lighting ETL are specified in Table AP1.1 in Appendix 1.

Table 1: Eligible High Efficiency Lighting Units comprising triphosphor compact fluorescent lamps and lighting fittings (including associated control gear) for indoor and outdoor applications.

Triphosphor lamps			Lighting fitting		
Type	Watts as labelled	Actual lamp watts when using HF control gear	Type of lamp control gear	Maximum LFEC value	
				General interior lighting	Amenity, display & accent lighting
Compact 2 tubes 	18W	16W	Electronic HF	<i>n/a</i>	F2
	24W	22W	Electronic HF	F1	F4
	36W	32W	Electronic HF	F2	F5
	40W	40W	Electronic HF	F2	F5
	55W	55W	Electronic HF	F2	F5
	80W	80W	Electronic HF	F1	F4
Compact 4 tubes flat 	18W	16W	Electronic HF	<i>n/a</i>	F2
	24W	22W	Electronic HF	<i>n/a</i>	F3
	36W	32W	Electronic HF	F2	F5
Compact 4 tubes 	10W	9.5W	Electronic HF	<i>n/a</i>	F2
	13W	12.5W	Electronic HF	<i>n/a</i>	F2
	18W	16.5W	Electronic HF	<i>n/a</i>	F2
	26W	24W	Electronic HF	<i>n/a</i>	F3
Compact 6 & 8 tubes 	18W	16W	Electronic HF	<i>n/a</i>	F2
	26W	24W	Electronic HF	<i>n/a</i>	F3
	32W	32W	Electronic HF	<i>n/a</i>	F3
	42W	42W	Electronic HF	<i>n/a</i>	F3
	57W	57W	Electronic HF	<i>n/a</i>	F3
	70W	70W	Electronic HF	<i>n/a</i>	F3
Compact 2D 	10W	9W	Electronic HF	<i>n/a</i>	F2
	16W	14W	Electronic HF	<i>n/a</i>	F2
	21W	19W	Electronic HF	<i>n/a</i>	F2
	28W	25W	Electronic HF	F1	F4
	36W	34W	Electronic HF	F1	F4
	55W	55W	Electronic HF	F1	F4

**Notes**

1. *n/a* (not achievable) indicates that the lighting unit is not sufficiently efficient to be eligible for use in general lighting installations.
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 is less (see columns 2 & 3 of Table).

**Furthermore, to qualify:**

- All lighting fittings must ensure compliance with the glare requirements of HSG 38.
- Lighting fittings to comply with EN-60598-1 and the relevant Parts 2.
- "Warm start" high frequency electronic control gear included in the current CELMA Guide must conform to 60929 (performance).
- Those types of high frequency electronic control gear included in the current CELMA Guide must conform to CELMA Class A1, A2 or A3 requirements, as appropriate, for maximum input power.

**Section 2: Details of eligible High Efficiency Lighting Units comprising T8 triphosphor linear fluorescent lamp(s) and lighting fitting with associated electronic control gear.**

These high efficiency lighting units incorporating T8 (26 mm diameter) triphosphor lamps and lighting fittings with HF electronic control gear typically consume 15% to 20% less energy than T8 triphosphor lamps operating on switch-start 50Hz (mains frequency) control gear for the same lighting level illuminance). Compared with the old halophosphate fluorescent lamps operating on switch-start control gear the running cost savings are c.35%.

The high frequency control gear can be either 'regulating' (dimming) or non-regulating 'warm start' types. Warm start HF control gear is mandatory to avoid potential lamp life problems where lighting controls are installed and lamps are switched at typical frequencies. The Lighting Fitting Efficiency Code requirements are such as to ensure that the high efficiency of the lamps and HF control gear is not nullified by poor performance of lighting fittings.

Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence ' controls are eligible provided that they comply with the performance and other stated specifications.

**Table 2: Eligible High Efficiency Lighting Units comprising T8 triphosphor linear fluorescent lamp(s) and lighting fitting with associated electronic control gear.**

T8 Triphosphor fluorescent lamps				Lighting fittings	
Watts as labelled	Actual lamp watts when used with HF control gear	Length (m)	Tube diameter (mm)	Type of associated control gear	Lighting fitting: Maximum value of LFEC
18	16	0.6	26	Electronic HF	F2
36	32	1.2	26	Electronic HF	F4
58	50	1.5	26	Electronic HF	F4
70	60	1.8	26	Electronic HF	F4
<b>Furthermore to qualify:</b> <ul style="list-style-type: none"> <li>- All lighting fittings must comply with the glare requirements of HSG 38; e.g. batten luminaires must be fitted with an attachment.</li> <li>- Lighting fittings to comply with EN 60598-1 and the relevant Parts 2.</li> <li>- Fluorescent lamps to comply with EN61195 (safety) and EN60081 (performance) and with nominal initial (100h) lumen values included in these criteria.</li> <li>- "Warm start" high-frequency control gear to comply with EN63147 (safety) and EN 60929 (performance and must conform to CELMA Class A1, A2 or A3 requirement as appropriate for maximum input power.</li> </ul>					

**Note 1: Required minimum nominal initial lumens of T8 linear fluorescent lamps, with triphosphor coating, included in the Lighting Units defined in Table 2 of the Lighting ETL are specified in Table AP1.2 in Appendix 1.**

**Section 3: Details of eligible High Efficiency Lighting Units comprising T5 triphosphor linear fluorescent lamp(s) and lighting fitting with associated electronic control gear.**

These high efficiency lighting units incorporating T5 (16 mm diameter) triphosphor linear fluorescent lamps and lighting fittings with HF electronic control gear have similar efficiencies to those of the units incorporating T8 triphosphor lamps defined in Section 2.

Lighting fittings that incorporate lighting control devices such as light regulation (dimming) and 'presence' controls are eligible provided that they comply with the performance and other stated specifications.

**Table 3: Eligible High Efficiency Lighting Units comprising T5 triphosphor linear fluorescent lamp(s) and lighting fitting with associated electronic control gear.**

T5 Triphosphor fluorescent lamps			Lighting fittings	
Lamp watts as labelled and when used with electronic HF control gear	Length (m)	Tube diameter (mm)	Type of associated control gear	Lighting fitting: Maximum value of LFEC
14	0.55	16	Electronic HF	F3
24	0.55	16	Electronic HF	F2
21	0.85	16	Electronic HF	F4
39	0.85	16	Electronic HF	F3
28	1.15	16	Electronic HF	F4
54	1.15	16	Electronic HF	F3
35	1.45	16	Electronic HF	F4
49	1.45	16	Electronic HF	F3
80	1.45	16	Electronic HF	F2

**Furthermore to qualify:**

- All lighting fittings must comply with the glare requirements of HSG 38; e.g. batten luminaires must be fitted with an attachment.
- Lighting fittings to comply with EN 60598-1 and the relevant Parts 2.
- Fluorescent lamps to comply with EN61195 (safety) and EN60081 (performance) and with nominal initial (100h) lumen values included in these criteria.
- "Warm start" high-frequency control gear to comply with EN63147 (safety) and EN 60929 (performance) and must conform to CELMA Class A1, A2 or A3 requirement as appropriate for maximum input power.

*Note 1: Required minimum nominal initial lumens of T5 linear fluorescent lamps with triphosphor coating, good colour rendering (colours 827, 830, 835 & 840 only) included in the Lighting Units defined in Table 3 of the Lighting ETL are specified in Table AP1.3 in Appendix 1.*

**Section 4: Details of eligible 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.**

For certain indoor lighting applications it is more practical and/or economical and/or energy-efficient to use medium to high wattage high-pressure sodium ('Plus' versions) or metal halide lamps in high bay or low bay lighting fittings instead of mercury fluorescent or linear fluorescent lamps.

The lamp control gear may be incorporated in the lighting fitting or in a separate accompanying enclosure.

**Table 4. Eligible 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.**

Lamp		Lighting fittings	
Type(s)	Watts as labelled	Type of associated control gear	Maximum LFEC (i.e. minimum efficiency)
High-pressure sodium 'Plus' versions	150	Standard 50Hz	F2
	250		F2
	400		F2
	600		F2
Metal Halide	150	Standard 50Hz	F2
	250		F2
	400		F2

**Furthermore, to qualify:**

- The design of the luminaires must be such that they comply with the glare recommendations of HSG 38.
- Luminaires to comply with EN 60598-1 and the relevant Parts 2.
- High-pressure sodium lamps to comply with EN 60662 (performance) and EN 62035 (safety).
- Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).
- Ballasts to comply with EN 60923 (performance) and EN 60922 (safety).
- Capacitors to comply with EN 61049 (performance) and EN 61048 (safety).
- Starting devices to comply with EN 61049 (performance) and EN 60927 (safety).

**Note 1: Required nominal initial (100h) lumens for lamp types included in the 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) as defined Table 4 of the Lighting ETL are specified in Table AP1.4 of Appendix 1**

**Section 5: Details of eligible Lighting Units comprising High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting.**

The low capital cost of highly inefficient tungsten halogen floodlights often results in their use in place of the significantly more energy-efficient types of lighting fittings that utilise high-pressure sodium 'Plus' or metal halide lamps.

Typically, floodlights housing high-pressure sodium 'Plus' or metal halide lamps will consume 65% to 75% less energy than those incorporating tungsten halogen lamps for an equivalent lighting result.

The lamp control gear may be incorporated in the lighting fitting or in a separate associated enclosure.

**Note 1:** Required nominal initial (100h) lumens for lamp types included in the Lighting Units (comprising High-pressure Sodium 'Plus' tubular lamps or Metal Halide lamps and Floodlight fittings or Post-mounted lanterns for exterior lighting) defined in Table 5 of Lighting ETL are specified in Table AP1.5 of Appendix 1.

**Table 5. Eligible 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.**

Lamp		Floodlight or Post-top lantern	
Type	Watts as labelled	Type of associated control gear	Maximum value of LFEC (i.e. minimum efficiency)
High-pressure sodium 'Plus' tubular lamps	70	Standard 50Hz	F3
	100		F3
	150		F3
	250		F3
	400		F3
Metal halide lamps	70	Standard 50Hz	F3
	150		F3
	250		F3
	400		F3
<b>Furthermore, to qualify:</b> <ul style="list-style-type: none"> <li>- Luminaires to comply with EN 60598-1 and the with EN 60662 (performance) and EN relevant sections of Part 2.</li> <li>- High-pressure sodium lamps to comply 62035 (safety).</li> <li>- Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).</li> <li>- Ballasts to comply with EN 60923 (performance) and EN 60922 (safety).</li> <li>- Capacitors to comply with EN 61049 (performance) and EN 61048 (safety).</li> <li>- Starting devices to comply with EN 61049 (performance) and EN 60927 (safety).</li> </ul>			

**Section 6: Details of eligible High Efficiency Lighting Units for Accent and Display lighting incorporating Metal Halide Lamps.**

The fairly recent introduction of improved colour quality low wattage (35 W to 150 W) metal halide lamps of small dimensions provides opportunities to achieve accent and display lighting effects equivalent to some of those currently obtained with tungsten halogen lamps but using c.65% less energy.

Note 1: Required nominal initial (100h) lumens for the Metal Halide lamps included in the Lighting Units (comprising Metal Halide lamps and Accent or Display lighting fittings with associated control gear) defined in Table 6 of Lighting ETL are specified in Table AP1.6 of Appendix 1

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

Lamp		Lighting fitting	
Type	Watts as labelled	Associated control gear	Maximum value of LFEC (i.e. minimum efficiency)
Metal Halide, including ceramic types	35	Standard 50Hz	F3
	70		F3
	150		F4
<b>Note:</b>			
<ul style="list-style-type: none"> <li>- Integral reflector (PAR) versions of the above lamps are eligible provided they comply with max. LFEC values</li> </ul>			
<b>Furthermore, to qualify:</b>			
<ul style="list-style-type: none"> <li>- Luminaires to comply with EN 60598-1 and the relevant Parts 2.</li> <li>- 60927 Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).</li> <li>- Ballasts to comply with EN 60923 (performance) and EN 60922 (safety).</li> <li>- Capacitors to comply with EN 61049 (performance) and EN 61048 (safety).</li> <li>- Starting devices to comply with EN 61049 (performance) and EN (safety).</li> </ul>			

**APPENDIX 1 - Required Nominal Initial (100h) Lumens of Lamp Types Specified in Tables 1 to 6 of the High Efficiency Lighting Unit Criteria Sections.**

**Table AP1.1: Required minimum nominal initial lumen values of triphosphor compact fluorescent lamps included in the Lighting Units defined in Table 1 of the Lighting ETL**

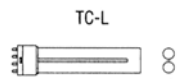
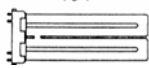
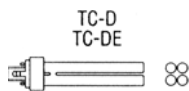
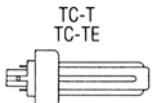
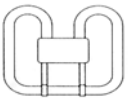
Lamp type	Lamp watts as labelled	Lamp watts when using HF control gear	Required minimum nominal initial (100h) lumens per lamp when operated on HF control gear
Compact 2 Tubes 	18W	16W	1150
	24W	22W	1750
	36W	32W	2800
	40W	40W	3500
	55W	55W	4800
	80W	80W	6000
Compact 4 tubes flat 	18W	16W	1100
	24W	22W	1700
	36W	32W	2800
Compact 4 tubes 	10W	9.5W	600
	13W	12.5W	900
	18W	16.5W	1200
	26W	24W	1800
Compact 6 & 8 tubes 	18W	16W	1200
	26W	24W	1800
	32W	32W	2400
	42W	42W	3200
	57W	57W	4300
	70W	70W	5200
Compact 2D 	10W	9W	590
	16W	14W	950
	21W	19W	1250
	28W	25W	1850
	36W	34W	2580
	55W	55W	3900
Furthermore, to qualify: All CFLs must comply with EN 61199 (safety) and EN 60901 (performance).			

Table AP1.2: Required minimum nominal initial lumens of T8 linear fluorescent lamps, with triphosphor coating, included in the Lighting Units defined in Table 2 of the Lighting ETL.

Lamp watts as labelled	Actual lamp watts when used with HF control gear	Length (m)	Required minimum nominal initial (100h) lumens per lamp when operated on HF control gear
18	16	0.6	1350
36	32	1.2	3200
58	50	1.5	5000
70	60	1.8	6000
<b>Furthermore, to qualify:</b>			
- Fluorescent lamps to comply with EN61195 (safety) and EN60081 (performance).			

Table AP1.3: Required minimum nominal initial lumens of T5 linear fluorescent lamps with triphosphor coating, good colour rendering (colours 827, 830, 835 & 840 only) included in the Lighting Units defined in Table 3 of the Lighting ETL.

<b>NOTE:</b> The photometric data for luminaires housing T5 lamps (Utilisation Factors, Light Output Ratios etc.) should also be obtained at 25°C ambient.			
Lamp watts as labelled and when operated on HF gear	Length (m)	Tube diameter (mm)	Required nominal initial lumens Initial (100h) lamp lumens @25°C
14	0.55	16	1200
24	0.55	16	1750
21	0.85	16	1900
39	0.85	16	3100
28	1.15	16	2600
54	1.15	16	4450
35	1.45	16	3300
49	1.45	16	4450
80	1.45	16	6150
<b>Furthermore, to qualify:</b>			
- Fluorescent lamps must comply with EN61195 (safety) and EN60081 (performance).			

Table AP1.4: Required nominal initial lumens for lamp types included in the Lighting Units defined Table 4 of the Lighting ETL.

High-pressure sodium 'Plus' version		Metal halide	
Lamp power (watts)	Minimum required nominal initial (100h) lumens per lamp	Lamp power (watts)	Minimum required nominal initial (100h) lumens per lamp
150	16000	150	12000
250	30500	250	17000
400	52000	400	30500
600	90000		
<b>Furthermore, to qualify:</b> <ul style="list-style-type: none"> <li>- High-pressure sodium lamps to comply with EN 60662 (performance) and EN 62035 (safety).</li> <li>- Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).</li> </ul>			

Table AP1.5: Required nominal initial lumens for lamp types included in the Lighting Units defined in Table 5 of Lighting ETL

High-pressure sodium tubular 'Plus' versions		Metal halide	
Lamp power (watts)	Minimum required nominal initial (100h) lumens per lamp	Lamp power (watts)	Minimum required nominal initial (100h) lumens per lamp
70	6500	70	5300
100	10000	150	11500
150	17500	250	17000
250	33000	400	30500
400	56500		
<b>Furthermore, to qualify:</b> <ul style="list-style-type: none"> <li>- High-pressure sodium lamps to comply with EN 60662 (performance) and EN 62035 (safety).</li> <li>- Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).</li> </ul>			

Table AP1.6 Required nominal initial lumens for the Metal Halide lamps included in the Lighting Units defined in Table 6 of Lighting ETL.

Lamp power (watts)	Minimum required nominal initial (100h) lumens per lamp
35	3300
70	6600
150	14000
<b>Note:</b> <ul style="list-style-type: none"> <li>- Integral reflector (PAR) versions of above lamps conform to the required lighting fitting efficiency code.</li> </ul>	
<b>Furthermore, to qualify:</b> <ul style="list-style-type: none"> <li>- Metal halide lamps to comply with EN 61167 (performance) and EN 62035 (safety).</li> </ul>	

**APPENDIX 2 - Determining the Lighting Fitting Efficiency Code (LFEC)**

**AP2.1 For indoor lighting fittings from the Utilisation Factor**

Table AP2.1 is an *example* of a Utilisation Factor (UF) table. Utilisation factors indicate the application efficiency of a lighting fitting in providing general lighting on a horizontal working plane in an interior. The UF for a lighting fitting varies according to the reflectances of the room surfaces and the room dimensions. Hence the UF table provides values for a range of surface reflectances and room indices; the latter calculated from the dimensions of the interior.

**Table AP2.1 EXAMPLE of a Utilisation Factor Table (SHR = nominal max.)**

Room Reflectances			Room Index								
C	W	F	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00
0.70	0.50	0.20	N/A	46	50	53	57	59	61	63	65
	0.30		N/A	42	45	49	53	58	59	61	63
	0.10		N/A	39	42	46	50	53	56	59	61
0.50	0.50	0.20	N/A	44	48	51	54	57	58	61	62
	0.30		N/A	41	44	47	51	54	56	59	60
	0.10		N/A	38	42	45	49	52	54	57	59
0.30	0.50	0.20	N/A	43	46	49	52	54	56	58	59
	0.30		N/A	40	43	46	50	52	54	56	58
	0.10		N/A	37	41	44	48	50	52	55	57
0	0	0	N/A	36	39	42	45	48	49	52	53
<b>N.B. UF data differs between types of lighting fittings.</b>											

The Lighting Fitting Efficiency Code (LFEC) of a lighting fitting is determined by the value of the UF for room surface reflectances of 0.7, 0.5 and 0.2, for C, W and F respectively and a Room Index of 3.0.

In the example Table AP2.1 the UF for these reflectance values is 0.61 (decimal points are not shown in UF tables).

Then, referring to table AP2.2 the LFEC for a luminaire having a UF of 0.61 is F4

**Table AP2.2 Luminaire Performance Codes**

LFEC	'K' or UF for lighting fitting for reflectances of 0.7,0.5 & 0.2, Room Index = 3.0
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

**AP2.2 If the manufacturer or supplier of the lighting fitting is unable to provide data in the form of a Utilisation Factor Table.**

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 reflectances of 0.70, 0.50 & 0.20 and an RI 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 AP2.2

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)

### AP2.3: 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 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 AP2.2 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 the same calculation as defined in section AP2.2, above.