

## **Come On Labels**

Contract N°: IEE / 09 / 628

## **PremiumLight**

Contract N°: IEE / 11 / 941

## **Euro Topten MAX**

Contract N°: IEE / 10 / 317

# **EU Ecodesign and Energy label Regulation for Domestic Lighting**

Come On Labels: Work Package 2 - Deliverable 2.3,  
PremiumLight WP 6 – Dissemination  
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## Table of Contents

1	Introduction.....	3
1.1	The involved IEE projects.....	3
1.2	The scope of this document .....	4
2	EU policy measures for electrical lamps and luminaires.....	5
2.1	The energy labelling.....	5
2.1.1	Old Energy Label.....	5
2.1.2	The new Energy Label .....	5
2.1.2.1	Subject matter and scope .....	5
2.1.2.2	Responsibilities.....	6
2.1.2.2.1	Electrical Lamps.....	6
2.1.2.2.2	Luminaires.....	7
2.1.2.3	Market surveillance verification procedures .....	7
2.1.2.4	Energy label variants .....	8
2.1.2.4.1	Label for Electrical Lamps .....	8
2.1.2.4.2	Label for Luminaires.....	9
2.1.2.5	Energy Efficiency requirements .....	11
2.2	Ecodesign requirements for lamps.....	12
2.2.1	Ecodesign Regulation 244/2009 .....	12
2.2.2	Ecodesign Regulation 1194/2012 .....	13
2.2.2.1	Efficiency requirements.....	13
2.2.2.2	Functionality requirements .....	13
2.2.2.2.1	Functionality requirements for directional lamps and other than LED lamps.....	13
2.2.2.2.2	Functionality requirements for directional compact fluorescent lamps.....	14
2.2.2.2.3	Functionality requirements for non-directional and directional LED lamps .....	15
2.2.2.3	Information requirements .....	15
2.3	Energy labelling vs. ecodesign requirements.....	18
3	Voluntary measures: EU LED Quality Charter .....	19
4	Lamps and luminaires on the market.....	19
4.1.1	Products with highest energy efficiency & quality .....	20

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# 1 Introduction

This document describes the energy labelling requirements for light sources and luminaires. It has been produced within three European projects focusing on energy efficient products: Come On Labels, PremiumLight and Euro Topten MAX, all supported by the Intelligent Energy Europe programme.

## 1.1 The involved IEE projects

The **Come On Labels**<sup>1</sup> project is focused on the support of the proper implementation of energy labelling of products, from investigating the adaption of legislation, through visiting shops for monitoring the proper presence of labels, collecting information about product tests, collecting information about product replacement schemes, to organising consumer education and promotion activities related to the awareness on the introduction of the new energy labels.

This specific series of documents deals with the EU legislation related to energy using products and energy labelling adapted and implemented during the course of the Come On Labels project (12/2010 – 5/2013). For the full new energy labelling legislation and the energy labels related to individual product groups, please, consult the project website:

<http://www.come-on-labels.eu/legislation/eu-product-energy-labelling>

**PremiumLight**<sup>2</sup> project aims to facilitate the transition to efficient high quality lighting solutions in households and thereby support the new legal instruments at the EU level. A smooth and effective transition from old inefficient lighting technology to highly efficient lighting requires further supportive measures and information services for the consumer. The central objective of the PremiumLight project is to facilitate this transition to efficient high quality lighting solutions in households thereby supporting the new legal instruments at EU level in a synergetic way. The central aims of the project are to:

- support the EU-Ecodesign and labelling regulations on non directional and directional lighting with accompanying effective information measures and services,
- motivate consumers to buy and use high quality energy efficient lighting products by providing them comprehensive knowledge and tools allowing easy selection of good products,
- increase the supply of high quality energy efficient lighting products in the retail market,
- make high quality energy efficient lighting products easily visible and identifiable for buyers at the point of sale,
- support a reduction of the current price barriers regarding LED lamps,
- support adequate fact based consumer information on energy efficient lighting technologies via media.

## **Euro Topten Max**<sup>3</sup>

Topten is a consumer-oriented online search tool, which presents the best appliances in various product categories. The key criteria are energy efficiency, impact on the environment, health and quality.

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<sup>1</sup> [www.come-on-labels.eu](http://www.come-on-labels.eu)

<sup>2</sup> [www.premiumlight.eu](http://www.premiumlight.eu)

<sup>3</sup> [www.topten.eu](http://www.topten.eu)

Topten helps consumers by showing pictures, electricity costs and important product data. The Topten criteria can also be used as specifications for large buyers. It makes explicit and transparent the *status quo* of efficient technologies on the European market and can thus serve as a basis for environmental policy design, labelling strategies, dissemination programmes, minimum efficiency requirements etc. It is a powerful instrument for market transformation. Topten was launched in 2000 in Switzerland. Since then, seventeen additional European national Topten sites have been established plus Topten China and Topten USA.

Topten relies on neutral tests and analysis of independent institutions, labels and on standardized declarations of manufacturers (e.g. EU-directives for household appliances). Topten is rigorous and transparent (the selection methodology is explained online), independent from producers and commercial distributors.

www.topten.eu shows lists with the following lighting products:

- LED classic lamps, base E27 and E14
- LED reflector lamps, base E24, E14, GU10, GU5.3 and G53
- Compact fluorescent lamps, base E27 and E14
- Office luminaires

## 1.2 The scope of this document

The **focus of this specific document** is to provide description of the latest EU lighting regulation including Ecodesign and energy labelling, which, as the Regulation notes, account for a significant part of household energy demand. There is a large scope for further reduction of the lighting-related energy consumption although the population tend to use an increasing number of lighting sources.

### SUMMARY TABLE

Product type	Labelling requirements	Ecodesign requirements
Incandescent light bulbs (GLS)	Delegated Regulation 244/2009 and 874/2012	Gradually phased out from the market starting 9/2009 and ending 2012 where practically all GLS lamps are phased out.
Halogen light bulbs		Phase out of the most worst energy consuming halogen lamps by 9/2016
Compact fluorescent light bulbs	Delegated regulation 244/2009 and 874/2012	Gradually stricter requirements starting with 1. Stage 9/2013
LEDs	Delegated regulation 1194/2012 and 874/2012	Gradually stricter requirements starting with 1. Stage 9/2013
Filament directional lamps, discharge lamps, other directional lamps	Delegated regulation 1194/2012 and 874/2012	
Luminaires	Delegated regulation 874/2012	No energy label for luminaires but the producers has to inform the energy label of the lighting sources it can hold.

## 2 EU policy measures for electrical lamps and luminaires

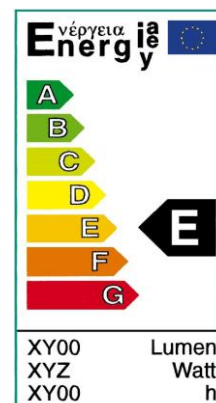
Since 1998, light sources have been labelled in EU. Despite energy label is a key tool to educate and motivate consumers to choose energy efficient products it was not sufficient to remove the energy intensive light sources substantially from the market. Therefore, energy labelling was revised and minimum ecodesign regulation was implemented in the EU.

### 2.1 The energy labelling

#### 2.1.1 Old Energy Label

Commission Directive 98/11/EC of 27 January 1998 implementing the Council Directive 92/75/EEC introduced energy labelling for household lamps. The label introduced had seven energy classes from class A (most efficient) to class G (least efficient).

The first energy labelling scheme covered household domestic light sources such as incandescent light bulbs, halogen light bulbs and compact fluorescent light bulbs, but it included only the non-directional light sources. LED light sources were not included as they did not exist at the market at that time.



#### 2.1.2 The new Energy Label

The Commission delegated Regulation No 874/2012<sup>4</sup> entered into force on 16 October 2012 and includes filament lamps, fluorescent lamps, electrical lamps and the use of light sources in luminaires. The Regulation 874/2012 applies from 1 September 2013, except in the cases listed in Article 9 (Transitional provisions).

The revised energy labelling encompasses energy efficiency classes up to A++. This Regulation phase out of the energy classes F, and G. Compared to the situation before, the new regulation also includes low voltage lamps, directional lighting sources and LED light sources.

##### 2.1.2.1 Subject matter and scope

The **Commission delegated Regulation No 874/2012** sets requirements for labelling and provision of supplementary product information for electrical lamps including:

- Filament lamps
- Fluorescent lamps
- High-intensity discharge lamps
- LED lamps and LED modules

<sup>4</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:258:0001:0020:EN:PDF>



Source: Osram

Source: Philips

Source: Osram

Source: LEDON

Concerning luminaires, the regulation sets requirements to information about the energy class for the lighting sources the luminaire can hold. There are no requirements to the efficiency of the luminaire. In case a lighting source (e.g. an LED) is integrated and replacement of the light source is impossible, this has to be made known.

### 2.1.2.2 Responsibilities

#### 2.1.2.2.1 Electrical Lamps

**Suppliers of electrical lamps placed on the market shall ensure that:**

- Product fiche (described in Annex II: Product fiche for electrical lamps) is made available. The fiche shall contain the information specified for the label. Where product brochures are not supplied, the label provided with the product can also be considered to be the fiche.
- Technical documentation (described in Annex III) is made available on request to the authorities. This includes for example the technical parameters for determining energy consumption and energy efficiency in the case of electrical lamps, and compatibility with lamps in the case of luminaires, specifying at least one realistic combination of product settings and conditions in which to test the product.
- Any advertisement, formal price quote or tender offer disclosing energy-related or price information for a specific lamp states the energy efficiency class;
- Any technical promotional material concerning a specific lamp which describes its specific technical parameters states the efficiency class of that lamp;
- if the lamp is intended to be marketed through a point of sale, a label produced in the format and containing information as set out in Annex I.1 is placed or printed on, or attached to, the outside of the individual packaging, and the packaging displays the nominal power of the lamp outside the label.

**Dealers of electrical lamps shall ensure that:**

- Each model offered for sale, hire or hire-purchase where the final owner cannot be expected to see the product displayed is marketed with the information to be provided by suppliers in accordance with Annex IV;
- any advertisement, formal price quote or tender offer disclosing energy-related or price information for a specific model states the energy efficiency class;

- any technical promotional material concerning a specific model which describes its specific technical parameters states the energy efficiency class of that model.

#### 2.1.2.2.2 *Luminaires*

##### **Suppliers of luminaires intended to be marketed to end-users shall ensure that:**

- The technical documentation as set out in Annex III is made available on request to the authorities of the Member States and to the Commission.
- The information contained in the label (Annex 1.2) is provided in the following situations:
  - Any advertisement, formal price quote or tender offer disclosing energy-related or price information for a specific luminaire;
  - Any technical promotional material concerning a specific lamp which describes its specific technical parameters.
- Any advertisement and technical promotion material, featuring the product price or specific technical parameters, includes also the energy efficiency class of that model.

In these cases the information may be provided in formats other than the one set out in Annex 1.2 (labels for luminaires presented at a point of sale) such as fully textual.

##### **Dealers shall ensure that:**

- the information contained in the label in accordance with Annex I.2 is provided in the following situation:
  - in any advertisement, formal price quote or tender offer disclosing energy-related or price information for a specific luminaire;
  - in any technical promotional material concerning a specific luminaire which describes its specific technical parameters;

In these cases the information may be provided in formats other than the one set out in Annex 1.2 (labels for luminaires presented at a point of sale) such as fully textual;

- each model presented at a point of sale is accompanied by the label as set out in Annex I.2. The label shall be displayed in one or both of the following ways:
  - in proximity to the displayed luminaire, so as to be clearly visible and identifiable as the label belonging to the model, without having to read the brand name and model number on the label;
  - clearly accompanying the most directly-visible information about the displayed luminaire (such as price or technical information) in the point of sale.

#### 2.1.2.3 **Market surveillance verification procedures**

Member States shall apply the procedure laid down in Annex V when assessing the conformity of the declared energy efficiency class and energy consumption.

Verification procedure for electrical lamps and LED modules marketed as individual products:

- for the purposes of checking conformity with the requirements laid down in Articles 3 and 4 (Responsibilities of suppliers and dealers), Member States' authorities shall test a sample



batch of a minimum of 20 lamps of the same model from the same manufacturer, where possible obtained in equal proportion from four randomly selected sources, and taking into account the technical parameters set out in the technical documentation (according to Annex III)

- the model shall be considered to comply with the requirements if the model's energy efficiency index corresponds to its declared energy efficiency class and if the average results of the batch do not vary from the limit, threshold or declared values (including the energy efficiency index) by more than 10 %
- otherwise, the model shall be considered not to comply with the requirements.

Verification procedure for luminaires intended to be marketed or marketed to the end-user:

- the luminaire shall be considered to comply with the requirements laid down in Articles 3 and 4 if it is accompanied by the required product information, and if it is found to be compatible with any lamps with which it is claimed to be compatible according to point 2.2(IV)(a) and (b) of Annex I, applying state-of-the-art methods and criteria for assessing compatibility;
- the information to be provided under Articles 3 and 4 (see chapter 2.1.4. Responsibilities) shall be obtained by reliable, accurate and reproducible measurement procedures, which take into account the recognised state-of-the-art measurement methods, as set out in Annex V.

#### 2.1.2.4 Energy label variants

The specific content and graphic design of all of the variants is defined in **Annex I** of the regulation.

**Annex II** of the Regulation describes the content of information required to be made available to consumers within the product fiche for electrical lamps.

**Annex III** describes the prescribed content of the Technical documentation, which shall be made available to authorities upon request, such as eg. the references to the harmonized standards applied, the identification of the person empowered to bind the supplier, technical parameters, and the results of calculations and extrapolations, as well as a list of other equivalent models, where the information was obtained in the same way.

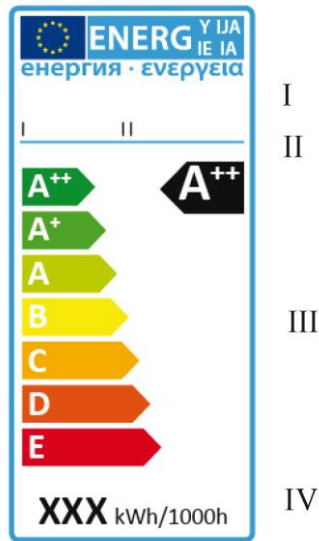
**Annex IV** lists the information, to be provided in cases where consumers/final owners cannot be expected to see the product displayed. The information referred such as the models energy efficiency class, the weighted energy consumption in kWh per 1.000 hours.

The following versions of the energy label have been designed and shall be used:

##### 2.1.2.4.1 *Label for Electrical Lamps*

The following information shall be included on the label, if it is not printed on the package:

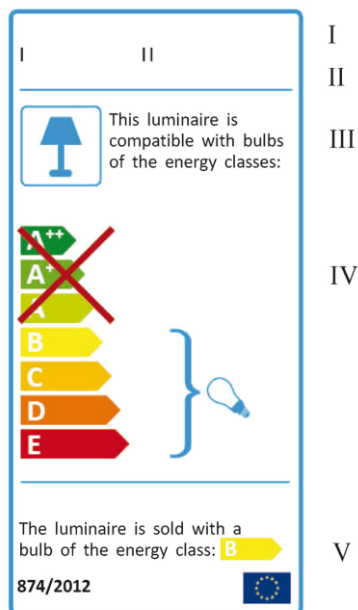




- I. Supplier's name or trade mark
- II. Supplier's model identifier, meaning the code, usually alphanumeric, which distinguishes a specific lamp model from other models with the same trade mark or supplier's name
- III. The energy efficiency class determined in accordance with Annex VI;
- IV. Weighted energy consumption (EC) in kWh per 1.000 hours, calculated and rounded up to the nearest integer in accordance with Annex VII.

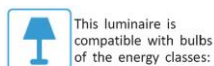
#### 2.1.2.4.2 Label for Luminaires

The following information shall be included in the label



- Supplier's name or trade mark
- The supplier's model identifier, meaning the code, usually alphanumeric, which distinguishes a specific luminaire model from other models with the same trade mark or supplier's name
- The sentence as shown in the example 'This luminaire is compatible with bulbs of the energy classes'.
- The range of energy-efficiency, additional information see description in Point V

The following illustrations provide examples of typical luminaire labels, without showing all possible combinations:

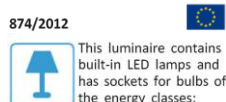


- a) luminaire operating with user-replaceable lamps compatible with lamps of all energy classes with no lamps included:



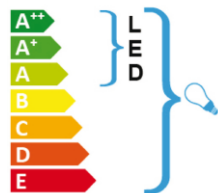
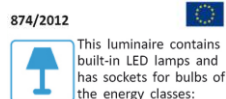
- b) luminaire containing only non-replaceable LED modules:

The lamps cannot be changed in the luminaire.



- c) luminaire containing both non-replaceable LED modules and sockets for user-replaceable lamps, with lamps included:

The luminaire is sold with a bulb of the energy class: C



- d) luminaire containing both non-replaceable LED modules and sockets for user-replaceable lamps, with lamps not included:

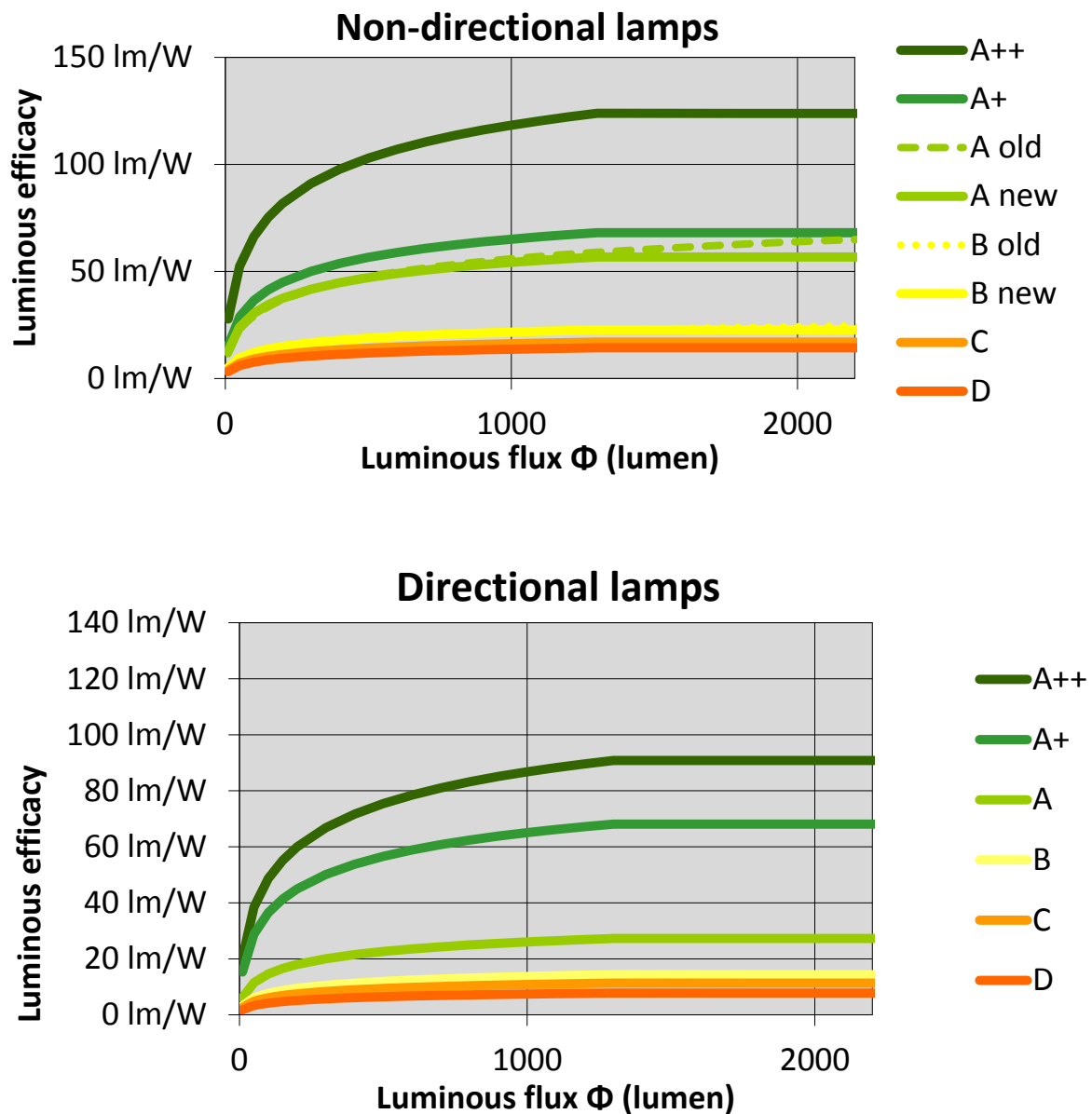
The LED lamps cannot be changed in the luminaire.

874/2012

### 2.1.2.5 Energy Efficiency requirements

The graphs below compare the requirements to luminous efficiency as a function of the luminous flux for both non-directional and directional lamps.

The requirements are calculated based on the EEI (Energy Efficiency Index) mathematic formulas developed for incandescent lamps. These formulas are not very appropriate for CFLs lamps and especially not for LED lamps where the energy efficiency is nearly not dependent on the luminous flux (in other quality requirements as Energy Star and IEA tiers constant lm/W requirements is used for LED lamps). During the next revision of the EU regulation, when practically all incandescent lamps are phased out, a change in the definition of energy efficiency requirements is also awaited.



## 2.2 Ecodesign requirements for lamps

### 2.2.1 Ecodesign Regulation 244/2009

Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council introduced Ecodesign requirements for non-directional household lamps. The Regulation entered into force the 13 April 2009. On 19 Sept 2009, an amendment on the UV radiations of lamps entered into force, with retroactive effect from 1 Sept 2009.

The Regulation sets minimum requirements for energy efficiency and functionality for lamps that are typically used in households (incandescent lamps, halogen lamps and compact fluorescent lamps). It includes mandatory requirements to indicate mercury content on CFL packaging and reference to a website with information of recycling.

Consumers will be able to choose between compact fluorescent lamps with the highest energy savings (consuming up to 75% less energy than incandescent lamps) or halogen lamps (with 25% and 50% less energy use).

The electrical lighting products listed in Article 1 shall meet the ecodesign requirements set out in Annex III, except if they are special purpose products. Ecodesign requirements apply in accordance with the following stages:

	Non-clear lamps				Clear lamps							
Date	Require- ment	Incan- descent	All Halogen	CFL / LED	Require- ment	Incandescent / Conventional halogen				Halogen C	Halogen B	LED <sup>1</sup>
						≥ 100 W	≥ 75 W	≥ 60 W	60 W >			
Today	None				None							
September 2009 <sup>1</sup>	A <sup>2</sup>				C for ≥ 100W <sup>3</sup>		≥ E <sup>3</sup>	≥ E <sup>3</sup>	≥ E <sup>3</sup>			
September 2010	A <sup>2</sup>				C for ≥ 75W <sup>3</sup>			≥ E <sup>3</sup>	≥ E <sup>3</sup>			
September 2011	A <sup>2</sup>				C for ≥ 60W <sup>3</sup>				≥ E <sup>3</sup>			
September 2012	A <sup>2</sup>				C for all							
September 2013	Second level of functionality requirements <sup>1</sup>											
Review 2014	Review											
September 2016	A <sup>2</sup>				B / C <sup>4</sup>					4		

Status for the 244/2009 regulation is as follows:

- During the first 4 stages of the regulation, practically all GLS are by 9/2012 not allowed to enter the market.
- Since 9/2013 the special purpose GLS lamps with S14, S15 and S19 cap will also be included in the phase out and the functional requirements for CFLs and halogen lamps will be increased.
- The regulation will be revised in 2014.

- Since 9/2016 the efficiency value for maximum consumption is lowered by 25% for all clear lamps except lamps with the cap G9 or R7.

## 2.2.2 Ecodesign Regulation 1194/2012

The **Commission Regulation No 1194/2012** establishes ecodesign requirements to be fulfilled for placing products on the market and covers the following electrical lighting products:

- directional lamps;
- light-emitting diode (LED) lamps;
- equipment designed for installation between the mains and the lamps, including lamp control gear, control devices and luminaires (other than ballasts and luminaires for fluorescent and high-intensity discharge lamps);

### 2.2.2.1 Efficiency requirements

There are three stages:

- Sept 2013: (Stage 1)
  - mains voltage filaments lamps: more than 450 lm min. D, less than 450 lm no requirements
  - other filament lamps: less than 450 lm min. C, more than 450 lm min. B
  - other lamps: min. A and partly B
- Sept 2014: (Stage 2)
  - mains voltage filaments lamps: min. D
  - other filament lamps: min. B
  - other lamps: no change
- Sept 2016: (Stage 3)
  - mains voltage filaments lamps: min. B
  - other filament lamps: min. B
  - other lamps: min. A+ and partly A

The Regulation sets minimum requirements for functionality and product informational requirement of directional lamps and LED lamps.

### 2.2.2.2 Functionality requirements

#### 2.2.2.2.1 *Functionality requirements for directional lamps and other than LED lamps*

The lamp functionality requirements are set out in the below Table for directional compact fluorescent lamps and in a table for directional lamps excluding compact fluorescent lamps, LED lamps and high-intensity discharge lamps.

Functionality parameter	Stage 1 except where indicated otherwise	Stage 3
Lamp survival factor at 6 000 h	From 1 March 2014: $\geq 0,50$	$\geq 0,70$
Lumen maintenance	At 2 000 hours: $\geq 80 \%$	At 2 000 h: $\geq 83 \%$ At 6 000 h: $\geq 70 \%$
Number of switching cycles before failure	$\geq$ half the lamp lifetime expressed in hours $\geq 10\,000$ if lamp starting time $> 0,3$ s	$\geq$ lamp lifetime expressed in hours $\geq 30\,000$ if lamp starting time $> 0,3$ s
Starting time	$< 2,0$ second	$< 1,5$ s if $P < 10$ Watt $< 1,0$ s if $P \geq 10$ W
Lamp warm-up time to 60 % $\Phi$	$< 40$ s or $< 100$ s for lamps containing mercury in amalgam form	$< 40$ s or $< 100$ s for lamps containing mercury in amalgam form
Premature failure rate	$\leq 5,0 \%$ at 500 h	$\leq 5,0 \%$ at 1 000 h
Lamp power factor for lamps with integrated control gear	$\geq 0,50$ if $P < 25$ W $\geq 0,90$ if $P \geq 25$ W	$\geq 0,55$ if $P < 25$ W $\geq 0,90$ if $P \geq 25$ W
Colour rendering (Ra)	$\geq 80$ $\geq 65$ if the lamp is intended for outdoor or industrial applications according to point 3.1.3(l) of this Annex	$\geq 80$ $\geq 65$ if the lamp is intended for outdoor or industrial applications according to point 3.1.3(l) of this Annex

If the lamp cap is a standardised type also used with filament lamps, then as from stage 2, the lamp shall comply with state-of-the-art requirements for compatibility with equipment designed for installation between the mains and filament lamps.

#### 2.2.2.2.2 Functionality requirements for directional compact fluorescent lamps

Functionality parameter	Stage 1 and 2	Stage 3
Rated lamp lifetime at 50 % lamp survival	$\geq 1\,000$ hours ( $\geq 2\,000$ h in stage 2) $\geq 2\,000$ h for extra low voltage lamps not complying with the stage 3 filament lamp efficiency requirement in point 1.1 of this Annex	$\geq 2\,000$ h $\geq 4\,000$ h for extra low voltage lamps
Lumen maintenance	$\geq 80 \%$ at 75 % of rated average lifetime	$\geq 80 \%$ at 75 % of rated average lifetime
Functionality parameter	Stage 1 and 2	Stage 3
Number of switching cycles	$\geq$ four times the rated lamp life expressed in hours	$\geq$ four times the rated lamp life expressed in hours
Starting time	$< 0,2$ second	$< 0,2$ s
Lamp warm-up time to 60 % $\Phi$	$\leq 1,0$ s	$\leq 1,0$ s
Premature failure rate	$\leq 5,0 \%$ at 100 h	$\leq 5,0 \%$ at 200 h
Lamp power factor for lamps with integrated control gear	Power $> 25$ W: $\geq 0,9$ Power $\leq 25$ W: $\geq 0,5$	Power $> 25$ W: $\geq 0,9$ Power $\leq 25$ W: $\geq 0,5$

### 2.2.2.2.3 *Functionality requirements for non-directional and directional LED lamps*

The lamp functionality requirements are set for both non-directional and directional LED lamps.

Functionality parameter	Requirement as from stage 1, except where indicated otherwise
Lamp survival factor at 6 000 h	From 1 March 2014: $\geq 0,90$
Lumen Maintenance at 6 000 h	From 1 March 2014: $\geq 0,80$
Number of switching cycles before failure	$\geq 15\,000$ if rated lamp life $\geq 30\,000$ h otherwise: $\geq$ half the rated lamp life expressed in hours
Starting time	$< 0,5$ s
Lamp warm-up time to 95 % $\Phi$	$< 2$ s
Premature failure rate	$\leq 5,0$ % at 1 000 h
Colour rendering (Ra)	$\geq 80$ $\geq 65$ if the lamp is intended for outdoor or industrial applications in accordance with point 3.1.3(l) of this Annex
Colour consistency	Variation of chromaticity coordinates within a six-step MacAdam ellipse or less.
Lamp power factor (PF) for lamps with integrated control gear	$P \leq 2$ W: no requirement $2\text{ W} < P \leq 5\text{ W}$ : PF $> 0,4$ $5\text{ W} < P \leq 25\text{ W}$ : PF $> 0,5$ $P > 25\text{ W}$ : PF $> 0,9$

If the lamp cap is a standardised type also used with filament lamps, then as from stage 2 the lamp shall comply with state-of-the-art requirements for compatibility with equipment designed for installation between the mains and filament lamps.

### 2.2.2.3 **Information requirements**

Information at the package, point of sales and web site shall include:

Luminous flux, wattage, switching cycles, colour temperature, warm-up time, warning if the lamp can't be dimmed, in case information about non-standard temperature conditions, size, in case follow a table specifying the equivalence to GLS lamps, in case content of mercury and the word "energy saving" must only be used for energy class A or better.

For distance selling and **internet sales**, the following information shall be provided<sup>5</sup>:

1. The information shall be provided in the following order:
  - (a) the **energy efficiency class** (as defined in Annex VI)

<sup>5</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:258:0001:0020:EN:PDF>



(b) where required (by Annex I), the **weighted energy consumption** in kWh per 1000 hours, rounded up to the nearest integer (calculated in accordance with part 2 of Annex VII).

2. When other information contained in the product fiche is also provided, it shall be in the form and order specified in Annex II.

3. The size and font in which all the information referred to in this Annex is printed or shown shall be legible.

Information to be visibly displayed to end-users, prior to their purchase, on the packaging and on **free access websites**<sup>6</sup>:

The information does not need to be specified using the exact wording of the list below. It may be displayed using graphs, figures or symbols rather than text.

- (a) When the nominal lamp power is displayed outside the energy label, the nominal luminous flux of the lamp shall also be separately displayed in a font at least twice as large as the nominal lamp power display outside the label;
- (b) Nominal life time of the lamp in hours (not higher than the rated life time);
- (c) Number of switching cycles before premature lamp failure;
- (d) Colour temperature (also expressed as a value in Kelvins);
- (e) Warm-up time up to 60 % of the full light output (may be indicated as ‘instant full light’ if less than 1 second);
- (f) A warning if the lamp cannot be dimmed or can be dimmed only on specific dimmers;
- (g) If designed for optimal use in non-standard conditions (such as ambient temperature  $T_a \neq 25^\circ\text{C}$ ), information on those conditions;
- (h) Lamp dimensions in millimeters (length and diameter);
- (i) If equivalence with an incandescent lamp is claimed on the packaging, the claimed equivalent incandescent lamp power (rounded to 1 W) shall be that corresponding in Table 6 to the luminous flux of the lamp contained in the packaging.
- (j) The term ‘energy saving lamp’ or any similar product related promotional statement about lamp efficacy may only be used if the lamp complies with the efficacy requirements applicable to non-clear lamps in Stage 1 according to Tables 1, 2 and 3.

*If the lamp contains mercury*

- (k) Lamp mercury content as X,X mg;
- (l) Indication which website to consult in case of accidental lamp breakage to find instructions on how to clean up the lamp debris.

As a minimum, the following information shall be expressed at least as values.

- Rated wattage (0,1 W precision);

<sup>6</sup> Example for non-directional light sources:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:076:0003:0016:en:PDF>

- Rated luminous flux;
- Rated lamp life time;
- Lamp power factor;
- Lumen maintenance factor at the end of the nominal life;
- Starting time (as X,X seconds);
- Colour rendering.
- *If the lamp contains mercury*
- Instructions on how to clean up the lamp debris in case of accidental lamp breakage;
- Recommendations on how to dispose of the lamp at its end of life.

### 2.3 Energy labelling vs. ecodesign requirements

The Ecodesign measures are based on the Energy Efficiency Index (EEI) which is calculated as the ratio of the rated power measured at nominal input voltage corrected by certain correction factors as specified in the regulation divided by a reference rated power at nominal input voltage. The calculation of EEI is defined in the Delegated Regulation 874/2012 and there are two formulas for directional and non-directional lamps (Annex VI, Table 1).

In the following Table labelling and ecodesign requirement are collected and compared

Household Lamps						
Labelling		Ecodesign				
Energy efficiency class for non-directional lamps:		Maximum Energy Efficiency Index (EEI) for directional lamps set in the Ecodesign Regulation:				
Energy Efficiency Class	Energy Efficiency Index	Application date	Maximum energy efficiency index (EEI)			
A++ (most efficient)	$EEI \leq 0,11$		Mains-voltage filament lamps	Other filament lamps	High-intensity discharge lamps	Other lamps
A+	$0,11 \leq EEI \leq 0,17$	Sept. 2013/ Stage 1	If $\Phi_{use} > 450$ lm : 1,75	If $\Phi_{use} \leq 450$ lm: 1.20	0,50	0,50
A	$0,17 < EEI \leq 0,24$			If $\Phi_{use} > 450$ lm: 0.95		
B	$0,24 < EEI \leq 0,60$					
C	$0,60 < EEI \leq 0,80$	Sept. 2014/ Stage 2	1,75	0,95	0,50	0,50
D	$0,80 < EEI \leq 0,95$	Sept. 2015/ Stage 3	0,95	0,95	0,36	0,20
E (least efficient)	$EEI > 0,95$					
Energy efficiency class for directional lamps:		Φuse is defined as follows:				
Energy Efficiency Class	Energy Efficiency Index	• directional lamps with beam angle ≥ 90°, other than filament lamps and carrying a warning on their packaging in accordance with point 3.1.2 ((j) nominal beam angle in degrees)				
A++ (most efficient)	$EEI \leq 0,13$	• other directional lamps: rated luminous flux in a 90° cone				
A+	$0,13 \leq EEI \leq 0,18$					
A	$0,18 < EEI \leq 0,40$					
B	$0,40 < EEI \leq 0,95$					
C	$0,95 < EEI \leq 1,20$					
D	$1,20 < EEI \leq 1,75$					
E (least efficient)	$EEI > 1,75$					

### 3 Voluntary measures: EU LED Quality Charter

The aim of the European LED Quality Charter<sup>7</sup> as of February 2011 is to support use of energy efficient high quality LED lamps and ensure consumer satisfaction. The charter is intended to be used by European utilities, industries and other bodies for:

- Manufacturing, marketing and/or sales of high quality LED lamps in the European Union.
- Raising consumer awareness and confidence in LED technology by assuring an acceptable quality and a good performance level are reached.
- Supporting promotion and procurement campaigns providing quality, comfort, energy and money saving and decreasing the carbon dioxide (CO<sub>2</sub>) emission.
- Large purchasers (e.g. utilities and supermarket chains) in their promotional campaigns and procurement (e.g. as part of white certificates schemes).

The energy efficiency requirements are increased year by year and for 2013 are as follows:

- 70 lm/W for LED non-directional lamp with CRI>80
- 60 lm/W for LED non-directional lamp with CRI>90
- 60 lm/W for LED directional lamp with CRI>80
- 50 lm/W for LED directional lamp with CRI>90

Concerning the colour temperature, 2600-3500 K is accepted. In order to make the situation more simple for the consumers, it is suggested that the industry provides three temperatures:

- F 2700 (2720 K, X=0.463, Y=0.420)
- F 3000 (2940 K, X=0.440, Y=0.403)
- F 3500 (3450 K, X=0.409, Y=0.394)

The final goal of the European LED Quality Charter is a rapid penetration of high quality energy efficient LEDs across the EU and thus contribute to the goals of the EU-Energy and environmental policies.

The LED Quality Charter will be revised in 2013 due to the fast development in the LED technology. The revision will be co-ordinated with the revision of other EU voluntary measures, namely the EU Ecolabel and GPP (Green Public Procurement) criteria for lighting.

### 4 Lamps and luminaires on the market

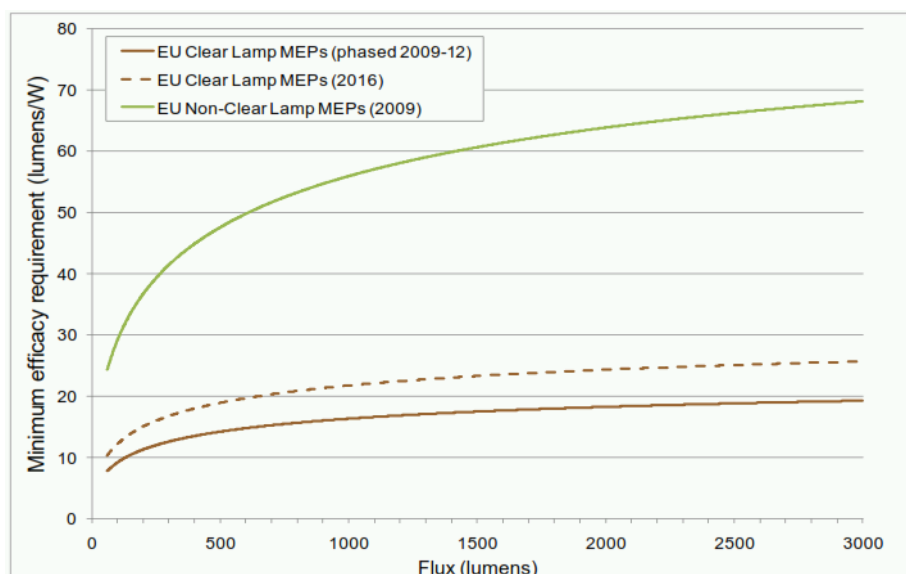
Lighting represents around 10% of the residential electricity consumption<sup>8</sup>, being the third main type of consumption after electricity for heating and cold appliances. Electricity consumption of household lighting was estimated to be around 84 TWh in 2007. Since then consumption decreased substantially compared to other appliance groups by around 5% resulting in an estimated electricity consumption of around 79.8 TWh in 2009. This trend is expected to continue in the coming years - it is predicted to raise to 102 TWh by 2020 due to growing welfare especially in some countries and rapidly increasing number of lamps per home.

<sup>7</sup> [http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/eu\\_led\\_quality\\_charter.pdf](http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/files/documents/eu_led_quality_charter.pdf)

<sup>8</sup> JRC: Energy Efficiency Status Report 2012

<http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/energy-efficiency-status-report-2012.pdf>

## Phase out of domestic lighting – EU25<sup>9</sup>



A study from CLASP/ECEEE of February 2013<sup>10</sup> foresees in its 'BAU' scenario a rapid decline in the remaining special-purpose incandescent lamp shipments, reaching zero by 2021. Halogen becomes a popular replacement for incandescent, however it starts to decline around 2015 and trends downward in response to Stage 6 in September 2016 which requires halogen lamps to achieve energy label B rating. CFLs peak in 2012 and then decline as the most suitable sockets for CFLs will then have long-life CFLs installed and consumers are expected not to fully embrace the technology due to warm-up time, mercury content and other issues. LEDs start to gain market-share, surpassing CFLs on a unit basis in 2015 and halogens in 2017. However, LEDs are very long life, thus once installed the socket is not available for replacement in the domestic setting for approximately 20 years – leading to peak in LED replacement lamp sales around 2020 and a gradual decline and levelling off by 2030 at around 200 million unit LED lamp sales per annum. Similar to the trend in tertiary lighting, the market is expected to increase lumen output while decreasing energy consumption under a CLASP/eceee study BAU scenario.

### 4.1.1 Topten: Products with highest energy efficiency & quality on the market

The website [www.topten.eu](http://www.topten.eu) shows the best models of common LED lamp types and compact fluorescent lamp types. All presented lamps meet strict efficiency as well as quality criteria and are available on the market today.

Key criteria for all lamps are luminous efficacy (lumens per watt), lamp life and number of switching cycles before failure. All LED lamps on [www.topten.eu](http://www.topten.eu) fulfil the requirement for colour rendering asked by the ecodesign regulation and LED quality charter (min. 80).

<sup>9</sup> [http://mappingandbenchmarking.iea-4e.org/shared\\_files/183/download](http://mappingandbenchmarking.iea-4e.org/shared_files/183/download)

<sup>10</sup> <http://www.clasponline.org/~media/Files/SLDocuments/2013/Estimating%20Potential%20Additional%20Energy%20Savings.pdf>

Technical criteria [www.topen.eu](http://www.topen.eu) are (as of March 2013):

	LED lamps	Compact fluorescent lamps
<b>Luminous efficacy</b>	non-directional: up to 300 lm: min. 45 lm/W 300 to 470 lm: min. 50 lm/W above 600 lm: min. 60 lm/W directional: min. 45 lm/W	bulbs E14 and candles E27/E14: min. 40 lm/W sticks E27/E14 and bulbs E27: min. 50 lm/W if length < 105 mm: min. 34
<b>Lamp life</b>	min. 20'000 hours	min. 12'000 hours
<b>Number of switching cycles before failure</b>	min. 50'000	min. 50'000
<b>Colour rendering (Ra)</b>	min. 80	-
<b>Start-up-time (60%)</b>	-	max. 60 seconds

Topen helps consumers by showing pictures, electricity costs and important product data. It makes explicit and transparent the status quo of efficient technologies on the European market and can thus serve as a basis for environmental policy design, labelling strategies, dissemination programmes, minimum efficiency requirements etc.

The Topen criteria can also be used as specifications for large buyers.

Selection Criteria Lamps XLS Download

compare

								
Brand	Vishalux	Mitsubishi	Osram	Osram	Lexus	EcoLED	EcoLED	Inefficient Model
Model	Classic A 10W	LED Classic 11W E27	Parathom Classic A 75 320° Advanced	Parathom Classic A 75 ADV OMNI	12W	Master LED bulb 12W	LED Bulb 17W	Eco Halogen Lamp 53W
Other models								
Electricity costs (€ in 15 years)	23	25	33	33	27	27	38	119
Wattage (W)	10	11	14.5	14.5	12	12	17	53
Luminous flux (lm)	820	810	1055	1055	800	806	1055	840
Equivalent wattage (W)	60	60	75	75	60	60	75	75
Luminous efficacy (lm/W)	82	74	73	73	67	67	62	16
Lamp life (h)	30'000	25'000	30'000	30'000	25'000	25'000	25'000	2'000
Switching cycles	50'000	1'000'000	200'000	200'000	100'000	50'000	50'000	120'000
Dimmable	no	yes	yes	yes	no	yes	yes	yes
Colour temperature (K)	3000	2800	2700	2700	2800	2700	2700	2800
Colour Rendering Index	80	80	80	80	90	80	80	100
Length (mm)	112	123	116	116	129	106	127	96
Diameter (mm)	60	65	62	62	66	58	61	55

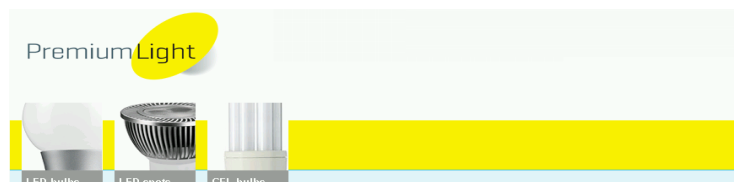
19/02/2013

More information about the project activities and all of its results are published on:

[www.come-on-labels.eu](http://www.come-on-labels.eu)

[www.topten.eu](http://www.topten.eu)

[www.premiumlight.eu](http://www.premiumlight.eu)



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