



The Institution of Lighting Professionals

Guidance on current and forth coming legislation within the lighting sector



Your Lighting Asset Needs You Now!

Whether you design, specify, install or maintain interior or exterior lighting installations this document advises on energy and carbon legislation that you need to know and act upon now.

Second edition V2.1 - Sept 2012

*Updated to reflect changes within the Regulations and Directives
V2.1 minor text clarification in Executive summary*

Foreword

If you are responsible for the specification, design, installation or maintenance of interior or exterior lighting then I cannot stress how important it is for you to understand the implication of the current and forth coming legislation which is aimed at reducing energy and carbon use and is described within this guidance document.

It is interesting to read the latest Green Public Procurement (GPP) guidance documents which make specific mention of the requirements and competency for those who design, install and maintain lighting installations. The GPP also includes comment regarding checks on what has been installed to verify that the installations meet the design criteria.

The equipment requirements are specifically relevant to fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps. This document gives guidance on the efficacy and performance requirements of these products with dates as to when each stage of the legislation comes into effect and effectively removes products from the market place.

With highway lighting installations having lives typically greater than 30 years and office installations greater than 10 years then it is not a matter of waiting until each stage of the legislation comes into force but to plan ahead and start using equipment now that meets the coming requirements.

This document has been reviewed and updated to reflect recent changes in appropriate EU Directives and also to reflect that as of April 2012 we have entered Stage 2 of the Energy related Products Directive.



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Contents

	Page
Executive summary	4
Introduction	7
The Law, Regulations and Directives	9
Carbon Reduction Commitment Energy Reduction scheme (CRCEE)	23
Green Public Procurement (GPP)	27
Ecolabel	30
References	32

Executive summary

This guidance document looks at the impact and requirements of current and forthcoming European Commission & Council and UK Legislation / Directives that directly affect the lighting sector, including:

- Background
- The Law
- Energy using Products / Energy related Products Directives (EuP / ErP)
- Carbon Reduction Commitment Energy Reduction scheme (CRCEE)
- Green Public Procurement (GPP)
- Ecolabel

Within the lighting sector both domestic and tertiary lighting (office and street lighting) have received the highest level of attention with perhaps the street lighting sector being the most developed due to the wide and developing range of lamps, ballast and luminaires used whereas the office sector has been principally based around fluorescent lamps technology for many years and it is only the advent of LED's that indicate any real change in office light sources.

The products covered are used within the tertiary sector but are also used in other applications such as industrial buildings, shops, car parks and as such the principals and requirements discussed will be applicable to these areas with respect to carbon and energy savings.

It is important that the designer, client, contractor are aware of the legislative requirements discussed in this document with regard to equipment, implementation and contract requirements and that they plan for the introduction of the equipment required at the earliest possibility. As can be seen from the lamp and ballast requirements to pick just two aspects some existing lamps as well as magnetic ballast will be removed from the market unless the manufacturers can develop them such that they meet the required performance and efficacy requirements laid down.

EU Regulations may be revised from time to time and the ILP will look to ensure that this guide is as up to date as possible, however users should take care to keep themselves informed referring to the EU Regulations themselves for a full statement of the legal requirements, manufacturer's data as lamps that currently may be phased out under the ErP Directive may be developed such that they remain compliant. In the case of any doubt take independent advice.

A summary of the timeline of some of the requirements for lamps, ballasts and luminaires under Regulation (EU) No 347/2010, as follows:

- 'Fat' linear T10 and T12 halophosphate lamps were banned as of April 2012 with the exception of lamps for special purposes.
- Requirements on minimum lumen maintenance levels have been introduced
- Minimum performance requirements for HID (high intensity discharge) lamps and ballasts to operate such lamps have been introduced

- From 2012 new luminaires shall be compatible with ballasts complying with the third stage (2017) requirements, except luminaires with ingress protection grade at least IP4X.
- The phasing out of High Pressure Mercury lamps by 2015.
- 90% of the High Pressure Sodium lamps should have a minimum life time of more than 16,000 hours.
- Metal halogen lamps should have a minimum life of 12,000 hours for 80% (frosted) and 90% (clear).
- Requirements of directional light sources for street lighting luminaires (not only HID) to reduce light pollution.
- From 2017 all fluorescent lamps must be designed to work with electronic ballasts.
- From 2017 magnetic ballasts are not permitted even for replacement in existing luminaires (it is considered that such ballasts will not meet the performance requirements).
- From 2017 new luminaires shall be compatible with ballasts complying with the third stage (2017) requirements.

The following table provides headline performance requirements with key implementation dates, phased improvement targets (P) and final targets (F).

	2010	2011	2012	2013	2014	2015	2016	2017
Fat' linear T10 & T12 halophosphate lamps will be banned			F					
Minimum efficacy and performance requirements for fluorescent lamps	P		P					F
Minimum efficacy and performance requirements for HID lamps			P					F
High pressure mercury lamps phased out						F		
Performance requirements for fluorescent lamp ballasts	P		P					F
Performance requirements for HID ballasts			P					F
New luminaires to be sold with electronic ballasts			F					
Magnetic ballasts removed from the market.								F

A number of the above are the current April 2017 minimum performance targets, an initial performance level was introduced in April 2010 for some sources and a stepped improvement came into force in April 2012. This will be followed by other improvements due in April 2015 and 2017 for these and other lamps and ballasts. These are all details within this guidance document.

Due to the long potential installation life of lamps, ballasts and luminaires any purchaser should consider the requirements of the forthcoming stage (i.e. as we are in stage 2 look to the requirements of stage 3) for any equipment that they are looking to purchase.

If we look at Directional lighting and LEDs then the Ecodesign regulatory committee met on the 13th July 2012. The draft Ecodesign regulation covers:

- All directional lamps (domestic and professional)
- LEDs (directional and non-directional)
- Related equipment, such as control devices and luminaires.

This sets and then strengthens minimum requirements for energy efficiency and functionality in stages.

- Stage 1 1st September 2013
- Stage 2 1st September 2014
- *Review of regulations in 2015*
- Stage 3 1st September 2016

Introduction

Worldwide there is growing concern over global warming and hence carbon dioxide emissions ($\text{CO}_{2(e)}$) as well as energy use which has led to targets being set for the reduction of $\text{CO}_{2(e)}$ globally which have been taken up by the European Commission and the UK Government in the form of the:

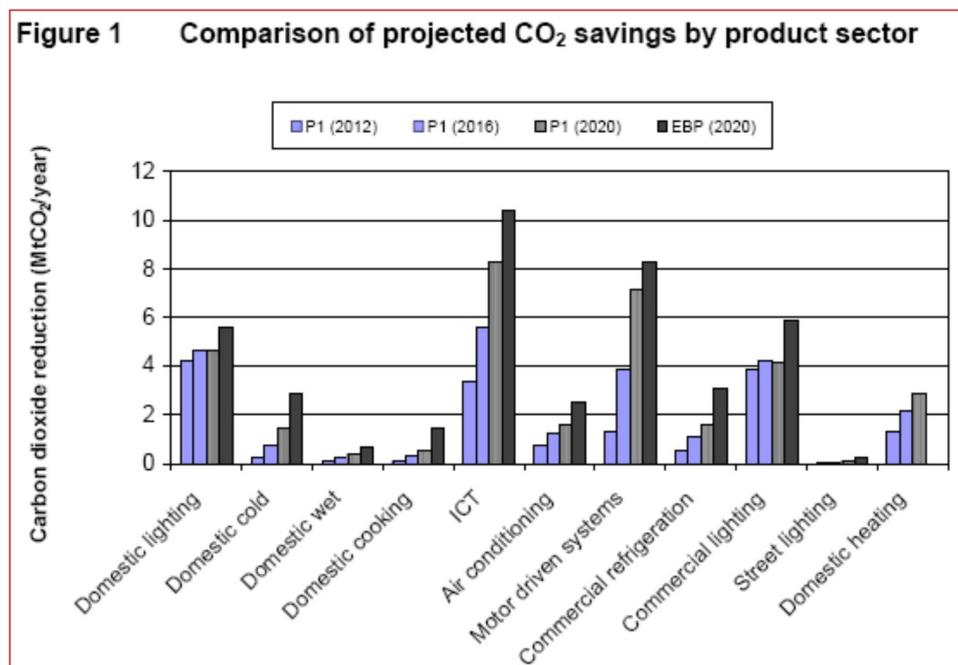
- Climate change Act 2009
- Energy Act 2009

Legally within the UK we now have a national requirement to reduce emissions by 80% (based upon 1990 level) by 2050 and in order to aid this an interim target of a 60% reduction by 2030 has been proposed Government's Committee on Climate Change (CCC) and is being considered.

This has led to studies under the Market transformation Programme (MTP) which had focused on the following ten market areas.

- Domestic lighting
- Domestic cold appliances
- Domestic wet products
- Domestic cooking
- Information communication technology
- Air conditioning
- Motor driven systems
- Commercial refrigeration
- Commercial lighting
- Street lighting and traffic signals

The Studies have indicated that the $\text{CO}_{2(e)}$ savings shown in figure 1 below could be achieved.



From figure 1 it should be noted that whilst the potential savings from street lighting are comparatively low the service carries a high visual and energy using profile.

A large number of implementing measures are being made under various Directives and apply to individual products or groups of products. The Department for the Environment, Food and Rural Affairs (Defra) lead on measures resulting from the initial studies which focus on energy efficiency gains. Measures are enforced by the National Measurement Office (NMO).

At this present time the ErP does not consider LEDs as market penetration has been comparatively small, however with the growth in the use and application of LEDs these are now being considered under a review of directional lighting. At the time of writing (July 2012) a Commission Regulation has been drafted and the panel has met regarding considerations for Directional lighting and LEDs. The regulation has yet to be numbered but the working title is "implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for directional lamps, light emitting diode lamps and related equipment". The draft has been out for public comment and for information may be viewed at:

<http://efficient-products.defra.gov.uk/cms/assets/Lighting-ED-DLS-LEDs-HL-converter-ExMemo-v2.0.pdf>

The draft ecodesign regulation covers:

- All directional lamps (domestic and professional)
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The Law, Regulations and Directives

Energy using Products / Energy related Products Directives (EuP / ErP)

Directive 2009/125/EC

The European Parliament and Council Directive 2005/32/EC established a framework for the setting eco-design requirements for Energy using Products (EuP). It was recast on the 21st October 2009 as the Eco-Design Directive (2009/125/EC) and established a frame work for the setting of ecodesign requirements for Energy related Products (ErP) to include all Energy using Products (EuP).

The aim of the Directive being to improve the environmental performance of products throughout their life-cycle, by the integration of environmental aspects at a very early stage in product design.

The Directive 2005/32/EC was transposed into UK law under Statutory Instrument (SI 2007 No:2037) and came into force on 11 August 2007 and the ErP Directive was implemented in November 2010.

Under this Directive, the European Commission, assisted by a committee of Member States, adopt implementing measures relating to individual product types. To date these have been adopted by Member States in the form of EU Regulations and as such are directly applicable in the UK and all other Member States. Implementing Measures are the specific product related pieces of legislation (e.g. regulations) that set out the legislative requirements legislative requirements that products sold in the EU will be required to meet from a specific date.

The UK Government is committed to seeking cost-effective ways to achieve targets set to reduce carbon emissions as part of its policy on Climate Change. It has already supported and implemented a range of EU policies aimed at improving energy efficiency standards for traded goods. The UK supports the adoption of regulations consistent with its approach including the Eco-design of Energy related Products Directive.

Energy related Product (ErP)

An 'Energy related Product' means any goods that have an impact on energy consumption during use. Many energy-related products have a significant potential for being improved in order to reduce environmental impacts and to achieve energy savings through better design which also leads to economic savings for businesses and end-users. In addition to products which use, generate, transfer, or measure energy, certain energy-related products, including products such as luminaires and control systems also contribute to significant energy savings during use. For example when designing an office or street lighting installation a luminaire with high performance optics may result in fewer luminaires being required, this together with a suitable lighting control system will produce significantly lower whole life installation costs including energy and maintenance aspects for the end client.

Under the above Directives the various energy using product sectors have each been reviewed and specific EU Commission Regulations issued to cover each sector.

The tertiary lighting sector

Office and street lighting is commonly termed the tertiary sector and is predominated affected by EU Commission Regulation 347/2010.

Office lighting

Office lighting is an important energy using product which has been installed and used for many decades and has in general always been based around fluorescent lamp technology. It is only the advent of Light Emitting Diodes (LED's) that indicates that there will be any change. The application of the ErP Directive covers fixed installation, floor lamps and control systems where they are integrated into the luminaire.

Street lighting

Street lighting has been installed for centuries, contributing to human development by providing and improving human vision at night. There has been significant technological progress in this sector over the last decades which continues to develop at a pace with advent of LED's and Central Management Systems (CMS) to name but two aspects.

Street lighting generally has a life of 30 to 40 years and hence a considerable number of old installations based upon old, energy inefficient technology remain in existence. Installations are mostly based on High Intensity Discharge lamps requiring appropriate ballasts and optical systems.

Products not within the scope of tertiary lighting include, traffic signals, tunnel lighting (low sales volumes), city beautification, private car parks, sports areas and industrial sites

Other sectors

It should be noted that identical technology from the tertiary sector is used in other lighting applications and therefore this does not exclude that they can directly benefit from the conclusions of the various studies and requirements for performance to bring CO_{2(e)} and energy savings to that sector as commented below.

Commission Regulation (EC) No 347/2010 of 21st April 2010

Commission Regulation (EC) No 347/2010 amends Commission Regulation (EC) No 245/2009 as regards the ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps and repealed Directive 2000/55/EC of the European Parliament and of the Council and entered into force retrospectively from 13th April 2010.

Under the Commission Regulations mandatory ecodesign requirements apply to products placed on the market wherever they are installed, therefore such requirements cannot be made dependent on the application in which the product is used (such as office lighting or public street lighting). Therefore this Regulation address's specific products, such as fluorescent lamps without integrated ballast, high intensity discharge lamps, and ballasts and luminaires able to operate such lamps.

Essentially the Regulation sets indicative benchmarks for fluorescent and high intensity discharge products covering:

- Lamp efficacy and lamp life
- Lamp mercury content
- Ballast performance
- Luminaire product information

The core environmental aspects that are identified as significant for the purposes of this Regulation are:

- (a) energy in the use phase;
- (b) mercury content of lamps.

Products exempt from the Regulation include:

- Special purpose lamps used in computer screens, photocopiers, tanning appliances and terrariums
- Lamps that are not white light sources (excluding SON lamps)
- Directional source lamps
- Double ended fluorescent lamps having specific diameters
- Lamps with defined levels radiation in specific wavelengths

Full details of exempt products can be found in Annex I of the Regulation.

Commission Regulations (EC) No 347/2010 and 245/2009 are available from:

[http://www.celma.org/archives/temp/CELMA_EcoDesign_\(SM\)257_COM_Regulation_347_2010_amending_Regulation_245_2009.pdf](http://www.celma.org/archives/temp/CELMA_EcoDesign_(SM)257_COM_Regulation_347_2010_amending_Regulation_245_2009.pdf)

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0017:0044:EN:PDF>

Regulation (EC) No 347/2010 requirements

The requirements are set out in Annex III of Regulation (EC) No 347/2010 and are broken into three parts:

- Part 1 – lamps – fluorescent lamps without integrated ballast and for high-intensity discharge lamps (efficacy requirements, performance (functionality) requirements, and product information)
- Part 2 – ballasts for fluorescent lamps without integrated ballast and ballasts for high-intensity discharge lamps
- Part 3 – requirements for luminaires for fluorescent lamps without integrated ballast and for luminaires for high intensity discharge lamps

Part 1 – lamps

Efficacy requirements:

All tables listed below are from the Regulation (EC) No 347/2010 and where they are shown below they may only be 'part tables' to an indicative view on the requirements and the reader should refer to the full version of the Regulation for full tables giving all lamp, ballast and luminaire requirements and the associated foot notes.

Introduced as of April 2010:

The rated minimum efficacy standards apply to double-capped T8 and T5 lamps, dependent on the nominal wattage of the lamp, as listed in Table 1

Table 1, Rated minimum efficacy values for T8 and T5 lamps.

T8 (26 mm Ø)		T5 (16 mm Ø) High Efficiency		T5 (16 mm Ø) High Output	
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
15	63	14	86	24	73
18	75	21	90	39	79
25	76	28	93	49	88

Table 2, Rated minimum efficacy values for single capped fluorescent lamps working on electromagnetic and electronic ballast

Small single parallel tube, lamp cap G23 (2 pin) or 2G7 (4 pin)		Double parallel tubes, lamp cap G24d (2 pin) or G24q (4 pin)		Triple parallel tubes, lamp cap GX24d (2 pin) or GX24q (4 pin)	
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
5	48	10	60	13	62
7	57	13	69	18	67

Table 3, Rated minimum efficacy values for single capped fluorescent lamps, working only on electronic ballast

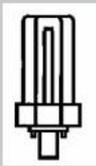
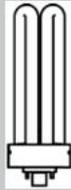
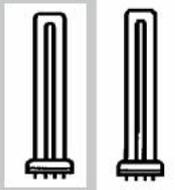
Triple parallel tubes, lamp cap GX24q (4 pin)		Four parallel tubes, lamp cap GX24q (4 pin)		Long single parallel tube, lamp cap 2G11 (4 pin)	
					
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
32	75	57	75	40	83
42	74	70	74	55	82

Table 4, Rated minimum efficacy values for single capped fluorescent lamps with square shape or (very) high output.

Single flat plane tube, lamp cap GR8 (2 pin), GR10q (4 pin) or GRY10q3 (4 pin)		Four or three parallel T5 tubes, lamp cap 2G8 (4 pin)	
			
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
10	65	60	67
16	66	82	75
21	64	85	71

Table 5, Rated minimum efficacy values for T9 and T5 Circular lamps.

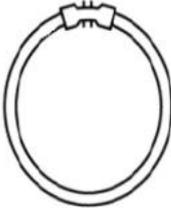
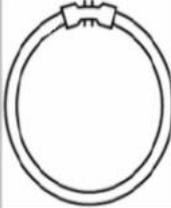
T9 Circular, tube diameter 29 mm with base G10q		T5 Circular, tube diameter 16 mm with base 2GX13	
			
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value	Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
22	52	22	77
32	64	40	78

Table 6, Deduction percentages for rated minimum efficacy values for fluorescent lamps with high colour temperature and/or high colour rendering and/or second lamp envelope and/or long life.

Lamp parameter	Deduction from luminous efficacy at 25 °C
$T_c \geq 5\,000\text{ K}$	- 10 %
$95 \geq Ra > 90$	- 20 %
$Ra > 95$	- 30 %
Second lamp envelope	- 10 %
Lamp Survival Factor $\geq 0,50$ after 40 000 burning hours	- 5 %

Changes and improvements introduced as of April 2012 and now current:

Double-capped fluorescent lamps of all types will be subject to the same requirements applied to T8 lamps in April 2010, i.e. those lamps not T8 lamps must meet the requirements for T8 lamps listed in Table 1 (column A).

High Pressure Sodium lamps of Ra shall have at least the rated efficacies outlined in Table 7. However where these lamps are designed to operate on control gear for High Pressure Mercury lamps, this requirement does not apply until April 2015. Where these lamps are of $T \geq 5,000\text{K}$ or equipped with a second lamp envelope, lamps shall achieve 90% of the efficacy requirements in Tables 7, 8 and 9.

Metal Halide Lamps will R 80 and High Pressure Sodium lamps with Ra 60 shall have at least the rated efficacies outlined in Table 8. Where these lamps are of $T \geq 5,000\text{K}$ or equipped with a second lamp envelope, lamps shall achieve 90% of the efficacy requirements in Tables 7, 8 and 9

Table 7, Rated minimum efficacy values for high pressure sodium lamps with $Ra \leq 60$

Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W] — Clear lamps	Rated Lamp Efficacy [lm/W] — Not clear lamps
$W \leq 45$	≥ 60	≥ 60
$45 < W \leq 55$	≥ 80	≥ 70
$55 < W \leq 75$	≥ 90	≥ 80
$75 < W \leq 105$	≥ 100	≥ 95
$105 < W \leq 155$	≥ 110	≥ 105
$155 < W \leq 255$	≥ 125	≥ 115
$255 < W \leq 605$	≥ 135	≥ 130

Table 8, Rated minimum efficacy values for Metal Halide Lamps with $R_a \leq 80$ and for high pressure sodium lamps with $R_a > 60$

Nominal Lamp Wattage [W]	Rated Lamp Efficacy [lm/W] — Clear lamps	Rated Lamp Efficacy [lm/W] — Not clear lamps
$W \leq 55$	≥ 60	≥ 60
$55 < W \leq 75$	≥ 75	≥ 70
$75 < W \leq 105$	≥ 80	≥ 75
$105 < W \leq 155$	≥ 80	≥ 75
$155 < W \leq 255$	≥ 80	≥ 75
$255 < W \leq 405$	≥ 85	≥ 75

Table 9, Rated minimum efficacy values for other high intensity discharge lamps

Nominal Lamp wattage [W]	Rated Lamp Efficacy [lm/W]
$W \leq 40$	50
$40 < W \leq 50$	55
$50 < W \leq 70$	65
$70 < W \leq 125$	70
$125 < W$	75

From April 2015:

High Intensity Discharge Lamps other than High Pressure Sodium lamps and Metal Halide Lamps shall have at least the efficacies listed in Table 9. Where these lamps are of $T \geq 5,000K$ or equipped with a second lamp envelope, lamps shall achieve 90% of the efficacy requirements in Tables 7, 8 and 9.

High Pressure Sodium lamps of $R_a \leq 60$ shall have at least the rated efficacies outlined in Table 7. Where these lamps are of $T \geq 5,000K$ or equipped with a second lamp envelope, lamps shall achieve 90% of the efficacy requirements in Tables 7, 8 and 9.

Mercury discharge lamps will be banned.

From April 2017:

Fluorescent lamps without integrated ballast shall be designed to operate with ballasts of energy efficiency class A2 (as outlined in the ballast requirements below).

Metal Halide Lamps shall have at least the rated efficacies of that listed in Table 10. Where these lamps are of $T \geq 5,000K$ or equipped with a second lamp envelope, lamps shall achieve 90% of the efficacy requirements in Tables 7, 8 and 9.

Table 10, Rated minimum efficacy values for metal halide lamps (third stage)

Nominal Lamp wattage (W)	Rated Lamp Efficacy (lm/W) — Clear lamps	Rated Lamp Efficacy (lm/W) — Not clear lamps
$W \leq 55$	≥ 70	≥ 65
$55 < W \leq 75$	≥ 80	≥ 75
$75 < W \leq 105$	≥ 85	≥ 80
$105 < W \leq 155$	≥ 85	≥ 80
$155 < W \leq 255$	≥ 85	≥ 80
$255 < W \leq 405$	≥ 90	≥ 85

Performance requirements

Introduced as of April 2010:

T8 fluorescent lamps without integrated ballast shall have a colour rendering index $Ra \geq 80$

Changes and improvements introduced as of April 2012 and now current:

All fluorescent lamps without integrated ballast shall have a colour rendering index $Ra \geq 80$.

All fluorescent lamps without integrated ballast shall have a lamp lumen maintenance factor of at least those given in Table 11 as appropriate for the different lamp types listed.

Table 11, Lamp lumen maintenance factors for single and double capped fluorescent lamps

Lamp lumen maintenance factor	Burning hours			
	Lamp types	2 000	4 000	8 000
Double-Capped Fluorescent lamps operating on non-high frequency ballasts	0,95	0,92	0,90	—
T8 Double-Capped Fluorescent lamps on high frequency ballast with warmstart	0,96	0,92	0,91	0,90
Other Double-Capped Fluorescent lamps on high frequency ballast with warmstart	0,95	0,92	0,90	0,90

The following introductory phrase cumulative deductions as shown in Table 11a shall be applied to the values in Table 11.

Lamp parameter	Deduction from lamp lumen maintenance requirement
Lamps with $95 \geq Ra > 90$	At burning hours $\leq 8\ 000$ h: - 5 % At burning hours $> 8\ 000$ h: - 10 %
Lamps with $Ra > 95$	At burning hours $\leq 4\ 000$ h: - 10 % At burning hours $> 4\ 000$ h: - 15 %
Lamps with a colour temperature $\geq 5\ 000$ K	- 10 %

All fluorescent lamps without integrated ballast shall have a lamp survival factor of at least those given in Table 12 as appropriate for the different lamp types listed.

Table 12, Lamp survival factors for single and double capped fluorescent lamps.

Lamp survival factor	Burning hours				
	Lamp types	2 000	4 000	8 000	16 000
Double-Capped Fluorescent lamps operating on non-high frequency ballasts		0,99	0,97	0,90	—
Double-Capped Fluorescent lamps on high frequency ballast with warmstart		0,99	0,97	0,92	0,90
Circular Single-Capped Fluorescent lamps operating on non-high frequency ballasts, T8 U-shaped double-capped fluorescent lamps and spiral-shaped double capped fluorescent lamps of all diameters equal to or larger than 16 mm (T5)		0,98	0,77	—	—
		0,50 at 5 000 burning hours			

High Pressure Sodium lamps shall have at least the lamp survival factors and lamp lumen maintenance factors listed Table 13.

Table 13, Lamp lumen maintenance factors and lamp survival factors for high pressure sodium lamps.

High pressure sodium lamp category and burning hours for measurement		Lamp lumen maintenance factor	Lamp survival factor
P ≤ 75 W LLMF and LSF measured at 12 000 burning hours	Ra ≤ 60	> 0,80	> 0,90
	Ra > 60	> 0,75	> 0,75
	all retrofit lamps designed to operate on high pressure mercury vapour lamp ballast	> 0,75	> 0,80
P > 75 W LLMF and LSF measured at 16 000 burning hours	Ra ≤ 60	> 0,85	> 0,90
	Ra > 60	> 0,70	> 0,65
	all retrofit lamps designed to operate on high pressure mercury vapour lamp ballast	> 0,75	> 0,55

Metal halide Lamps shall have at least the lamp survival factors and lamp lumen maintenance factors listed Table 14.

From April 2017

Table 14, Lamp lumen maintenance factors and lamp survival factors for metal halide lamps

Burning hours	Lamp lumen maintenance factor	Lamp survival factor
12 000	> 0,80	> 0,80

Product information requirements

Introduced as of April 2010:

Manufacturers must make available the information listed in para 1.3 (a-j) of Annex III Regulation (EC) No 347/2010 on free access websites for each fluorescent lamp without integrated ballast or High Intensity Discharge lamp placed on the market.

Part 2 - ballasts

Performance requirements

Ballast efficiency (η_{ballast}) means the ratio between the lamp power (ballast output) and the input power of the lamp-ballast circuit with possible sensors, network connections and other auxiliary loads disconnected.

Introduced as of April 2010:

Non-dimmable ballasts for fluorescent lamps shall meet at least the standards as defined in Tables 17 or 18, depending on the ballast type

Table 17, Energy efficiency index requirements for non-dimmable ballasts for fluorescent lamps.

LAMP DATA					BALLAST EFFICIENCY (Plamp/Pinput)				
					Non-dimmable				
Lamp type	Nominal Wattage	ILCOS CODE	Rated/typical wattage		A2 BAT	A2	A3	B1	B2
			50 Hz	HF					
	W		W	W	W				
T8	15	FD-15-E-G13-26/450	15	13,5	87,8 %	84,4 %	75,0 %	67,9 %	62,0 %
T8	18	FD-18-E-G13-26/600	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
T8	30	FD-30-E-G13-26/900	30	24	82,1 %	77,4 %	72,7 %	79,2 %	75,0 %
T8	36	FD-36-E-G13-26/1200	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
T8	38	FD-38-E-G13-26/1050	38,5	32	87,7 %	84,2 %	80,0 %	84,1 %	80,4 %
T8	58	FD-58-E-G13-26/1500	58	50	93,0 %	90,9 %	84,7 %	86,1 %	82,2 %
T8	70	FD-70-E-G13-26/1800	69,5	60	90,9 %	88,2 %	83,3 %	86,3 %	83,1 %
TC-L	18	FSD-18-E-2G11	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
TC-L	24	FSD-24-E-2G11	24	22	90,7 %	88,0 %	81,5 %	76,0 %	71,3 %

Table 18, Energy efficiency index requirements for non-dimmable ballasts for fluorescent lamps not included in Table 17.

η_{ballast}	Energy Efficiency Index
$\geq 0,94 * E_{\text{Bb}_{\text{FL}}}$	A3
$\geq E_{\text{Bb}_{\text{FL}}}$	A2
$\geq 1-0,75*(1-E_{\text{Bb}_{\text{FL}}})$	A2 BAT

Dimmable ballasts for fluorescent lamps shall meet at least the efficacy requirements set out in Table 19.

Table 19, Energy efficiency index requirements for dimmable ballasts for fluorescent lamps

Complied class at 100 % lumen output	Energy Efficiency Index of dimmable ballast
A3	A1
A2	A1 BAT

The power consumption of fluorescent lamp ballasts shall not exceed 1.0 W when operated lamps do not emit any light in normal operating conditions and when other possible connected components (network connections, sensors etc.) are disconnected.

Changes and improvements introduced as of April 2012 and now current:

Dimmable ballasts for High Intensity Discharge lamps shall meet the efficacy requirements set out in Table 15

Table 15, Minimum efficiency for ballasts for high intensity discharge lamps

Nominal lamp wattage (P) W	Minimum ballast efficiency ($\eta_{ballast}$) %
$P \leq 30$	65
$30 < P \leq 75$	75
$75 < P \leq 105$	80
$105 < P \leq 405$	85
$P > 405$	90

The power consumption of ballasts used with fluorescent lamps without integrated ballast shall not exceed 0,5 W when operated lamps do not emit any light in normal operating conditions. This requirement shall apply to ballasts when other possible connected components (network connections, sensors etc.) are disconnected.

From April 2017:

Ballasts for fluorescent lamps without integrated ballast shall have the efficiency:

$$\eta_{ballast} \geq EBbFL$$

where EBbFL is defined in Annex II.3.g of the Regulation.

Ballasts for high intensity discharge lamps shall have the efficiency described in Table 16

Table 16, Minimum efficiency for ballasts for high intensity discharge lamps.

Nominal lamp wattage (P) W	Minimum ballast efficiency ($\eta_{ballast}$) %
$P \leq 30$	78
$30 < P \leq 75$	85
$75 < P \leq 105$	87
$105 < P \leq 405$	90
$P > 405$	92

Product information requirements

Introduced as of April 2010:

Manufacturers of ballasts shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their ballast models. That information shall also be affixed in a distinct and durable form to the ballast.

For ballasts for fluorescent lamps, an energy efficiency index (EEI) class shall be provided, as defined in the measure and as referred to in Table 17

For non-dimmable ballasts not included in table 17 an EEI shall be assigned as depending on their efficiency as described in Table 18

Dimmable fluorescent lamp ballasts receive EEI classes according to the class into which the ballast would fall when it is operated at the 100% lumen output, as described in Table 19.

Changes and improvements introduced as of April 2012 and now current:

Ballasts for high intensity discharge lamps, the efficiency of the ballast as defined in Annex II.1.d shall be indicated.

Part 3 – luminaires

Performance requirements

Introduced as of April 2010:

The power consumption of luminaires for fluorescent lamps without integrated ballast shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are normally operating do not emit any light when other possible connected components (network connections, sensors etc.) are disconnected. If they cannot be disconnected, their power shall be measured and deducted from the result.

Changes and improvements introduced as of April 2012 and now current:

Luminaires for fluorescent lamps without integrated ballast and for high intensity discharge lamps shall be compatible with ballasts complying with the third stage requirements, except luminaires with ingress protection grade at least IP4X.

The power consumption of luminaires for high intensity discharge lamps shall not exceed the sum of the power consumption of the incorporated ballasts when the lamps they are normally operating do not emit any light when other possible connected components (network connections, sensors etc.) are disconnected. If they cannot be disconnected, their power shall be measured and deducted from the result.

From April 2017:

All luminaires for fluorescent lamps without integrated ballast and for High Intensity Discharge Lamps shall be compatible with ballasts complying with the third stage requirements.

Product information requirements

Introduced as of October 2010

Manufacturers of luminaires for fluorescent lamps without integrated ballast with total lamp lumen above 2, 000 lumen shall provide at least the following information on free-access websites and in other forms they deem appropriate for each of their luminaire models. That information shall also be contained in the technical documentation file drawn up for the purposes of conformity assessment pursuant to Article 8 of Directive 2005/32/EC:

- (a) if the luminaire is placed on the market together with the ballast, information on the efficiency of the ballast according to Annex III.2.2, in accordance with the ballast manufacturer's data;
- (b) if the luminaire is placed on the market together with the lamp, lamp efficacy (lm/W) of the lamp, in accordance with the lamp manufacturer's data;
- (c) if the ballast or the lamp are not placed on the market together with the luminaire, references used in manufacturers' catalogues must be provided on the types of lamps or ballasts compatible with the luminaire;
- (d) maintenance instructions to ensure that the luminaire maintains, as far as possible, its original quality throughout its lifetime;
- (e) disassembly instructions.

Changes and improvements introduced as of April 2012 and now current:

The information provision requirements of the first stage (i.e. from October 2010) shall also apply to luminaires for high intensity discharge lamps with total lamp lumen above 2,000 lumen.

All luminaires for high intensity discharge lamps shall indicate that they are designed for either clear and/or coated lamps within the meaning of Annex II

Market surveillance and enforcement

The regulations described require manufacturers to ensure that the products they place on the market perform to the minimum standards stated. The enforcement process is under consideration but is it likely to be undertaken by an existing central Government body who already carry out similar work. Under current legislation the maximum penalty for failure to meet these requirements stands at £5,000, however this is under due review with the aim of raising the maximum penalty such that it provides a sufficient deterrent against non-compliance and will eliminate any financial gains or benefits made and look to deter future offenders.

Information can be gained from www.defra.gov.uk

Carbon Reduction Commitment Energy Efficiency scheme

Summary

The CRC Energy Efficiency Scheme (CRC) is a mandatory UK-wide trading scheme. The scheme is designed to incentivise large public and private sector organisations to improve energy efficiency and reduce the amount of carbon dioxide CO_{2(e)} emitted within the UK.

Organisations must currently assess their status against two criteria to determine whether they qualify for CRC participation:

- i) presence of at least one settled half hourly electricity meter; and
- ii) a total qualifying electricity supply of at least 6,000MWh in the qualification year

It is expected that almost every local authority will be captured the CRC.

The CRC has as one of its key elements, a requirement to purchase allowances to cover a participant's CRC emissions. The price of these allowances will be set annually by the Treasury as part of the budget-setting process. For the 2012/13 financial year and also (currently anticipated) for the next financial year, HM Treasury has determined that one tCO_{2(e)} is valued at £12 for the basis of the emissions charge.

For reference:

$$\begin{aligned} 1 \text{ kWh} &= 0.54418 \text{ Kg CO}_{2(e)} \\ \text{tCO}_2 &= \text{kWh} \times 0.541 \times 0.001 \\ \text{Cost of emissions} &= \text{tCO}_2 \times \text{£12} \end{aligned}$$

History of Unmetered Supplies under the CRC

On the 25th January 2010 the Department of Energy Climate Change (DECC) published an Addendum¹ providing further guidance on the CRC. Prior to this guidance being issued it was understood that all unmetered supplies would be captured by the CRC. The guidance changed this to state that NHH and passive HH energy are outside the scope of the CRC and so not subject to annual reporting. This was a very significant and wide reaching policy change introduced only a few months before the scheme was launched on the 1st April 2010. Local authorities typically have to commit to purchasing their energy at least six months in advance.

¹ www.decc.gov.uk/en/content/cms/consultations/crc/crc.aspx

Prior to Jan 2010

Method of trading	In scope of CRC?	Core Source?	Comment
NHH	Yes	Yes	Deemed to be estimate and carbon emissions enhanced by 10%
Passive HH	Yes	Yes	Deemed to be estimate and carbon emissions enhanced by 10%
Dynamic HH	Yes	Yes	Eligible for benefits under Early Action metric, not deemed to be an estimate

Post Jan 2010

Method of trading	In scope of CRC?	Core Source?	Comment
NHH	<i>No</i>	<i>No</i>	<i>Completely excluded</i>
Passive HH	<i>No</i>	<i>No</i>	<i>Completely excluded</i>
Dynamic HH	Yes	Yes	Eligible for benefits under Early Action metric

A summary of the impact of the changes introduced in April 2010 can be obtained from the Technical / Environmental section of the ILP web site www.theilp.org.uk

October 2010 Government Spending Review

The original intention of the CRC was that payments would be recycled to participants based on their position in the CRC league table. Those that were in the top half of the table (who had invested in AMR and reduced their emissions) would get their money back *plus a percentage*, those lower down the table would get their money back *less a percentage*. Under the Government spending review this recycling of payments was cancelled and as such the CRC is now to all intents and purposes a 'tax'.

What should my local authority do?

Any local authority that is still trading their unmetered supplies on a Non Half Hourly basis needs to ensure that these emissions are not being declared for CRC reporting purposes.

Any local authority that is trading their unmetered supplies on a Half Hourly basis should ensure that they are trading passively, i.e. that the PECU Array is not being used for the energy calculation. If the authority is passive they must ensure that the emissions are not being reported for the CRC.

Where a CMS is being used to dim / and or part night switching, it is possible to trade this energy on a separate dynamic Half Hourly MPAN, so that the energy from non CMS equipment is not also included in the CRC emissions.

When the first CRC league table was published, it was clear that there were some reporting issues around unmetered supplies. If there is any doubt about your current trading method please contact your Meter Administrator / Distribution Business as appropriate.

What is the difference between passive HH / dynamic HH and NHH?

Passive Half Hourly follows the same process as dynamic HH (same tariff, should be the same supply contract) except it would see the Meter Administrator (MA) stop using data from the PECU Array and/or CMS. Instead it uses the calculated sunrise/sunset times each day. There will be a difference in calculated consumption as there is a benefit to having a PECU Array recording your photocells' on/off times each day. On average Power Data Associates calculated an increase of around 1% by moving to passive trading. This extra consumption cost however was far outweighed by the savings from not being included in the CRC.

Passive / Dynamic trading should have no bearing on the supply contract though you are advised to confirm this directly with your supplier / Purchasing Organisation. In addition the authority will need permission from their Distribution Business(es), also known as the UMSO.

Non Half Hourly uses an Estimated Annual Consumption (EAC) and does not involve a Meter Administrator. Instead of daily times from the PECU Array or sunrise / sunset, it uses a published annual hours figure for each Distribution area. NHH cannot facilitate CMS data.

Dimming / switch off using a CMS

Different Distribution Businesses have taken different approaches to using a CMS under the passive arrangements. Some will allow CMS controlled dimming / CMS controlled switch off to be declared as if it was a normal (fixed) dimmed electronic ballast or part night photocell.

This means some authorities can benefit from dimming and part night switch off while trading passively and not paying CRC costs. Other authorities may not be allowed this option in which case to get any of the energy saving benefits from their chosen CMS they will need to set up a separate dynamic HH MPAN for the CMS controlled equipment only.

Authorities will need to contact their UMSO to discuss what is allowed under their passive arrangements. If required they can then assess savings vs. costs to see if the savings brought by trimming and multistep dimming, etc... would equal or exceed the CRC costs dynamic trading would incur.

Future of the CRC

The CRC Simplification Consultation² is now closed. Meetings are being held with DECC to discuss unmetered supplies and the second phase of the scheme.

² <http://www.decc.gov.uk/assets/decc/11/consultation/CRC/4757-cons-simp-crc-energy-efficiency-scheme.pdf>

It is currently envisaged that all unmetered energy will be brought into the scope of the scheme from 1st April 2014

Once the draft Order has been approved a further update will be issued to industry. It is currently unclear whether initial proposals such as an uplift of 10% for NHH and passive HH (as they are based on estimates) will still apply and clarification is being sought on this from DECC.

Assistance

Software programmes such as LIGHT CO₂RE are available to aid the designer / organisation calculate their lighting carbon footprint. LIGHT CO₂RE is available from ASLEC / HEMSA and the ILP.

Green Public Procurement (GPP)



GPP is a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured.

In the 2008 Communication "Public Procurement for a Better Environment", the European Commission set an indicative target that, by 2010, 50% of all public tendering procedures should be green in the EU, where "green" means compliant with endorsed common core EU GPP criteria for ten priority product/service groups such as construction, transport, cleaning products and services.

Green Public Procurement for lighting.

The European Commission GPP training tool kit (February 2012) covers the following lighting applications;

- Indoor Lighting

This covers 'lamps, luminaires and lighting controls installed within buildings' with exceptions for specialist lighting (coloured lighting, emergency escape lighting, external lighting of any type, illuminated signs, stage lighting for example).

- Street Lighting and Traffic Signs

This covers 'Fixed lighting installations intended to provide good visibility to users of outdoor public traffic areas during the hours of darkness to support traffic safety, traffic flow and public security'

GPP details can be found at:

http://ec.europa.eu/environment/gpp/faq_en.htm

At the current time the GPP is only voluntary, but by following the process sustainable lighting solutions can be obtained.

The following outlines the overall GPP thought process with respect to indoor and street lighting installations.

The general principals of GPP are applicable to both indoor and street lighting schemes are best described as follows:

General principals of GPP

The EU GPP criteria for lighting set out three key criteria as follows:

- The purchasing of resource and energy efficient lamps
- The design of new lighting system or the refurbishment on an existing system
- Installation work.

EU GPP criteria for the design of lighting

Where a new lighting system is being designed, the tenderer shall demonstrate that the design will be undertaken by personnel with at least three years' experience in lighting design and/or having a suitable professional qualification in lighting engineering or membership of a professional body in the field of lighting design.

This shall be verified, the tenderer shall supply a list of the persons responsible for the project, including managerial staff, indicating educational and professional qualifications and relevant experience. This should include persons employed by subcontractors where the work is to be sub-contracted. The contractor shall also supply a list of lighting schemes the tenderer has designed over the last three years.

Technical requirements

The designer should provide calculations showing that the total power consumed by the lighting, including lamps, ballasts, sensors and controls.

In addition the designer should confirm that the design meets the relevant performance standards for example: EN 1246, BS EN 13201 as applicable for the installation / task being lit and should also consider any equivalent national standards or best practice guides (such as those published by the ILP), or those set by the public authority, these may include details of illuminance, uniformity, control of glare, colour rendering and colour appearance

Installation

Where a new or renovated lighting system is being installed, the tenderer shall demonstrate that the installation will be undertaken by personnel with at least three years' experience in installation of lighting systems and/or having a suitable professional qualification in electrical or building services engineering, or membership of a professional body in the field of lighting.

The tenderer shall supply a list of the persons responsible for the project, including managerial staff, indicating educational and professional qualifications and relevant experience. This should include persons employed by subcontractors where the work is to be sub-contracted. The tenderer shall also supply a list of lighting schemes the contractor has installed over the last three years.

The tenderer shall provide the following for new or renovated lighting installations:

- Disassembly instructions for luminaires
- Instructions on how to replace lamps, and which lamps can be used in the luminaires without increasing the stated power densities
- Instructions on how to operate and maintain lighting controls

- For control systems, instructions on how to adjust their sensitivity and time delay, and advice on how best to do this to meet occupant needs without excessive increase in energy consumption

The contractor shall ensure that the lighting equipment (including lamps and luminaires and lighting controls) are installed exactly as specified in the original design.

Verification: Schedule of installed lighting equipment with appended manufacturers' invoices or delivery notes, and confirmation that the equipment is as originally specified.

This contract performance clause is intended to eliminate the substitution of inferior lighting products at the installation stage. Where substitution is inevitable because the originally specified products are unavailable, the contractor shall provide a replacement schedule and calculation showing that the installation with the substituted products still complies with the relevant lighting design criteria.

Life cycle costing

The contracting authority may optionally wish to carry out a life cycle cost assessment, or to require the contractor to carry out such an assessment. Such an assessment should include the initial cost of the installation, its estimated lifetime, replacement costs of lamps and their estimated life, and energy cost of the lighting over its lifetime. The contracting authority will need to define its electricity price and the rate at which this increases, and its interest rate on investments.

Use of GPP

When issuing a call for tenders for products or services, the easiest way to use the GPP criteria is to copy and directly paste the criteria which are relevant to the subject matter of the contract into the tendering documents.

The document can be obtained at:

http://ec.europa.eu/environment/gpp/pdf/street_lighting_GPP_background_report.pdf

Ecolabel

The European Ecolabel for Light sources "The official EU mark for Greener Products.

The European Ecolabel is a voluntary scheme, established in 1992 to promote products and services with reduced environmental impact during their life cycle and provide consumers with accurate, non-deceptive, science based information regarding the product. Complying products and services are awarded the flower logo.

While the logo may be simple, the environmental criteria behind it are tough, and only the very best products, which are kindest to the environment, are entitled to carry the EU Ecolabel.



Ecolabel criteria are not based on one single factor, but on studies which analyse the impact of the product or service on the environment throughout its life-cycle, starting from raw material extraction in the pre-production stage, through to production, distribution and disposal.

The EU Ecolabel guarantees

- Reduced energy consumption
- Limited use of mercury
- Limited use of substances harmful to the environment and health
- Increased quality control and durability of the product
- User instructions for environmental use

It can be awarded to all light sources which provide general purpose lighting and have single-ended, bayonet, screw, or pin fittings, or fittings at both ends (such as all linear fluorescent tubes).

Green Public Procurement criteria the products should not necessarily bear any Energy label or Ecolabel. However where Energy label or Ecolabel criteria exist the products bearing these labels does not need any further verification.

The flower logo helps manufacturers, retailers and service providers gain recognition for good standards, while helping purchasers to make reliable choices

For more information...

.. on the scheme visit

<http://ec.europa.eu>

... on the 'light sources' product group visit

http://ec.europa.eu/environment/ecolabel/ecolabelled_products/categories/light_bulbs_en.htm

The following table represents a first assessment only criteria for light sources. The list is a non-exhaustive list of the EU criteria requirements and the official criteria documentation should be referred too for full details.

Life cycle step	Criterion	Expectations
Manufacturing (formulation)	Limitation of the use of substances harmful to the environment and health	<ul style="list-style-type: none"> If any plasticizer substance in the manufacturing process is applied, it must comply with the requirements on hazardous substances Additionally, DNOP (di-n-octyl phthalate), DINP (di-isononyl phthalate) and DIDP (di-isodecyl phthalate) should not intentionally be added to the product. Plastic parts must not contain chlorine content greater than 50 % by weight.
Manufacturing	hazardous substances and mixtures	The product or any part of it should not contain substances referred to in Article 57 of Regulation (EC) No 1907/2006 nor substances or mixtures which may be or have been assigned certain hazard statements.
Manufacturing	Substances listed in accordance with Article 59 (1) of Regulation (EC) No 1907/2006	No derogation from the exclusion in Article 6(6) maybe given concerning substances identified as substances of very high concern, present in mixtures, in an article or in any homogenous part of a complex article in concentrations higher than 0,1 %. Specific concentration limits apply in case it is lower than 0,1 %.
Manufacturing	Packaging	<ul style="list-style-type: none"> Where cardboard boxes are used, they should be made of 80 % post-consumer recycled material. Where plastic materials are used they should be made of at least 50 % post-consumer recycled material.
Manufacturing	Colour rendering index	The colour rendering (Ra) index of the light source should be greater than 85.
Manufacturing	Colour consistency	The light source should have a Correlated Colour Temperature (CCT) spread within a 3-step MacAdam ellipse or better.
Manufacturing	Social accountability	<ul style="list-style-type: none"> Fundamental principles and rights regarding working conditions must be fulfilled during the production of the Ecolabelled light source. The licensee must ensure that the production of the light source follows the ILO conventions regarding child labour, forced labour, health and safety, discrimination, discipline, hours of work, wages, freedom of association and collective bargaining.
Use	User instructions	<p>Specific information should come with the product:</p> <ul style="list-style-type: none"> For double-ended light sources: information on the packaging should indicate that the environmental performance of the light source is improved when it is used with high frequency electronic control equipment. Clean-up guidelines for a broken fluorescent light source listed on the packaging. The proper maintenance of lamps, such as cleaning, to maintain lumen output. Turning off lights saves energy and money. <p><i>Please refer to the online criteria document for full list and details</i></p>
Use	Information appearing on the EU Eco-label	<p>Optional label with text box contains the following text:</p> <ul style="list-style-type: none"> 'High energy efficiency — saves money, Long life time Performance tested'
Use	Energy efficiency, life-time, lumen maintenance and mercury content	<p>Light sources must meet specific requirements :</p> <ul style="list-style-type: none"> Energy efficiency <ul style="list-style-type: none"> Single and double ended: 10% better than the lumen per watt value according to Class A Life time (hours) <ul style="list-style-type: none"> Single ended: 15 000 Double ended: 20 000 Mercury (mg) <ul style="list-style-type: none"> < 1.5 < 3.0 <p><i>Please refer to the online criteria document for full list and details</i></p>
Use	Switch on/off	<ul style="list-style-type: none"> For compact fluorescent lamps (CFLs) and LEDs, the number of switch on/off cycles that the light source can withstand before premature failure should be greater than the lamp life time expressed in hours. For lamps claiming to withstand frequent switching, this number should be higher than 60 000 switch on/off cycles.

Table taken from the ec.europa.eu web site.

References

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NB: These notes are intended as guidance only and the tables shown are not complete and only demonstrate the requirements for some lamp wattages. The full tables within the appropriate Directives and Regulations should be read to obtain the information for all lamp wattages and types. The application of the values given in the various tables and text should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting.

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