

Guidelines accompanying

July
2015

Regulation (EU)
N° 874/2012 with regard to
energy labelling of lighting products
and
Regulations (EC/EU) N° 244/2009,
245/2009 and 1194/2012 with
regard **ecodesign requirements**
for lighting products



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1. Introduction

Lighting accounts for 19% of the worldwide electricity consumption and 14% of all electricity consumption in the European Union (EU). Residential lighting alone represents 30% of the total European lighting market. Residential lighting includes halogen, fluorescent (both tubular and compact) and LED technology. Besides lamps, residential lighting system also includes ballast, luminaire (also known as armature or fixture) and control systems (e.g. movement detector, illuminance sensor and timers).

The current ecodesign and Energy Labelling regulations for lighting were published between 2009 and 2012. These Regulations established minimum requirements and an energy labelling scheme for the products in its scope. This Technical Implementation Guide summarise the most relevant information from the regulations in a readable format to give SMEs an introduction to the subject and answer their most common questions.

In Chapter 2, reviews the existing standards on lighting products. Chapter 3 presents the scope of ecodesign regulation and its requirements on lighting products (lamps, ballasts and luminaires) with regard to efficiency, functionality and information. Chapter 4 explains the Labelling regulation for lamps and luminaires. Chapter 5 suggests how LEDs could be promoted both in stores and online. Chapter 6 addresses some important considerations and frequently asked questions made by manufacturers and suppliers/dealers. The guide closes with additional sources for further information.

The document aims to help a number of groups, including industry and public authorities, to transfer the Regulation and requirements into practice.

This guide is not intended to provide a binding interpretation of EU law as this is the sole competence of the European Court of Justice.

The regulations

The Commission has published the following regulations concerning lighting products:

- ✓ [Commission Regulation \(EC\) No 244/2009](#)
- ✓ [Commission Regulation \(EU\) No 245/2009](#)
- ✓ [Commission Regulation \(EU\) No 1194/2012](#)
- ✓ [Commission Regulation \(EC\) No 874/2012](#)

By using this guide in an electronic format, the requirements can be directly accessed by clicking the highlighted link. If the Guide has been printed, you will need to have the regulation documents at hand, as this Guide only refers to the requirements as (Page | Annex | Chapter/Table).

2. EU Legislation

The EU has been very active in the last few years, in order to reach the 20-20-20 goals by 2020. Energy efficiency and the environment are two major targets. In effect, new EU legislation for domestic lighting (namely ecodesign and Labelling) has been set. It has strongly influenced the development of the lighting market since 2009. The following table presents the most important European Regulation that manufacturers and suppliers must be aware of when producing and selling lighting components.

Table 1 - Important European Regulation

Regulation	Name	Description
Directive 2004/108/EC	EMC (Electromagnetic Compatibility)	Covers electromagnetic emissions from the product and immunity to electromagnetic interference
Directive 2006/95/EC	Low Voltage	To ensure safety in the use of electrical equipment used within 50-1000 V(AC) and 75-1500 V(DC)
Regulation 1907/2006	REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals)	Ensures suppliers and manufacturers do not place in the market or produce products with harmful substances for human health and the Environment.
Directive 2009/125/EC	Ecodesign	Establishes framework for the setting of Ecodesign requirements for energy related products to be placed in the European market
Directive 2010/30/EC	Labelling	Establishes a framework for labelling and standard product information
Directive 2011/65/EC	RoHS (Restriction of Hazardous Substances)	Restricts the use of certain substances
Directive 2012/19/EC	WEEE (Waste Electrical and Electronic Equipment)	Covers the disposal and recycling of waste

There are also some voluntary agreements (European and International) that, even though they are not mandatory nor have any legal binding, have been pushing the market to higher levels of quality and efficiency. Several examples are: EU LED Quality Charter, IEA SSL, TopTen, Eco-Lighting and PremiumLight.

3. Ecodesign Directive

Three sets of regulations under the ecodesign directive apply to lighting products. Each one establishes requirements for specific lighting products, as we can see in the following picture.

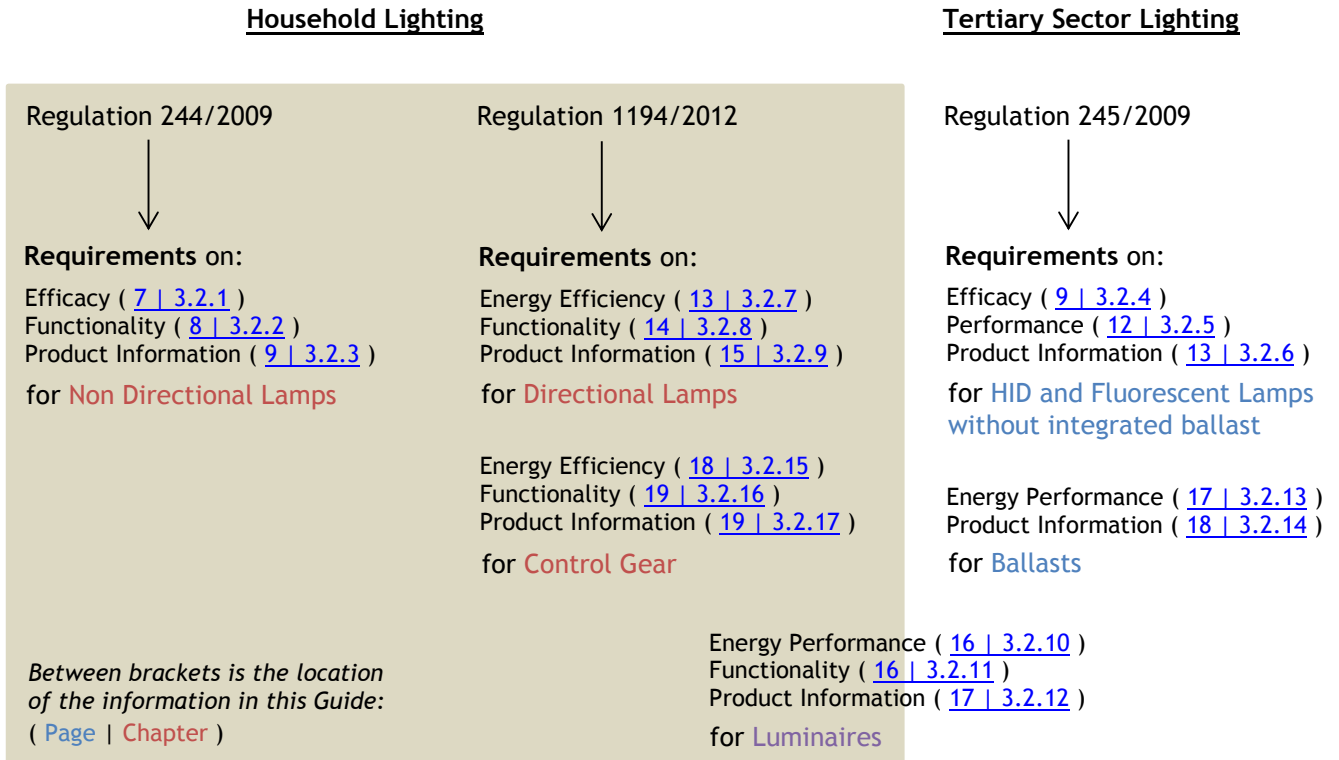


Figure 2 - Comprehensive scheme-guide of ecodesign

So that manufacturers would have time to adjust to the ecodesign requirements, several stages have been implemented, updating and/or establishing the new requirements. The following table summarizes all stages of Ecodesign for lighting products.

Table 2 - Stages of ecodesign Requirements

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
244/2009	01/09/2009	01/09/2010	01/09/2011	01/09/2012	01/09/2013	01/09/2016*
245/2009	13/04/2010	13/04/2012	13/04/2017			
1194/2012	01/09/2013	01/09/2014	01/09/2016			

Since the present year is 2015, we are at Stage 5 of 244/2009, Stage 2 of 245/2009 and Stage 2 of 1194/2012. All requirements from previous stages, up until now, must have full compliance (unless any value has been updated in a later stage).

* The here presented information is accurate as of the date of this guide's publication. An amending Regulation changing certain aspects, such as the date of Stage 6 to 01/09/2018, is currently in the legislative process and expected to change further certain aspects of Regulations 244/2009, 245/2009 and 1194/2012.

3.1. Scope

The products in the scope of the regulation include luminaires, lamps, ballasts and control systems (namely control gears and control devices). The next table shows the scope of ecodesign for luminaires, lamps and ballasts, thus distinguishing the ones that must comply with the requirements, and those given their special characteristics that do not.

Table 3 - Scope of ecodesign Luminaires, Lamps, Ballasts and Control Gears

	Within the scope	Out of the scope
Luminaires	<p>:: Luminaires operating fluorescent lamps without integrated ballast and high intensity discharge lamps <i>Regulation 245/2009</i></p> <p>:: All other Luminaires <i>Regulation 1194/2012</i></p>	<p>:: Emergency lighting and emergency sign (<i>Directive 2006/95/EC</i>) luminaires</p> <p>:: Explosion-protected luminaires covered by <i>Directives 94/9/EC</i> and <i>1999/92/EC</i></p> <p>:: Luminaires integrated into machinery covered by <i>Directive 2006/42/EC</i></p> <p>:: Luminaires integrated into medical products covered by <i>Directive 93/42/EEC</i></p> <p>:: Luminaires that are toy components covered by <i>Directive 88/378/EEC</i></p>
Lamps	<p>:: Non-directional household lamps <i>Regulation 244/2009</i></p> <p>:: Fluorescent lamps without integrated ballast and high intensity discharge lamps <i>Regulation 245/2009</i></p>	<p><i>Regulation 244/2009</i></p> <p>:: Special purpose lamps (Page 3 Article 1 of the ecodesign Revision Point 1) designed essentially for other types of applications and clearly indicated as such on accompanying product information</p> <p>:: Lamps having:</p> <ul style="list-style-type: none"> o luminous flux < 60 lm and luminous flux > 12.000 lm o 6 % or more of total radiation of the range 250-780 nm in the range of 250-400 nm o the peak of the radiation between 315-400 nm (UVA) or 280-315 nm (UVB) o The following chromaticity: <ul style="list-style-type: none"> • $x < 0,270$ or $x > 0,530$ • $y < - 2,3172 x^2 + 2,3653 x - 0,2199$ or • $y > - 2,3172 x^2 + 2,3653 x - 0,1595$ <p><i>Regulation 245/2009</i></p> <p>:: Lamps that are not white light source (Page 11 Annex II of 245/2009 Point 3 b))</p> <p>:: lamps that are directional light sources (Page 10 Annex II of 245/2009 Point 3 a))</p> <p>:: blended (Page 12 Annex II of 245/2009 Point 3 o)) high intensity discharge lamps having:</p> <ul style="list-style-type: none"> o 6% or more of total radiation of the range 250-780 nm in the range of 250-400 nm o 11% or more of total radiation of the range 250-780 nm in the range of 630-780 nm o 5% or more of total radiation of the range 250-780 nm in the range of 640-700 nm, and o the peak of the radiation between 315-400 nm (UVA) or 280-315

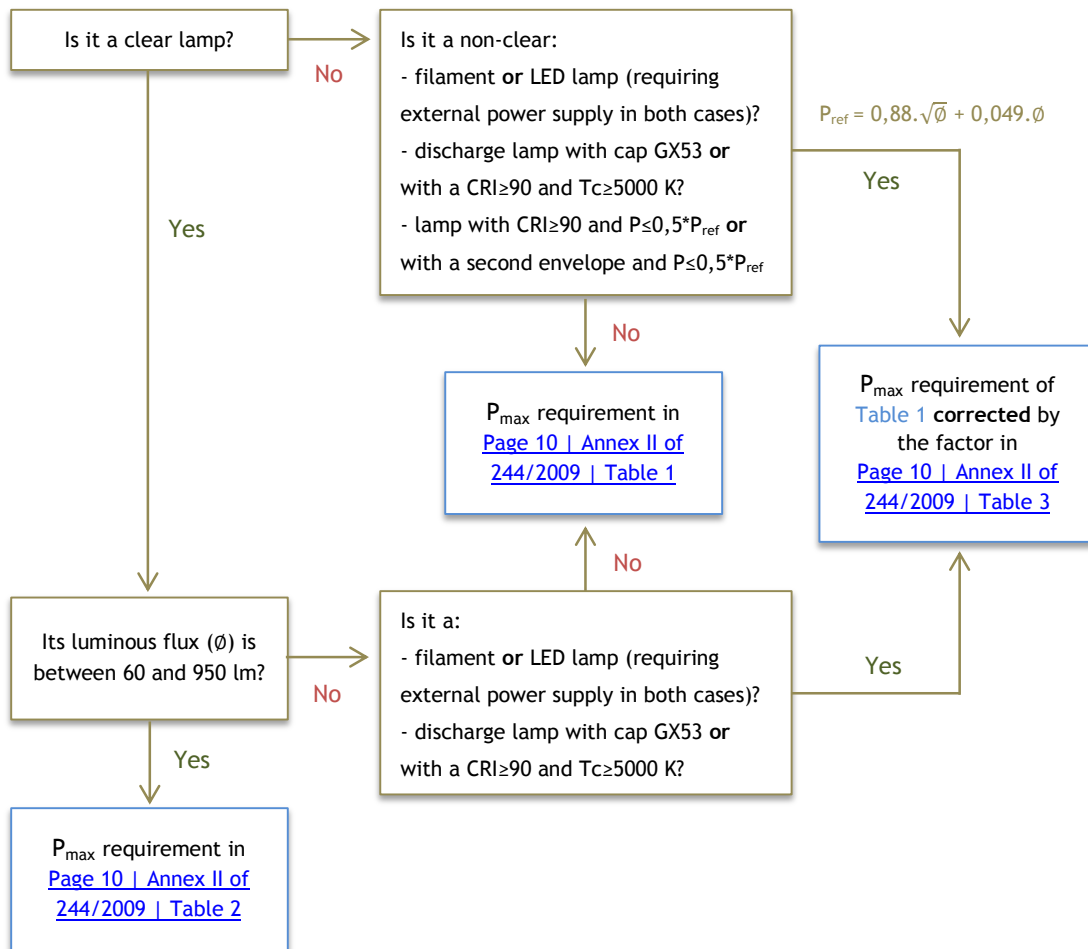
	Within the scope	Out of the scope
	<p>:: Directional lamps and LED lamps (including when they are integrated into other products) <i>Regulation 1194/2012</i></p>	<p>nm (UVB); :: Double capped fluorescent lamps having: <ul style="list-style-type: none"> o a diameter of 7 mm (T2) and less o a diameter of 16 mm (T5) and lamp power $P \leq 13$ W or $P > 80$ W o a diameter of 38 mm (T12), lamp cap G-13 Medium BiPin base, +/- 5 m (+magenta, -green) colour compensating filter value limit (cc). CIE coordinates $x=0,330$ $y=0,335$ and $x=0,415$ $y=0,377$, and o a diameter of 38 mm (T12) and equipped with an external ignition strip; :: Single capped fluorescent lamps having a diameter of 16 mm (T5) 2G11 4 pin base, $T_c = 3\ 200$ K with chromaticity coordinates $x=0,415$ $y=0,377$ and $T_c = 5\ 500$ K with chromaticity coordinates $x=0,330$ $y=0,335$; :: HID lamps with colour temperature above 7000 K, or having an UV output higher than 2 mW/klm, or not having lamp cap E27, E40, PGZ12. <i>Regulation 1194/2012</i> :: LED modules if they are marketed as part of luminaires that are placed on the market in less than 200 units per year.</p>
Ballasts	Not-integrated ballasts for fluorescent lamps	<p>:: Reference ballasts for the use in laboratories for lighting measurement techniques :: Integrated ballasts as a non-replaceable part of a luminaire (<i>requirements shall be fulfilled by the luminaire</i>) :: Ballast intended for use in emergency lighting luminaires, emergency sign luminaires and designed to operate the lamps in emergency conditions</p>
Control	Halogen control gears LED control gears Control devices (dimmers, switches, and sensors)	-

3.2. Requirements

As we have seen, each stage will introduce new requirements, either by adding new ones or just updating previous values. The following chapters help identify which requirements you must comply with now, whether you have a lamp, luminaire or control systems manufacturer/supplier.

3.2.1. Non-directional Lamps | Efficacy Requirements

Regarding lamp efficacy (lm/W), the manufacturer must comply with a maximum [rated](#) power (W) for a given rated luminous flux (lm). Different formulas are provided whether the lamp is [clear](#) or non-clear (frosted). And, depending on the lamp's type, it might be subjected to a correction factor. Nevertheless, if the lamp has certain specific characteristics (mentioned in the scheme below) it will have a different maximum rated power formula. The next figure depicts how you should determine the minimum efficacy requirements of a non-directional lamp.



As of 2016*, clear lamps with G9 or R7s cap will also have to comply with the P_{max} requirement for a certain luminous flux. That was established in [Page 10 | Annex II of 244/2009 | Table 2](#).

As for the correction factors in [Page 10 | Annex II of 244/2009 | Table 3](#), they are cumulative. If a lamp presents more than one of those mentioned characteristics, the manufacturer must consider as many correction factors as characteristics. **Example:** a non-clear discharge lamp with cap GX53 that has a colour rendering index of 92 and colour temperature of 5000 K, will have its P_{max} of [Page 10 | Annex II of 244/2009 | Table 1](#) multiplied by $\frac{1}{0,75}$ and $\frac{1}{0,76}$.

Correction factors also apply to [Page 10 | Annex II of 244/2009 | Table 2](#) maximum rated powers.

3.2.2. Non-directional Lamps | Functionality Requirements

Regulation 244/2009 does not say anything about LED’s functionality requirements. These are only set for CFLs in [Page 11 | Annex II of 244/2009 | Table 4](#) and (at the current stage) for halogen lamps in [Page 11 | Annex II of 244/2009 | Table 5](#). The following table shows which functionality requirements the regulation sets minimum values for.

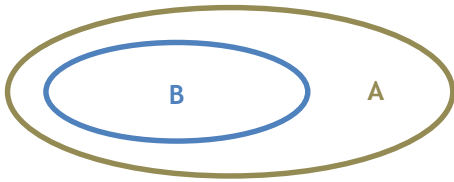
Compact Fluorescent Lamps (CFLs)	Halogen Lamps
Lamp Survival Factor (LSF) @6.000h	Rated lamp lifetime
Lamp warm-up time to 60% of the flux	
Starting time	

Compact Fluorescent Lamps (CFLs)	Halogen Lamps
Lumen Maintenance	
Number of switching cycles before failure	
Premature Failure Rate	
Lamp Power Factor	
UVA+UVB radiation	
UVC radiation	
Colour Rendering (Ra)	

On the other hand, Regulation 1194/2012, even though it concerns directional lamps, also sets requirements for non-directional LEDs. These can be seen in [Page 12 | Annex III of 1194/2012 | Table 5](#).

3.2.3. Non-directional Lamps | Product Information Requirements

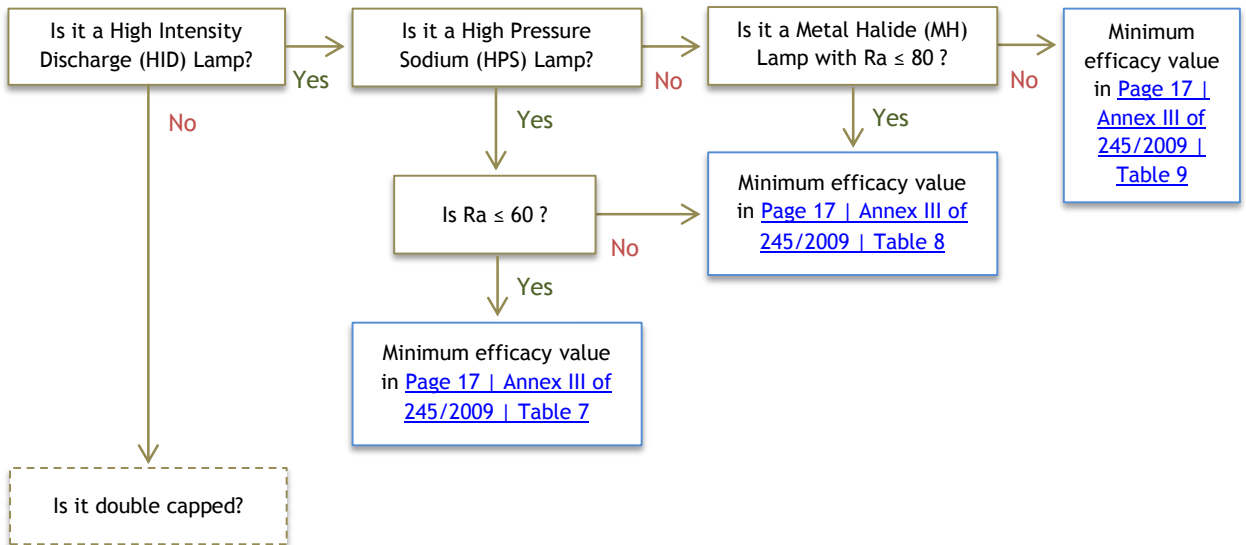
There is a great deal of information that needs to be made publicly available on a free access websites (A) by the manufacturers. Nevertheless, only a part of it must be visibly displayed on the package of the lamp (B).

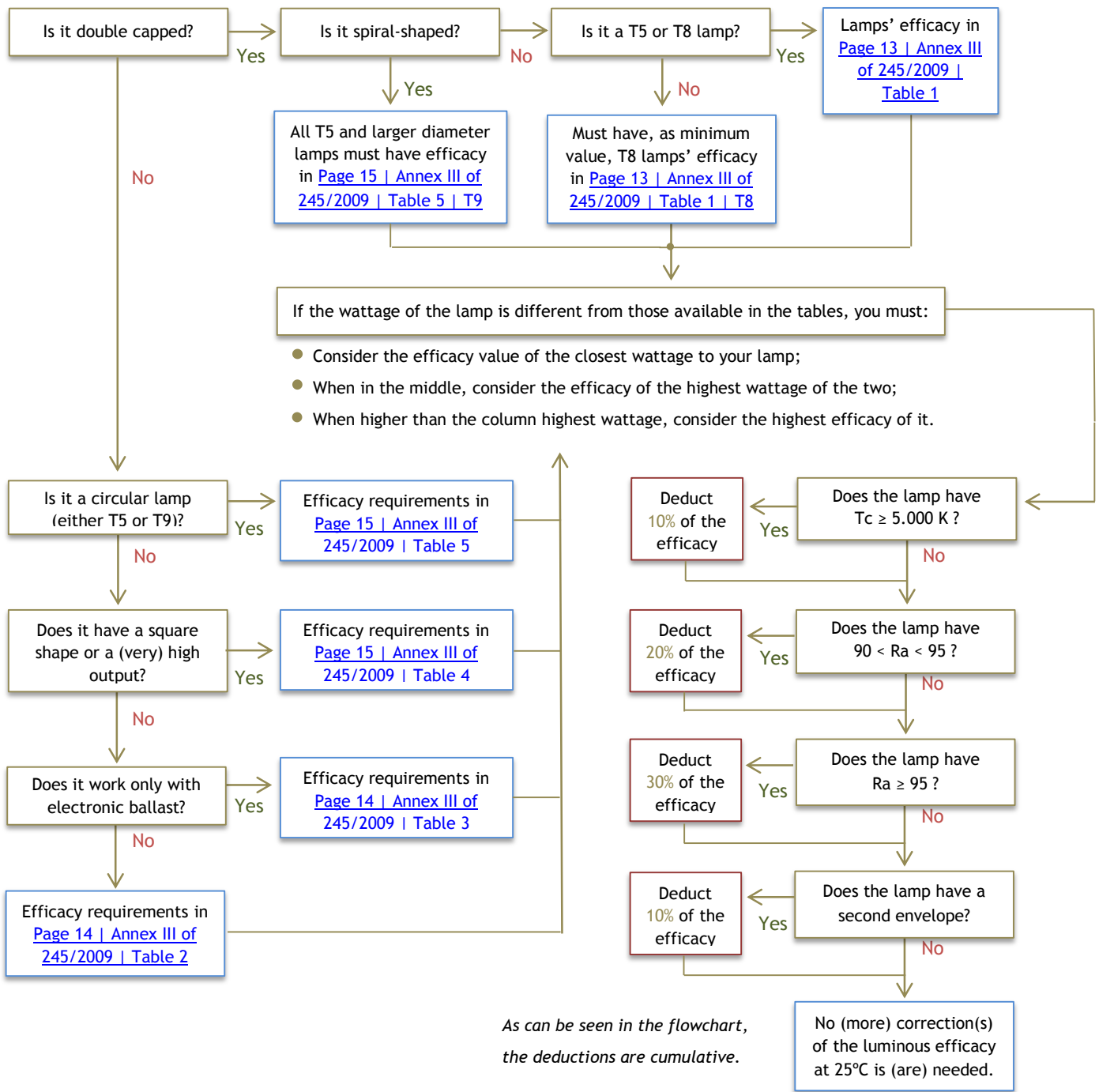


[Page 13 | Annex II of 244/2009 | Chapter 3.2](#)

[Page 12 | Annex II of 244/2009 | Chapter 3.1](#)

3.2.4. HID and Fluorescent Lamps w/out integrated ballast | Efficacy Requirements





Even if single- and double-capped fluorescent lamps do not have their optimum temperature at 25°C, they must still comply, at their own optimum temperature, with the luminous efficacy requirements set out in the tables and conditions of the previous scheme.

The next table presents the type of lamps referred to in the regulations.

Table 1 245/2009 <i>double capped</i>	<ul style="list-style-type: none"> :: T8 (tube diameter of 26 mm) :: T5 (tube diameter of 16 mm) High Efficiency High Output
Table 2 245/2009 <i>both electronic and electromagnetic</i>	<ul style="list-style-type: none"> :: 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) :: 4 legs in one plane, lamp cap 2G10 (4 pin) :: Long single parallel tube, lamp cap 2G11 (4 pin)
Table 3 245/2009 <i>with electronic ballasts only</i>	<ul style="list-style-type: none"> :: 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)
Table 4 245/2009	<ul style="list-style-type: none"> :: Single flat plane tube, lamp cap GR8 (2pin), GR10q (4pin) or GRY10q3 (4pin) <i>Square Shape</i> :: Four or three parallel T5 tubes, lamp cap 2G8 (4 pin) <i>High Output</i>
Table 5 245/2009 <i>circular lamps</i>	<ul style="list-style-type: none"> :: T9 Circular, tube diameter 29 mm with base G10q :: T5 Circular, tube diameter 16 mm with base 2GX13

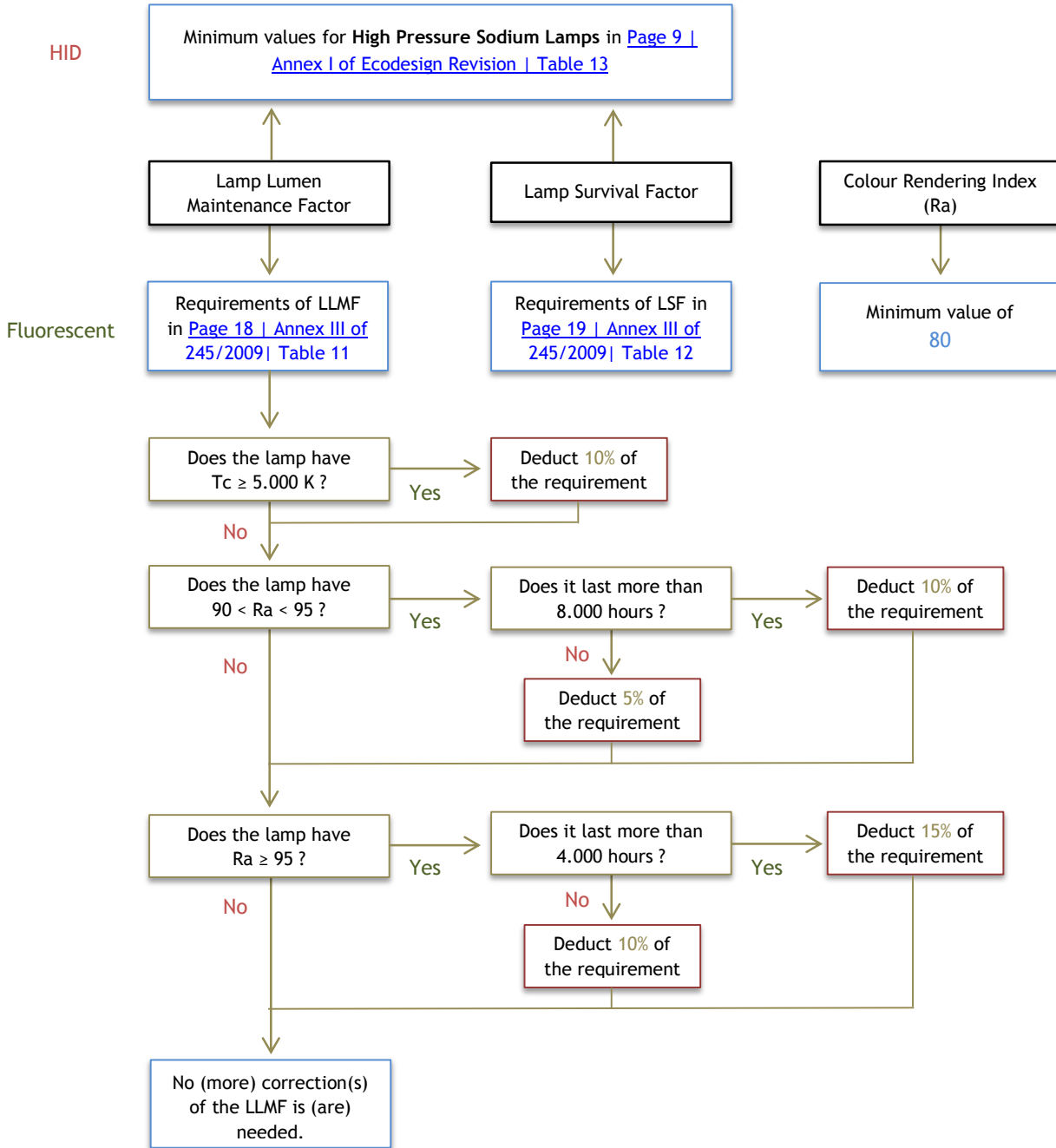
Future (Stage 3 | 2017)

Fluorescent lamps without integrated ballast shall be able to operate with ballasts of energy efficiency class A2 or more efficient ones, namely A2 BAT (Best Available Technology) or with A1 and A1 BAT for dimmable lamps. In addition they may also be able to operate with ballasts of less efficient classes than A2. [Chapter 3.2.13](#) addresses the efficiency values of these classes.

Metal halide lamps must comply with [Page 18 | Annex III of 245/2009 | Table 10](#). If the lamps have a second envelope or a colour temperature ≥ 5.000 K, then they shall only have to comply with **90%** of the values in [Page 18 | Annex III of 245/2009 | Table 10](#).

3.2.5. HID and Fluorescent Lamps w/out integrated ballast | Performance Requirements

Single- or double-capped fluorescent lamps without integrated ballast (high frequency (HF) or non-HF) and HID lamps covered by the previous efficacy requirements shall have, at least, the following performance requirements:

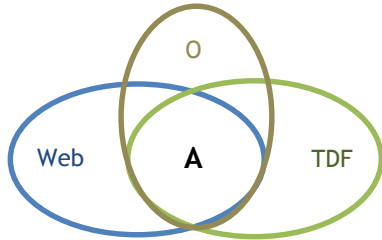


Future (Stage 3 | 2017)

Metal halide lamps shall have at least the lamp lumen maintenance factors and lamp survival factors in [Page 9 | Annex I of Ecodesign Revision | Table 14](#).

3.2.6. HID and Fluorescent Lamps w/out integrated ballast | Product Information

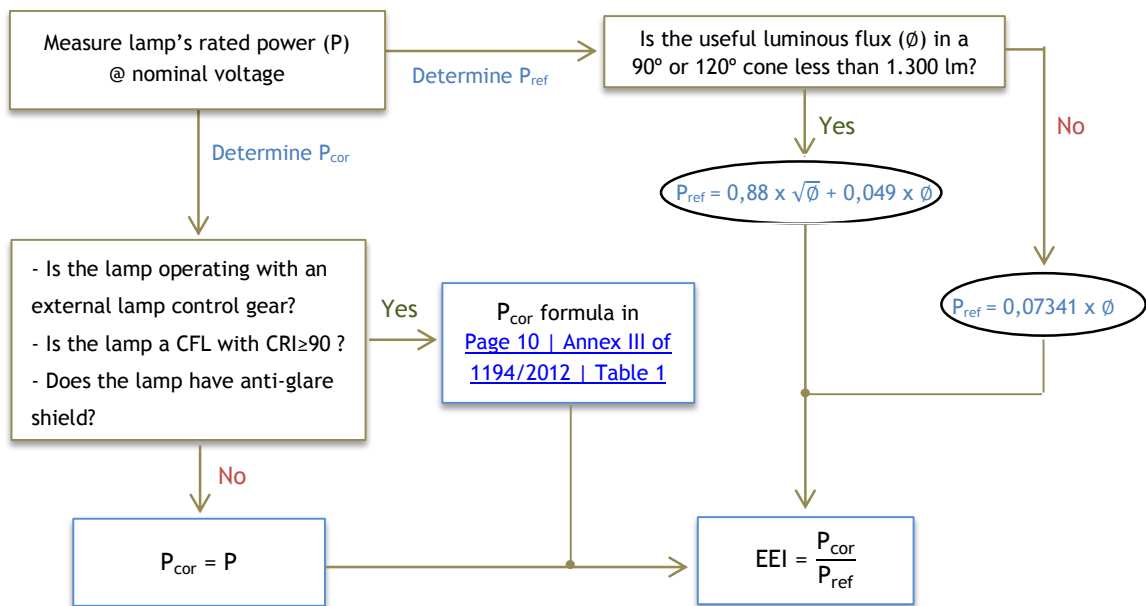
Manufacturers shall provide mandatory information (A) on free-access websites (Web) in the [technical documentation file](#) (TDF) and in other forms (O) they deem appropriate. The way or format is not important, as long as the information is understandable.



The nine product information requirements (A) manufacturers must provide are set in [Page 20 | Annex III of 245/2009 | 1.3](#)

3.2.7. Directional Lamps | Energy Efficiency Requirements

For directional lamps, instead of referring efficacy requirements (lm/W), [Page 11 | Annex III of 1194/2012 | Table 2](#) expresses energy efficiency requirements (no units). The next scheme shows manufacturers how to obtain the energy efficiency index (EEI) of the lamp:



As we are at Stage 2, the following requirements must be complied:

	Mains-voltage halogen	Other halogen	LEDs and CFLs	HID
Maximum EEI	1,75	0,95	0,5	0,5

Future (Stage 3 | 2016)

	Mains-voltage halogen	Other halogen	LEDs and CFLs	HID
Maximum EEI	0,95	0,95	0,2	0,36

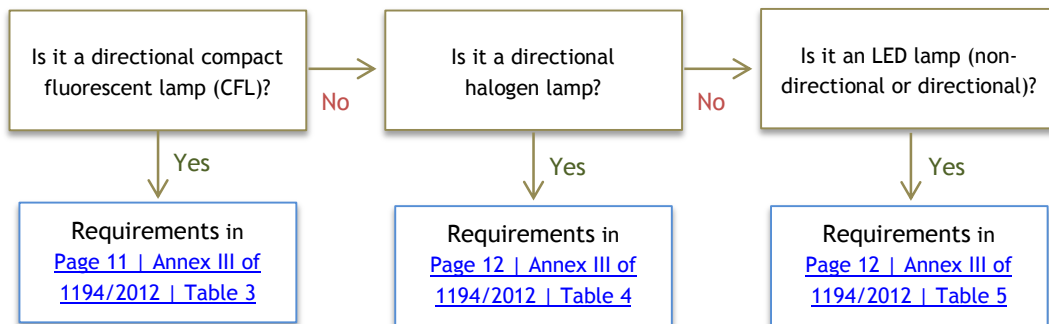
This mains-voltage halogen requirement in stage 3 will only apply if, by September 2015, there is evidence that the compliant lamps then on the market are affordable for end-users, equivalent in terms of consumer-relevant functionality and compatible with equipment designed for installation between the mains and the lamp, according to state-of-the-art requirements for compatibility.

The Commission produced such evidence and stage 3 will therefore apply.

3.2.8. Directional Lamps | Functionality Requirements

The following table shows all the functionality requirements for directional halogen and CFLs, and LED lamps that the manufacturer must assess and comply with. The scheme below identifies where these requirements are set for the different types of household lamps.

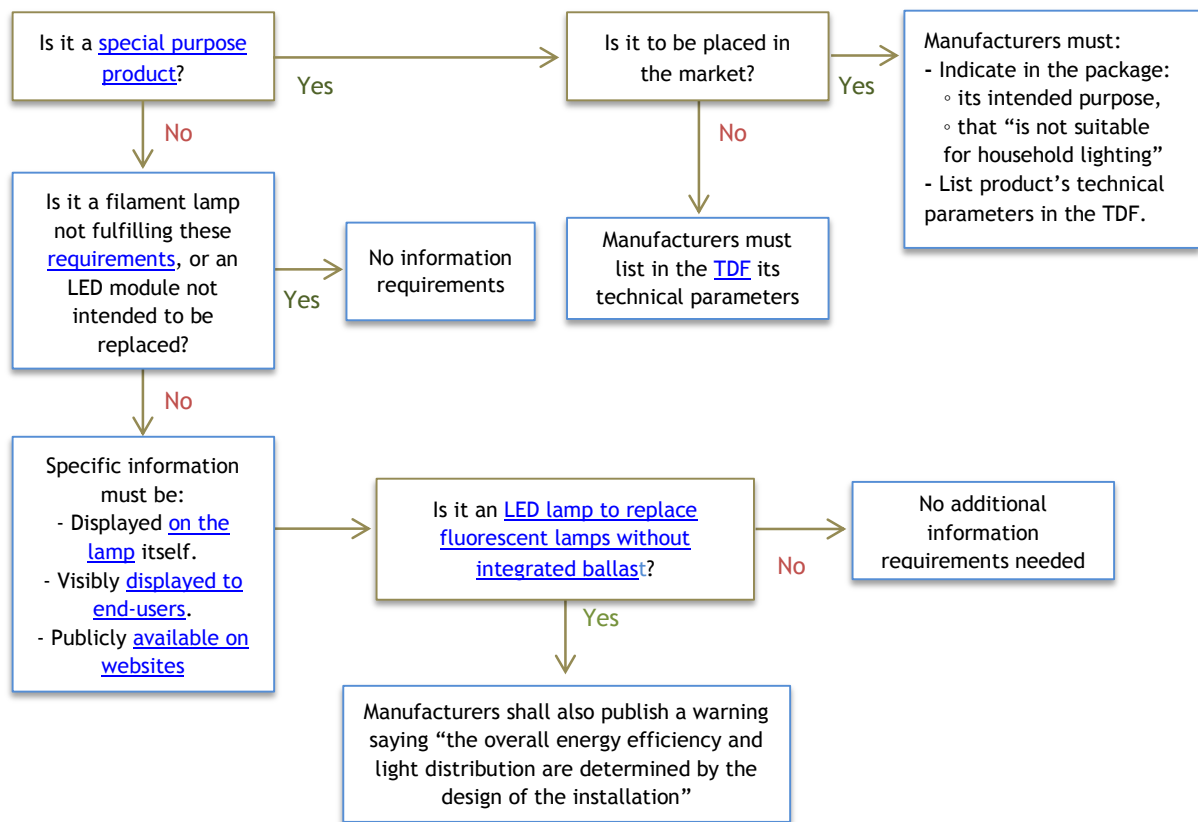
LEDs	Directional CFLs	Directional Halogen
Lamp survival factor at 6.000 h		Rated lamp lifetime at 50 % lamp survival
Lumen Maintenance at 6.000 h	Lumen maintenance	
Number of switching cycles before failure		Number of switching cycles
Starting time		
Lamp warm-up time to 95 % Φ	Lamp warm-up time to 60 % Φ	
Premature failure rate		
Lamp power factor for lamps with integrated control gear		
Colour rendering (Ra)		-
Colour consistency	-	-



If the lamp cap is a standardised type also used with filament lamps (e.g. E14, E27, GU10), then the lamp must be compatible with equipment designed for installation between the mains and filament lamps. For now, there are still no compatibility standards established; therefore, they must comply with existing state-of-the-art compatibility requirements.

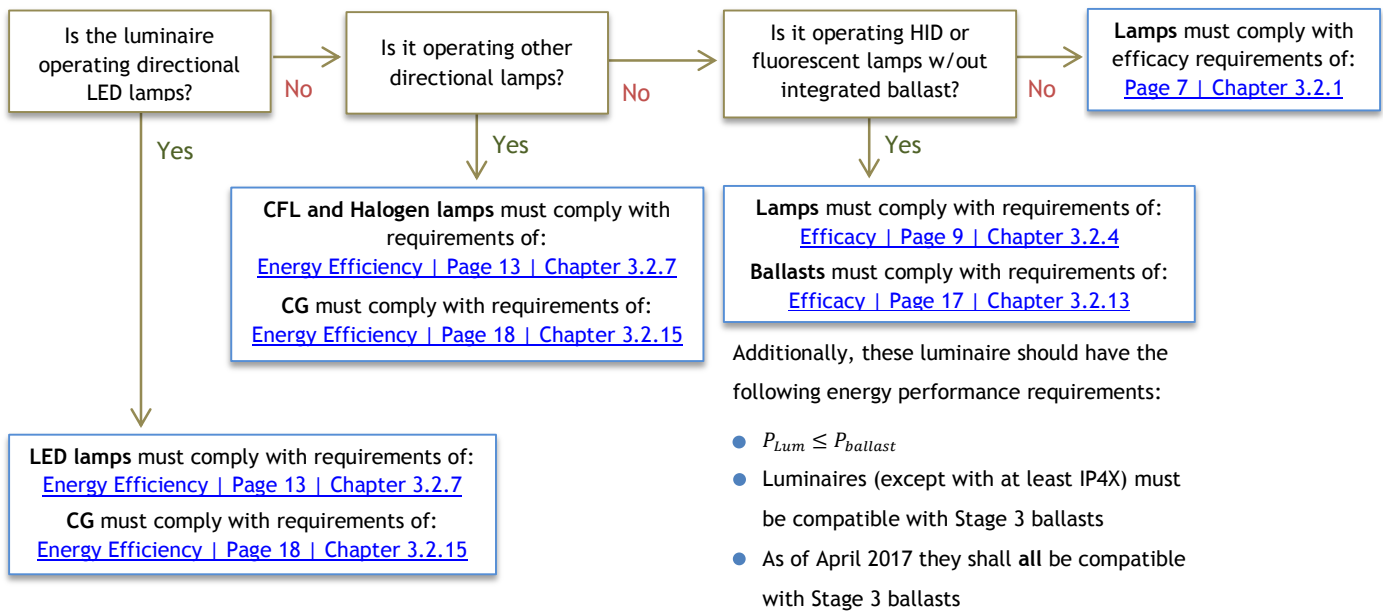
3.2.9. Directional Lamps | Product Information Requirements

There are product information requirements both for domestic lighting products and special purpose products.



3.2.10. Luminaire | Efficacy and Energy Performance Requirements

So far, no international mandatory requirements exist when it comes to luminaire efficacy. Only some ideas regarding efficacy assessment, in the scope of the ecodesign process, have been discussed, but nothing has yet been implemented. Nevertheless, ecodesign establishes requirements for household luminaires operating directional lamps, fluorescent lamps without integrated ballast and LEDs. Luminaire requirements are then set by the requirements of its components (lamps, ballasts and control gears). The next figure will help you link to those.



Note:
 P_{Lum} is the power consumption of the luminaire
 $P_{ballast}$ is the power consumption of the ballast with the lamp not emitting light when other connected components are disconnected.

3.2.11. Luminaire | Functionality Requirements*

The functionality requirements can also be understood as [compatibility requirements](#) with its lighting components. Thus, since September 2014, the luminaire must be compatible with lamps (or replaceable modules) with:

- $EEl < 0,24$ (for non-directional lamps)
- $EEl < 0,4$ (for directional lamps)

Additionally, in case a luminaire intended to be marketed to the end-users includes replaceable lamps, they must be one of the two highest energy classes the luminaire is labelled to be compatible with.

Future:

2016 :: Luminaires must be compatible with A+ lamps and Stage 3 control systems requirements

2017 :: All luminaires must be compatible with Stage 3 ballasts.

3.2.12. Luminaire | Product Information Requirements

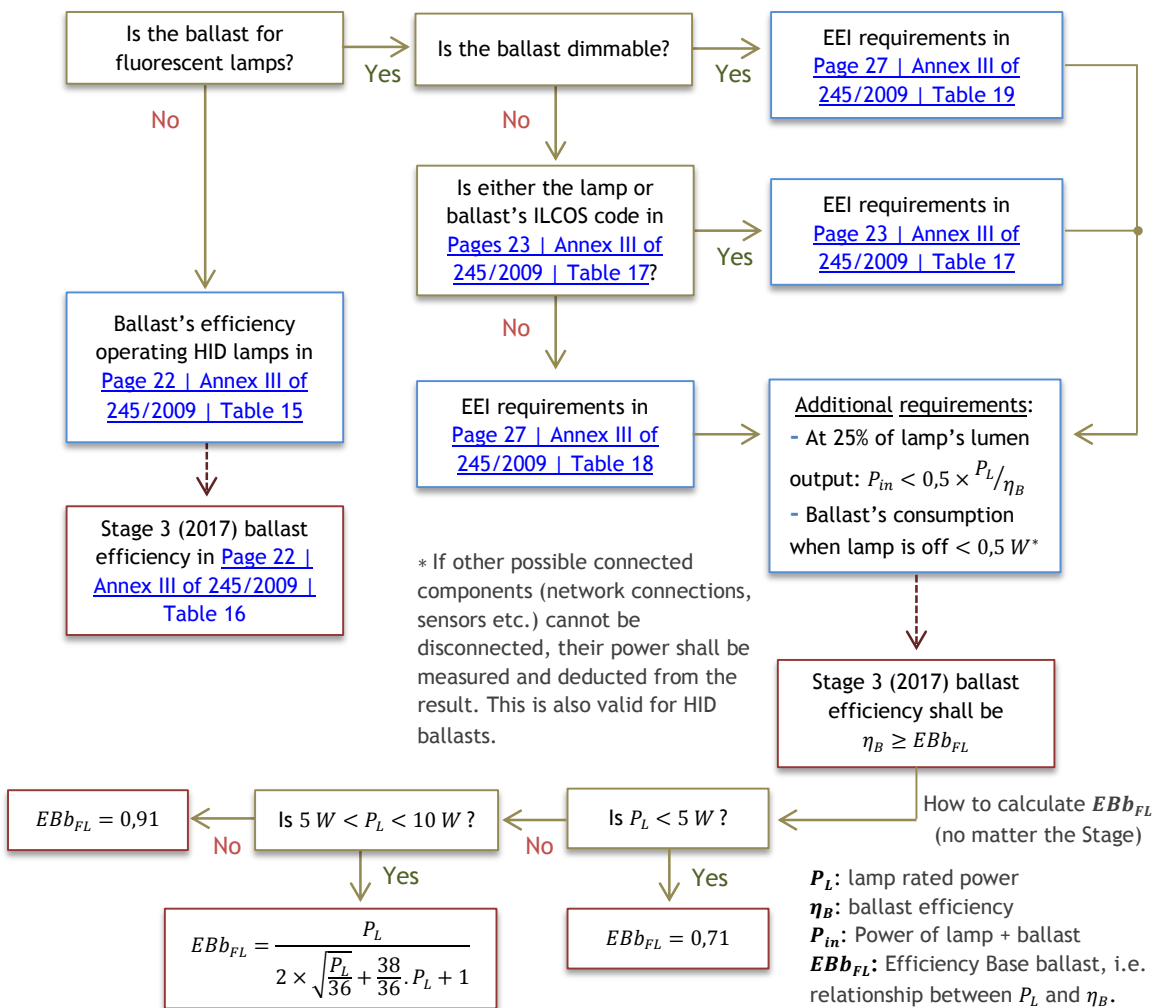
Regarding product information, luminaire manufacturers on their free websites and any other form appropriate must:

- Indicate whether the luminaire’s design is appropriated to [clear](#) or non-clear lamps;
- [Refer the compatibility](#) of the luminaire with its components (lamp and control systems)
- Refer (when included) ballast efficiency and lamp efficacy;
- Provide maintenance instructions and disassembly instructions;
- Comply with other needed information set by the [Labelling](#) regulation (874/2012).

Note: In the case of HID and fluorescent lamps without integrated ballast, only luminaires with a total lamp lumen above 2.000 lumens must provide this information.

3.2.13. Ballast | Energy Performance Requirements

The following scheme will help identify the requirements ballasts need to comply with.



Overall the minimum energy efficiency index classes shall be:

B2	Ballasts covered in Table 17 of 245/2009
A3	Ballasts covered in Table 18 of 245/2009
A1	Ballasts covered in Table 19 of 245/2009

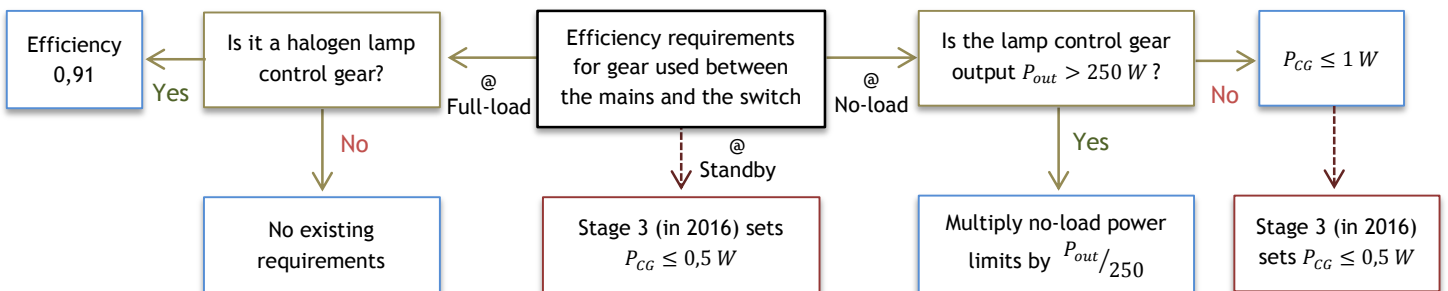
3.2.14. Ballast | Product Information Requirements

η_B is the minimum energy efficiency limit of the respective energy efficiency index (EEI) class. Manufacturers must provide ballast's EEI class, according to its energy performance value (η_B) obtained as indicated in the previous point. This must be done on free-access websites and in other forms they deem appropriate for each of their ballast models. This information shall also be affixed in a distinct and durable form to the ballast and be in the technical documentation. The next table indicates (from the most to the least efficient) the classes for non-dimmable and dimmable ballasts.

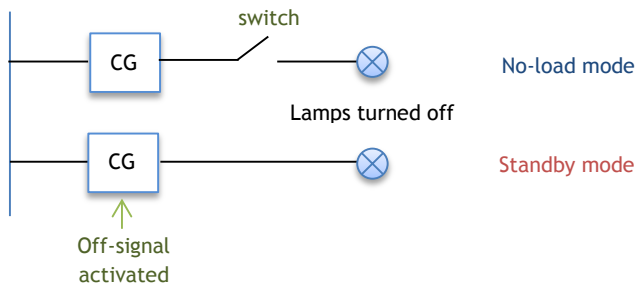
Non-dimmable ballasts	Dimmable ballasts
A2 BAT	A1 BAT
A2	A1
A3	
B1	
B2	

3.2.15. Control Gear | Energy Efficiency Requirements

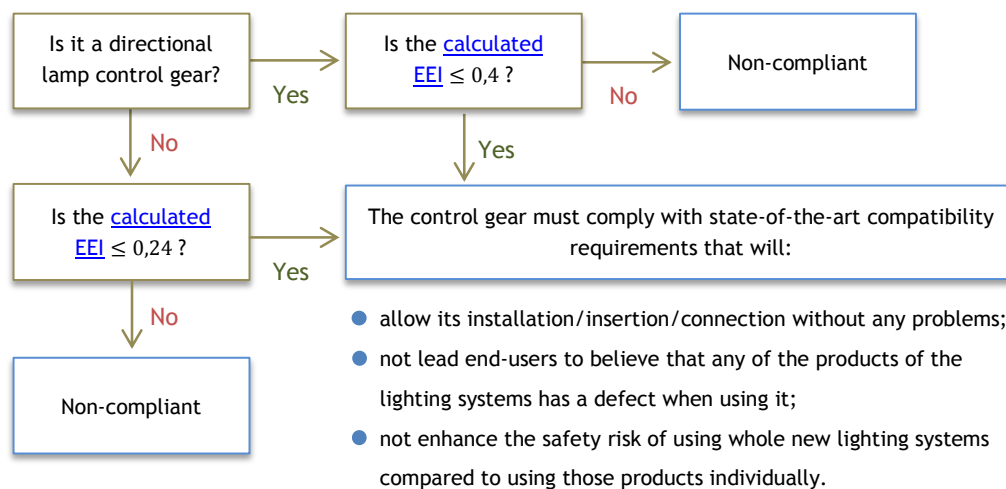
Regulation 1194/2012 sets the energy efficient requirements for lamp control gears (CG) operating at no-load (NL), full-load and standby mode.



P_{CG} represents the maximum power of the control gear when the lights are OFF. As of 2016 control gears will have to comply both with a standby P_{CG} and a no-load P_{CG} . The definitions of standby and no-load concept are explained in [Pages 8 and 9 | Annex II of 1194/2012 | s\) and t\)](#). The following scheme shows the difference between the two of them.



3.2.16. Control Gear | Functionality Requirements



When a dimming control device is switched ON at its lowest control setting for which the operated lamps consume power, the operated lamps shall emit at least 1% of their luminous flux at full load.

3.2.17. Control Gear | Product Information Requirements

If the equipment provides no compatibility with any of the energy saving lamps, a warning that the equipment is not compatible with energy-saving lamps shall be published on publicly available free-access websites and in other forms the manufacturer deems appropriate.

The following information shall be published on publicly available free access websites and in other forms the manufacturer deems appropriate:

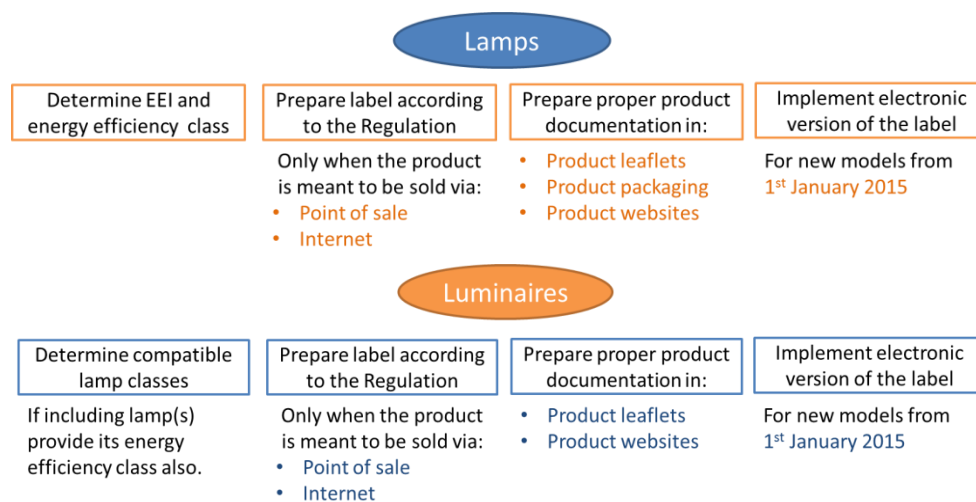
- Indication that the product is intended to be used as a lamp control gear
- Information that the product may be operated in no-load mode, if applicable

4. Labelling Directive

Labelling can be perceived as the interface between the ecodesign Directive and the consumer, as it will give the end-user visual information about the product's quality. Regulation 874/2012 has set regulated requirements for filament lamps, fluorescent lamps, HID lamps, LED lamps and models, and luminaires operating these types of lamps.

Luminaire design and compatibility has to be properly communicated via the new luminaire label, so the awareness of EU end-user is improved to make the proper choice.

In order to comply with the Regulation 874/2012, lamp and luminaire manufacturers are recommended to do the following steps:



The requirements of the energy labelling Regulation mandatorily apply from 1st September 2013. The requirements of the labelling of energy related products on the Internet start on the 1st of January 2015. The table below presents the scope for the labelling regulation for luminaires.

Table 3 - Scope of Labelling lighting products

Luminaires	
Within the scope	Out of the scope
<ul style="list-style-type: none"> :: Halogen lamps :: Fluorescent lamps :: LED lamps and modules :: Related luminaires marketed to end-users 	<ul style="list-style-type: none"> :: Luminaires, lamps and LED modules with 12000 < luminous flux < 30 lumens :: Luminaires, lamps and LED modules marketed for operation with batteries :: Luminaires, lamps and LED modules marketed for applications or products where their primary purpose is not lighting :: Lamps and LED modules marketed as part of a luminaire and not intended to be removed by the end-user :: Lamps and LED modules that do not comply with ecodesign requirements

4.1. Lamps | Energy Efficiency Classes

The levels for the energy efficiency classes are set in a way that the same technology is in the same efficiency class independently if it is directional or a non-directional lamp.

	NON DIRECTIONAL		DIRECTIONAL	
	EEL	Lamps	EEL	Lamps
A++	$\leq 0,11$	Best LEDs (including modules)	$\leq 0,11$	Best LEDs (including modules)
A+	$0,11 < \text{EEL} \leq 0,17$	Very good LED lamps and modules; Best LFLs and CFLs	$0,11 < \text{EEL} \leq 0,17$	Very good LED lamps and modules
A	$0,17 < \text{EEL} \leq 0,24$	Avg LEDs and modules; Avg CFLs and less efficient LFLs	$0,17 < \text{EEL} \leq 0,24$	Average LEDs and modules; Average to Good CFLs
B	$0,24 < \text{EEL} \leq 0,6$	Less efficient CFLs and LEDs; Best halogen (extra-LV)	$0,24 < \text{EEL} \leq 0,6$	Less efficient CFLs and LEDs; Best halogen (extra-LV)
C	$0,6 < \text{EEL} \leq 0,8$	Less efficient conventional extra-LV halogen	$0,6 < \text{EEL} \leq 0,8$	Less efficient conventional extra-LV halogen
D	$0,8 < \text{EEL} \leq 0,95$	Best 230V and conventional halogen; Best incandescent	$0,8 < \text{EEL} \leq 0,95$	Best 230V and conventional halogen; Best incandescent
E	$> 0,95$	Typical Incandescent	$> 0,95$	Less efficient 230V halogen and Incandescent

4.2. Lamps | Energy Label

If a lamp is presented at the point-of-sale it shall carry an energy label with the following information:

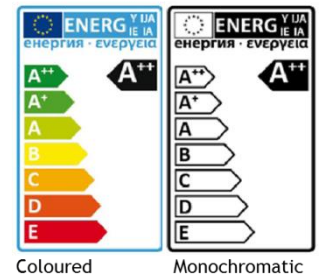


- I. Supplier's name or trademark
- II. Supplier's model identifier (alphanumeric code)
- III. Energy efficiency class at the head of the arrow
- IV. Energy consumption in kWh per 1.000 hours

III

If the mandatory information of points I, II and IV is printed elsewhere on the packaging, the label can then simply be:

IV



4.3. Lamps | Product Documentation

The **product 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.

The **technical documentation**, which shall be made available on request to the authorities of the Member States and to the Commission, must include:

- the name and address of the supplier;
- a general description of the model, sufficient for it to be unequivocally and easily identified;
- references of the harmonized standards applied;
- other technical standards and specifications used;
- identification and signature of the person empowered to bind the supplier;
- technical parameters for determining energy consumption and energy efficiency and results of the calculations.

The following scheme represents suppliers and dealers responsibilities regarding the label.

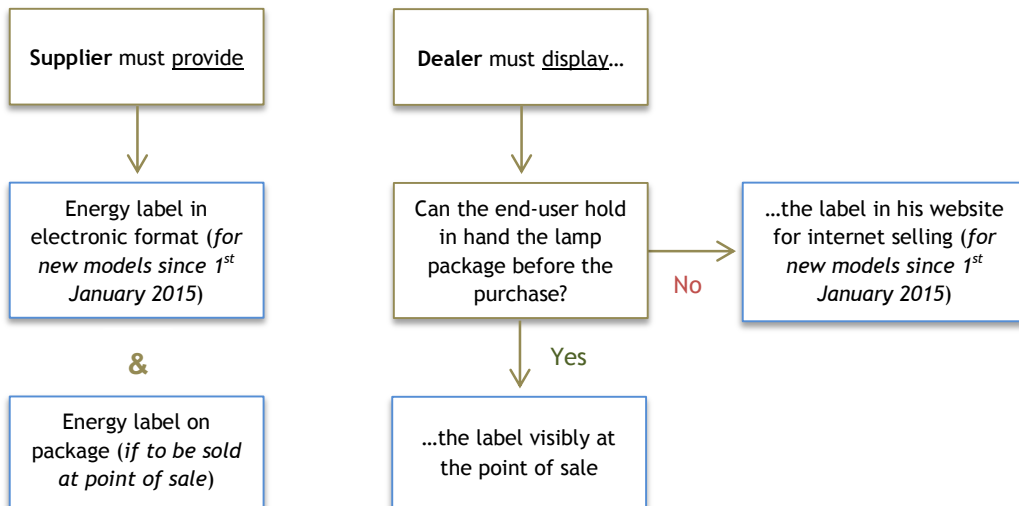
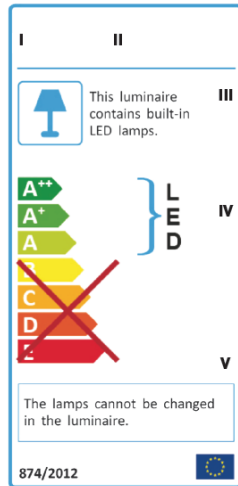


Figure - Suppliers and dealers responsibilities

Both dealers and suppliers have the responsibility to provide the energy class of the lamps in advertisements, price quotes, tenders and promotional material. Suppliers, additionally, must provide the product fiche and the technical documentation file.

4.4. Luminaires | Energy Label

A new label is required for luminaires placed on the market from 1st March 2014 that are intended to be marketed through a point of sale. It is important to highlight that this label for luminaires does not refer to the energy efficiency of the luminaire, it only informs on the following:



I. Supplier's name or trademark

II. Supplier's model identifier (e.g. alphanumeric code, preventing any kind of ambiguity between different models).

III. According to the specific situation, the sentence on compatibility of the luminaire with lamps can either be:

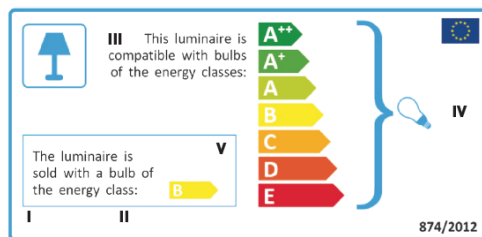
- "This luminaire is compatible with bulbs of the energy classes:"
- "This luminaire contains built-in LED lamps."
- "This luminaire contains built-in LED lamps and has sockets for bulbs of the energy classes."

IV. According to the specific situation, the range of energy efficiency classes, of compatible lamps, are shown by the following:

- 'Bulb' pictogram indicating the classes of user-replaceable lamp
- Red cross over the classes of lamps with which the luminaire is not compatible
- Letters 'LED' arranged vertically along the classes A to A++ if the luminaire contains LED modules not intended to be removed by the end-user.

V. According to the specific situation, the sentence reporting the type of lamp it contains (if any) can either be:

- "The luminaire is sold with a bulb of the energy class: 'pictogram with the class'"
- "The lamps cannot be changed in the luminaire"
- Empty space if there are no lamps included within the luminaire



If better suited, there is absolutely no problem to supply a label in the horizontal format, provide it complies with regulated dimensions.

The exact correct measures of both labels' dispositions are set in Regulation 874/2012, Annex I - 2.4.

4.5. Luminaires | Product Information

The Regulation also specifies requirements for the information to be provided for any form of distance selling, advertisements and technical promotional material for luminaires. This may be in the format of a label or in another format, such as text with the information from I to V identified previously in the label picture. Also the following **technical documentation** must be presented:

- the name and address of the supplier;
- a general description of the model, sufficient for it to be unequivocally and easily identified;
- references of the harmonized standards applied;
- other technical standards and specifications used;
- identification and signature of the person empowered to bind the supplier;
- the technical parameters for determining compatibility with lamps, specifying at least one realistic combination of product;
- settings and conditions in which to test the product.

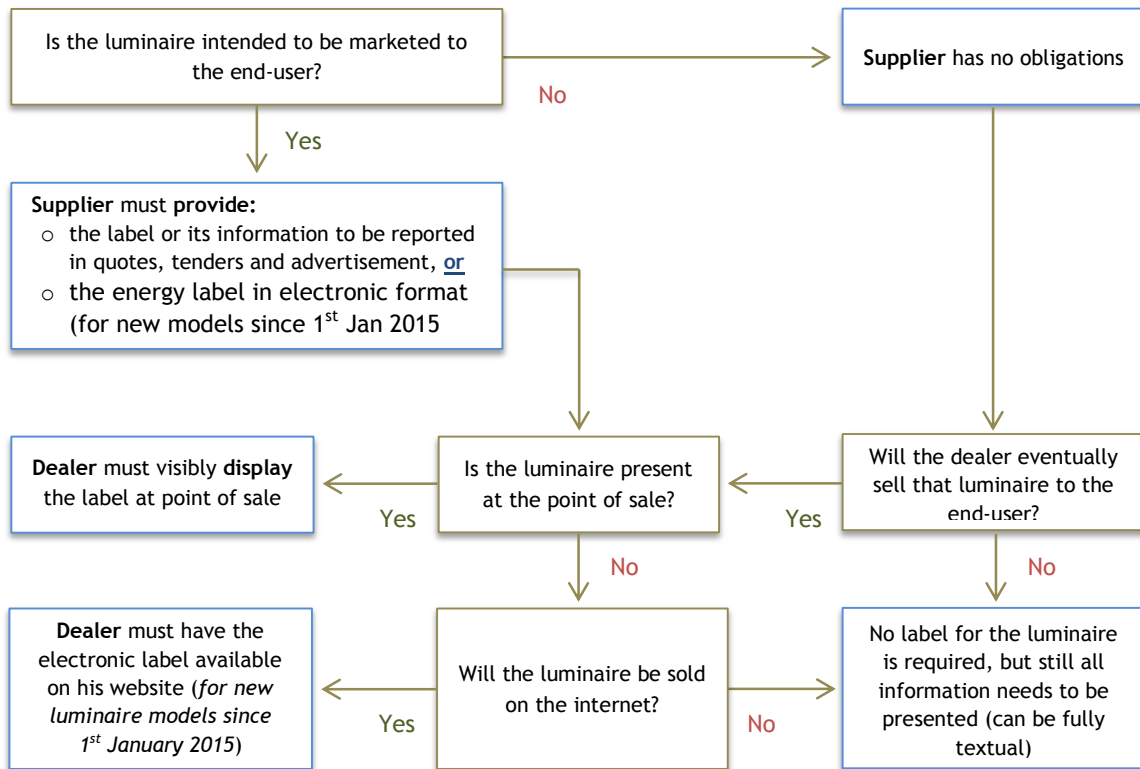


Figure - Scheme of responsibilities of suppliers and dealers of luminaires

5. How to promote LEDs

A perfectly understandable and assertive promotion of LED technology is very important. Clarification of the benefits and demystification of misinformation should be tackled on the suppliers' promotion activities, namely brochures, highlighting the benefits both in energy efficiency and quality, with new optional functionalities. Below, we present some ways, whether on-site or on promotional materials, to better promote the use of LEDs, thus making the customer aware of the advantages of these products.

On-site promotion:

- Demonstrate, in the store, LED lighting fixtures illuminating colourful objects. This helps demystify the notion that consumers have about LED's light quality when compared to incandescent and halogen.
- Clearly distinguish, with proper signalization (different colour section, energy efficient and money saving signs, PremiumLight logo, etc.), the area dedicated to LEDs. In this area include brochures and other information materials (namely labelling and PremiumLight video).

Information that should be included in promoting materials:

- Create awareness that LEDs can be found with several sockets, shapes and sizes to fit a client's luminaire.
- Emphasize the wide(r) range in colour temperature that LEDs can offer for different rooms and specific activities.
- Make them aware that LEDs have instant warm-up time and maximum luminous flux.
- Explain LEDs have a higher environmental responsibility with less energy related emissions and less material waste dumped.
- Present case-studies of success, mentioning accomplished energy savings and CO2 reduction.
- Address the phase-out of incandescent lamps and explain the retrofit simplicity of changing to LEDs and explain that they get the same amount of light and light quality.
- Mention the extremely longer lifecycle of LEDs (quantify and compare to others) and the convenience of not having to replace it on regular basis, especially in hard-to-reach locations.
- Inform about lifecycle costs (people must be aware that, in the end, LEDs are the most economical solution).
- Must inform how to properly dim LED lamps. We don't want to create angry costumers if their LED cannot be dimmed with installed control device.
- Explain how to avoid bad products, thus really paying for quality and not being disappointed. A criteria table should be included.
- Emphasize and explain the importance/aspects of the existing labelling scheme
- Refer health aspects, namely demystification about UV, flicker and blue light, and emphasize it does not have Mercury. Messages should be factual enough to be compelling but also user-friendly and simple enough to be memorable: "LED, the only efficient lamp without Mercury"

6. Relevant Issues for Manufacturers and Suppliers

In this chapter several frequently asked questions from manufacturers and suppliers are answered, regarding ecodesign and Labelling directives.

WHAT SHOULD WE DO IN CASE THE NOMINAL WATTAGE OR LAMP SHAPE OF A FLUORESCENT LAMP WITHOUT INTEGRATED BALLAST IS DIFFERENT FROM THE SPECIFIED IN REGULATION 245/2009?

In case the nominal wattages or lamp shapes are different from those listed in tables 2 to 5 of Annex III, lamps must reach the luminous efficacy of the nearest equivalent in terms of wattage and shape. If the nominal wattage is at equal distance from two wattages in the table, it shall conform to the higher efficacy of the two. If the nominal wattage is higher than the highest wattage in the table, it shall conform to the efficacy of that highest wattage.

IF AN UPDATE OF THE ENERGY CLASS IS ADDED (CLASS A+++ AND/OR THE CLASS E DISAPPEARS), MUST ALL LABELS BE UPDATED?

According to legislation currently in force, yes. But only to products that have not yet been placed on the market. This situation goes both to lamps and luminaires. Nevertheless it is expected there will be a transitional period defined within the relevant legislation.

MY LUMINAIRES ARE NOT SOLD TO END USERS, DO I NEED A LABEL?

No you do not, even though all the information of the label needs to be presented. In effect, the label for luminaires can be provided with the label on the luminaire manufacturer's website, hence available for the dealer/retailer. This way the label will be available, if by any chance that a luminaire is sold to the end-user, even though it was not intended to.

CAN A LUMINAIRE CONTAIN ANY KIND OF LAMP(S) THE MANUFACTURER DECIDES?

No, they cannot! When a luminaire is placed on the market with lamps included, its lamp(s), if intended to be replaced by the end-user, must be of one of the two highest energy classes the luminaire is compatible with. LED modules, not intended to be removed by the end-user, do not need to be labelled at all.

DO UNREMOVABLE LED MODULES FREE THEIR LUMINAIRES FROM COMPLYING WITH THE REGULATION?

Luminaires, from which no LED lamp or module can be extracted for testing, should not offer a way for LED manufacturers to escape energy efficiency requirements. Components, like lamp modules and control gears/devices shall comply with ecodesign, both for energy efficiency and functionality requirements.

ARE LED MODULES EXEMPT FROM REGULATION 1194/2012?

No they are not. Requirements settled for LED lamps in the regulation extend also to LED modules! These shall only be exempted from the requirements of 1194/2012 if they are marketed as part of luminaires that are placed in the market in less than 200 units per year.

DOES THE LABEL NEED TO BE IN COLOUR?

For the luminaire, yes it does. Although the lamp's label can be black and white, there is no monochrome option for the label for luminaires. Nevertheless, it is sufficient to make it available in electronic format (e.g. downloadable from the manufacturer's website), as a printed label is not mandatory for manufacturers to supply, only optional on request of the supplier/dealer.

CAN THE LUMINAIRE LOGO IN THE LABEL BE DIFFERENT?

Yes, it can. Suppliers can use their own product picture, logo etc. relevant to the specific product. Also, the particular luminaire type or the product can substitute the word luminaire where it is integrated (e.g. furniture, bookshelf, etc.)

THERE IS A MINIMUM SIZE FOR THE LABEL, BUT IF IT DOES NOT FIT THE PACKAGE CAN IT BE MINIMIZED FURTHER?

No, there is no reduction allowed. The reason is to ensure a sufficiently readable label. It can be on the packaging, but does not need to be.

FROM WHICH DATE MUST THE LABEL BE USED?

The requirements of the Energy Labelling Regulation mandatorily apply from **1st September 2013!** But luminaires already placed on the market prior to **1st March 2014** can continue to be sold. Every luminaire put in the market after this date has to have the new label.

WHO HAS THE RESPONSIBILITY TO KEEP THE TECHNICAL DOCUMENT FILE (TDF)?

The TDF must be kept for a period of ten years after its last product is placed in the market or put into service. The obligation to keep it and present it upon request (e.g. from the market surveillance authority) lies with the manufacturer/supplier that placed it on the market, regardless where the product was manufactured or imported from.

ARE THERE ANY REQUIREMENTS FOR CONTROL DEVICES?

The ecodesign regulation does not state any efficiency, standby or no-load requirements for control devices, but, like for control gears (ballasts, drivers), they must be compatible with energy class A or better, unless a non-compatibility warning is stated. Additionally, minimum dimming shall be able to produce 1% of full-load luminous flux!

WHAT HAPPENS TO LUMINAIRES THAT DO NOT MEET ECODESIGN REQUIREMENTS?

These luminaires must no longer be placed in the EU market. Therefore, luminaires imported from non-EU countries are also obliged to fulfil these requirements. However, products placed on the market before the regulation came into force are still allowed to be traded.

7. Sources of Additional Information

7.1. European Commission

- Commission Regulation (EC) No 244/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for non-directional household lamps- <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02009R0244-20090901&qid=1439217915392&from=EN>
- Commission Regulation (EU) No 245/2009 of 18 March 2009 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for fluorescent lamps without integrated ballast, for high intensity discharge lamps, and for ballasts and luminaires able to operate such lamps- <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02009R0245-20100413&qid=1439218040968&from=EN>
- Commission Regulation (EU) No 1194/2012 of 12 December 2012 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 - <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1414704767614&uri=CELEX:32012R1194>
- Commission Regulation (EC) No 874/2012 of 12 July 2012 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of electrical lamps and luminaires - <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02012R0874-20140606&qid=1439218136675&from=EN>

7.2. Retailer & Industry Associations

- Lighting Europe - <http://www.lightingeurope.org/>
- IEC - International Electrotechnical Commission - <http://www.iec.ch/>
- ISO - International Organization for Standardization - <http://www.iso.org/iso/home.html>

7.3. Consumer & Environmental NGOs

- ANEC - The European consumer voice in standardisation - <http://www.anec.eu/anec.asp>
- CEN - European Committee for Standardization - <https://www.cen.eu/Pages/default.aspx>
- CENELEC - European Committee for Electrotechnical Standardization - <http://www.cenelec.eu/>

7.4. Others

- Ecodesign Lot 19 - http://www.ecee.org/ecodesign/products/directional_lighting
- Ecodesign Revision (Draft Document)

Appendix 1

Special purpose lamp means a lamp that uses the technologies covered by Regulation 244/2009 but is intended for use in special applications because of its technical parameters described in the technical documentation. Special applications are those that require technical parameters not necessary for the purposes of lighting average scenes or objects in average circumstances. These applications are of the following types:

1. Applications where the primary purpose of the light is not lighting, such as:
 - (a) emission of light as an agent in chemical or biological processes (such as polymerisation, ultraviolet light used for curing / drying / hardening, photodynamic therapy, horticulture, pet care, anti-insect products);
 - (b) image capture and image projection (such as camera flashlights, photocopiers, video projectors);
 - (c) heating (infrared lamps);
 - (d) signalling (such as traffic control or airfield lamps);
2. Lighting applications where:
 - (a) the spectral distribution of the light is intended to change the appearance of the scene or object lit, in addition to making it visible (such as food display lighting or coloured lamps, with the exception of variations in correlated colour temperature); or
 - (b) the spectral distribution of the light is adjusted to the specific needs of particular technical equipment, in addition to making the scene or object visible for humans (such as studio lighting, show effect lighting, theatre lighting); or
 - (c) the scene or object lit requires special protection from the negative effects of the light source (such as lighting with dedicated filtering for photosensitive patients or photosensitive museum exhibits); or
 - (d) lighting is required only for emergency situations (such as emergency lighting luminaires or control gears for emergency lighting); or
 - (e) the lighting products have to withstand extreme physical conditions (such as vibrations or temperatures below -20°C or above 50°C);

Special purpose lamps shall comply with the following requirements:

1. If the chromaticity coordinates of a lamp always fall within the following range:
 $x < 0,270$ or $x > 0,530$
 $y < -2,3172 x^2 + 2,3653 x - 0,2199$ or $y > -2,3172 x^2 + 2,3653 x - 0,1595$;
Then the chromaticity coordinates shall be stated in the technical documentation file.
2. The intended purpose shall be stated in all forms of product information, together with the warning that they are not intended for use in other applications. The technical documentation file shall list the technical parameters that make the lamp for special purpose. Also if the lamp is visibly displayed to the end-user prior to purchase, the packaging must clearly indicate:
 - (a) the intended purpose;
 - (b) that it is not suitable for household room illumination; and
 - (c) the technical parameters that make the lamp design specific for the stated purpose.

Note: Incandescent lamps longer than 60mm are not special purpose lamps, if:

- they are resistant only to mechanical shock or vibrations and are not [incandescent traffic signalling lamps](#); or
- they possess a rated power higher than 25W and claim to have specific features that are also present in lamps having higher energy efficiency classes such as:

- zero EMC emissions,
- CRI value higher or equal to 95, and
- UV emissions less or equal than 2mW per 1000lm.

Page 6 | “white light source”

‘White light source’ means a light source having chromaticity coordinates that satisfy the following requirement:

- $0,270 < x < 0,530$
- $- 2,3172 x^2 + 2,3653 x - 0,2199 < y < - 2,3172 x^2 + 2,3653 x - 0,1595$

Page 6 | “directional light source”

‘Directional Light Source’ (DLS) means light sources having at least 80 % light output within a solid angle of π sr (corresponding to a cone with angle of 120°).

Page 6 | “blended”

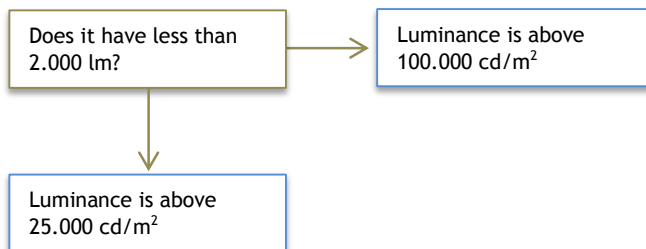
‘Blended lamp’ means a lamp containing a mercury vapour lamp and an incandescent lamp filament connected in series in the same bulb.

Page 7 | “rated”

A rated value is the one used to specify a product in a particular operating condition.

Page 7 | “clear”

This type of lamp is equipped with only transparent envelopes in which the light producing filament, LED or discharge tube is clearly visible. Excluding CFLs, a clear lamp respects the following:



Page 8 | Page 10 | Annex II of 244/2009 | Table 1

Application date	Maximum rated power (P_{max}) for a given rated luminous flux (Φ) (W)	
	Clear lamps	Non-clear lamps
Stages 1 to 5	$0,8 * (0,88\sqrt{\Phi}+0,049\Phi)$	$0,24\sqrt{\Phi}+0,0103\Phi$
Stage 6	$0,6 * (0,88\sqrt{\Phi}+0,049\Phi)$	$0,24\sqrt{\Phi}+0,0103\Phi$

Scope of the exception	Maximum rated power (W)
Clear lamps $60 \text{ lm} \leq \Phi \leq 950 \text{ lm}$ in Stage 1	$P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps $60 \text{ lm} \leq \Phi \leq 725 \text{ lm}$ in Stage 2	$P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps $60 \text{ lm} \leq \Phi \leq 450 \text{ lm}$ in Stage 3	$P_{\text{max}} = 1,1 * (0,88\sqrt{\Phi}+0,049\Phi)$
Clear lamps with G9 or R7s cap in Stage 6	$P_{\text{max}} = 0,8 * (0,88\sqrt{\Phi}+0,049\Phi)$

Scope of the correction	Maximum rated power (W)
filament lamp requiring external power supply	$P_{\text{max}}/1,06$
discharge lamp with cap GX53	$P_{\text{max}}/0,75$
non-clear lamp with colour rendering index ≥ 90 and $P \leq 0,5 * (0,88\sqrt{\Phi}+0,049\Phi)$	$P_{\text{max}}/0,85$
discharge lamp with colour rendering index ≥ 90 and $T_c \geq 5\,000 \text{ K}$	$P_{\text{max}}/0,76$
non-clear lamp with second envelope and $P \leq 0,5 * (0,88\sqrt{\Phi}+0,049\Phi)$	$P_{\text{max}}/0,95$
LED lamp requiring external power supply	$P_{\text{max}}/1,1$

Functionality parameter	Stage 1	Stage 5
Lamp survival factor at 6 000 h	$\geq 0,50$	$\geq 0,70$
Lumen maintenance	At 2 000 h: $\geq 85\%$ ($\geq 80\%$ for lamps with second lamp envelope)	At 2 000 h: $\geq 88\%$ ($\geq 83\%$ for lamps with second lamp envelope) 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 $> 0,3 \text{ s}$	\geq lamp lifetime expressed in hours $\geq 30\,000$ if lamp starting time $> 0,3 \text{ s}$
Starting time	$< 2,0 \text{ s}$	$< 1,5 \text{ s}$ if $P < 10 \text{ W}$ $< 1,0 \text{ s}$ if $P \geq 10 \text{ W}$
Lamp warm-up time to 60 % Φ	$< 60 \text{ s}$ or $< 120 \text{ s}$ for lamps containing mercury in amalgam form	$< 40 \text{ s}$ or $< 100 \text{ s}$ for lamps containing mercury in amalgam form
Premature failure rate	$\leq 2,0\%$ at 200 h	$\leq 2,0\%$ at 400 h
UVA + UVB radiation	$\leq 2,0 \text{ mW/klm}$	$\leq 2,0 \text{ mW/klm}$
UVC radiation	$\leq 0,01 \text{ mW/klm}$	$\leq 0,01 \text{ mW/klm}$
Lamp power factor	$\geq 0,50$ if $P < 25 \text{ W}$ $\geq 0,90$ if $P \geq 25 \text{ W}$	$\geq 0,55$ if $P < 25 \text{ W}$ $\geq 0,90$ if $P \geq 25 \text{ W}$
Colour rendering (Ra)	≥ 80	≥ 80

Functionality parameter	Stage 1	Stage 5
Rated lamp lifetime	≥ 1 000 h	≥ 2 000 h
Lumen maintenance	≥ 85 % at 75 % of rated average lifetime	≥ 85 % at 75 % of rated average lifetime
Number of switching cycles	≥ four times the rated lamp life expressed in hours	≥ four times the rated lamp life expressed in hours
Starting time	< 0,2 s	< 0,2 s
Lamp warm-up time to 60 % Φ	≤ 1,0 s	≤ 1,0 s
Premature failure rate	≤ 5,0 % at 100 h	≤ 5,0 % at 200 h
UVA + UVB radiation	≤ 2,0 mW/klm	≤ 2,0 mW/klm
UVC radiation	≤ 0,01 mW/klm	≤ 0,01 mW/klm
Lamp power factor	≥ 0,95	≥ 0,95

Functionality parameter	Requirement as from stage 1, except where indicated otherwise
Lamp survival factor at 6 000 h	From 1 March 2014: ≥ 0,90
Lumen Maintenance at 6 000 h	From 1 March 2014: ≥ 0,80
Number of switching cycles before failure	≥ 15 000 if rated lamp life ≥ 30 000 h otherwise: ≥ half the rated lamp life expressed in hours
Starting time	< 0,5 s
Lamp warm-up time to 95 % Φ	< 2 s
Premature failure rate	≤ 5,0 % at 1 000 h
Colour rendering (Ra)	≥ 80 ≥ 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 ≤ 2 W: no requirement 2 W < P ≤ 5 W: PF > 0,4 5 W < P ≤ 25 W: PF > 0,5 P > 25 W: PF > 0,9

Besides the information specified in Page 12 | Annex II of 244/2009 | Chapter 3.1, the following information shall be expressed at least as values.

- Rated wattage (with 0,1 W precision);
- 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 then include also:

- 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.

First of all, the following information list of requirements does not apply to filament lamps that do not fulfil the efficacy requirements of Stage 4. Furthermore, the information does not need to be specified using the exact wording. It may be displayed using graphs, figures or symbols rather than text.

- 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;
- Nominal life time of the lamp in hours (not higher than the rated life time);
- Number of switching cycles before premature lamp failure;
- Colour temperature (also expressed as a value in Kelvins);
- Warm-up time up to 60 % of the full light output (may be indicated as ‘instant full light’ if less than 1 second);
- A warning if the lamp cannot be dimmed or can only be dimmed on specific dimmers;
- Information on non-standard conditions (such as ambient temperature $T_a \neq 25 \text{ }^\circ\text{C}$) if designed for optimal use in those conditions;
- Lamp dimensions in millimetres (length and diameter);
- The claimed equivalent incandescent lamp power (if any, rounded to 1 W) must correspond to the luminous flux of the lamp inside according to the next table.

Rated lamp luminous flux Φ [lm]			Claimed equivalent incandescent lamp power
CFL	Halogen	LED and other lamps	[W]
125	119	136	15
229	217	249	25
432	410	470	40
741	702	806	60
970	920	1 055	75
1 398	1 326	1 521	100
2 253	2 137	2 452	150
3 172	3 009	3 452	200

The intermediate values of both the luminous flux and the claimed incandescent lamp power (rounded to 1W) shall be calculated by linear interpolation between the two adjacent values.

- 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](#).

If the lamp contains mercury:

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

Page 9 | Page 17 | Annex III of 245/2010 | Table 7

Rated minimum efficacy values for high pressure sodium lamps

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

Page 9 | Page 17 | Annex III of 245/2010 | Table 8

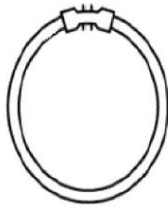
Rated minimum efficacy values for Metal Halide Lamps

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

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

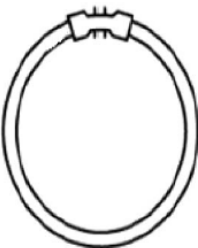
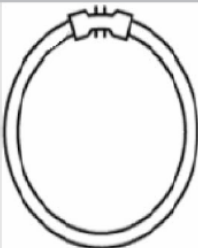
T9 Circular, tube diameter 29 mm with base G10q




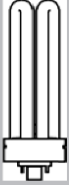
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
22	52
32	64
40	70
60	60

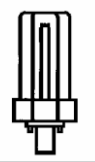
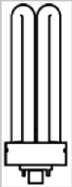
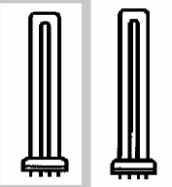
T8 (26 mm Ø)	
Nominal wattage (W)	Rated luminous efficacy (lm/W), 100 h initial value
15	63
18	75
25	76
30	80
36	93
38	87
58	90
70	89

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
30	80	35	94	54	82
36	93			80	77
38	87				
58	90				
70	89				

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
40	70	55	75
60	60	60	80

The following table indicates the 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
28	73	120	75
38	71		
55	71		

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
57	75			80	75
70	74				

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
9	67	18	67	26	66
11	76	26	66		
4 legs in one plane, lamp cap 2G10 (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		
18	61	18	67		
24	71	24	75		
36	78	34	82		
		36	81'		

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

Lamp lumen maintenance factor	Burning hours			
	2 000	4 000	8 000	16 000
Lamp types				
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
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)	0,80	0,74	—	—
	0,72 at 5 000 burning hours			
Circular Single-Capped Fluorescent lamps operating on high frequency ballasts	0,85	0,83	0,80	—
	0,75 at 12 000 burning hours			
Other Single-Capped Fluorescent lamps operating on non-high frequency ballasts	0,85	0,78	0,75	—
Other Single-Capped Fluorescent lamps on high frequency ballast with warmstart	0,90	0,84	0,81	0,78'

Lamp survival factor	Burning hours			
	2 000	4 000	8 000	16 000
Lamp types				
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			
Circular Single-Capped Fluorescent lamps operating on high frequency ballasts	0,99	0,97	0,85	—
	0,50 at 12 000 burning hours			
Other Single-Capped Fluorescent lamps operating on non-high frequency ballasts	0,98	0,90	0,50	—
Other Single-Capped Fluorescent lamps on high frequency ballast with warmstart	0,99	0,98	0,88	—'

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 12000 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 ≤ 605 W LLMF and LSF measured at 16000 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

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

This document, compiled by the manufacturer in order to make possible an assessment of the conformity of the product with the requirements of the applicable implementing measure, must contain the following:

- general description of the product and of its intended use;
- results of relevant environmental assessment studies carried out by the manufacturer, and/or references to environmental assessment literature or case studies, which are used by the manufacturer in evaluating, documenting and determining product design solutions;
- ecological profile, where required by the implementing measure;
- elements of the product design specification relating to environmental design aspects of the product;
- list of the appropriate standards applied in full or in part, and a description of the solutions adopted to meet the requirements where the standards have not been applied or could not entirely cover them;
- a copy of the information concerning the environmental design aspects of the product provided in accordance with the requirements specified in [Page 24 | Annex I of Directive 2009/125/EC | Part 2](#);
- the results of measurements on the ecodesign requirements carried out, including details of the conformity of these measurements regarding those ecodesign requirements.

(a) Nominal and rated lamp wattage.

(b) Nominal and rated lamp luminous flux.

(c) Rated lamp efficacy at 100 h in standard conditions (25 °C, for T5 lamps at 35 °C). For fluorescent lamps both at 50 Hz (mains frequency) operation (where applicable) and at High Frequency (> 50 Hz) operation (where applicable) for the same rated luminous flux in all cases, indicating for High Frequency operation the calibration current of the test conditions and/or the rated voltage of the HF generator with the resistance. It shall be stated in a conspicuous manner that the power dissipated by auxiliary equipment such as ballasts is not included in the power consumed by the source.

(d) Rated lamp Lumen Maintenance Factor at 2 000 h, 4 000 h, 6 000 h, 8 000 h, 12 000 h, 16 000 h and 20 000 h (up to 8 000 h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.

(e) Rated lamp Survival Factor at 2 000 h, 4 000 h, 6 000 h, 8 000 h, 12 000 h, 16 000 h and 20 000 h (up to 8 000 h only for new lamps on the market where no data is yet available), indicating which operation mode of the lamp was used for the test if both 50 Hz and High Frequency operation are possible.

(f) Lamp mercury content as X.X mg.

(g) Colour Rendering Index (Ra) of the lamp.

(h) Colour temperature of the lamp.

(i) Ambient temperature at which the lamp was designed to maximise its luminous flux. If the lamp does not fulfil at least 90 % of the respective luminous efficacy requirement in Annex III.1.1 at an ambient temperature of 25 °C (100 % for T5 lamps), it shall be stated that the lamp is not suitable for indoor use at standard room temperatures.

Application date	Maximum energy efficiency index (EEL)			
	Mains-voltage filament lamps	Other filament lamps	High-intensity discharge lamps	Other lamps
Stage 1	If $\Phi_{use} > 450$ lm: 1,75	If $\Phi_{use} \leq 450$ lm: 1,20 If $\Phi_{use} > 450$ lm: 0,95	0,50	0,50

Application date	Maximum energy efficiency index (EEL)			
	Mains-voltage filament lamps	Other filament lamps	High-intensity discharge lamps	Other lamps
Stage 2	1,75	0,95	0,50	0,50
Stage 3	0,95	0,95	0,36	0,20

Scope of the correction	Corrected power (P_{cor})
Lamps operating on external halogen lamp control gear	$P_{rated} \times 1,06$
Lamps operating on external LED lamp control gear	$P_{rated} \times 1,10$
Fluorescent lamps of 16 mm diameter (T5 lamps) and 4-pin single capped fluorescent lamps operating on external fluorescent lamp control gear	$P_{rated} \times 1,10$
Other lamps operating on external fluorescent lamp control gear	$P_{rated} \times \frac{0,24\sqrt{\Phi_{use}} + 0,0103\Phi_{use}}{0,15\sqrt{\Phi_{use}} + 0,0097\Phi_{use}}$
Lamps operating on external high-intensity discharge lamp control gear	$P_{rated} \times 1,10$
Compact fluorescent lamps with colour rendering index ≥ 90	$P_{rated} \times 0,85$
Lamps with anti-glare shield	$P_{rated} \times 0,80$

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 h: $\geq 80 \%$	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	$< 2,0$ s	$< 1,5$ s if $P < 10$ W $< 1,0$ s if $P \geq 10$ W
Lamp warm-up time to 60 % Φ	< 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)	≥ 80 ≥ 65 if the lamp is intended for outdoor or industrial applications according to point 3.1.3(l) of this Annex	≥ 80 ≥ 65 if the lamp is intended for outdoor or industrial applications according to point 3.1.3(l) of this Annex

Functionality parameter	Stage 1 and 2	Stage 3
Rated lamp lifetime at 50 % lamp survival	$\geq 1\ 000\text{ h}$ ($\geq 2\ 000\text{ h}$ in stage 2) $\geq 2\ 000\text{ h}$ for extra low voltage lamps not complying with the stage 3 filament lamp efficiency requirement in point 1.1 of this Annex	$\geq 2\ 000\text{ h}$ $\geq 4\ 000\text{ h}$ for extra low voltage lamps
Lumen maintenance	$\geq 80\%$ at 75 % of rated average lifetime	$\geq 80\%$ at 75 % of rated average lifetime
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	$< 0,2\text{ s}$	$< 0,2\text{ s}$
Lamp warm-up time to 60 % Φ	$\leq 1,0\text{ s}$	$\leq 1,0\text{ s}$
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 $> 25\text{ W}$: $\geq 0,9$ Power $\leq 25\text{ W}$: $\geq 0,5$	Power $> 25\text{ W}$: $\geq 0,9$ Power $\leq 25\text{ W}$: $\geq 0,5$

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 % Φ	< 2 s
Premature failure rate	$\leq 5,0$ % at 1 000 h
Colour rendering (Ra)	≥ 80 ≥ 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 W $< P \leq 5$ W: PF $> 0,4$ 5 W $< P \leq 25$ W: PF $> 0,5$ $P > 25$ W: PF $> 0,9$

Page 15 | “special purpose product”

Link with [Page 6](#) | [Page 3](#) | [Article 1 of the Ecodesign Revision](#) | [Point 1](#) (which is in [Page 1](#) of this Appendix)

Page 15 | “requirements”

Maximum energy efficiency index (EEI)

Mains-voltage filament lamps	Other filament lamps
1,75	0,95

To calculate EEI please check [3.2.7 Directional Lamps | Energy Efficiency Requirements](#).

Page 15 | “on the lamp itself”

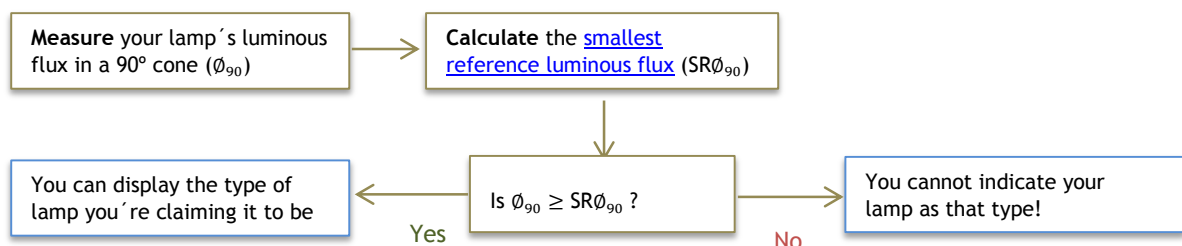
It is imperative that the manufacturer includes safety related information on the surface of the lamp, namely power (W) and voltage (V). Only then, while there is sufficient space available on the lamp without unduly obstructing the light coming from it, it can be also included, in a legible font, the following information:

- 1st. Nominal useful luminous flux (lm),
- 2nd. Colour temperature (K)
- 3rd. Nominal beam angle (°)

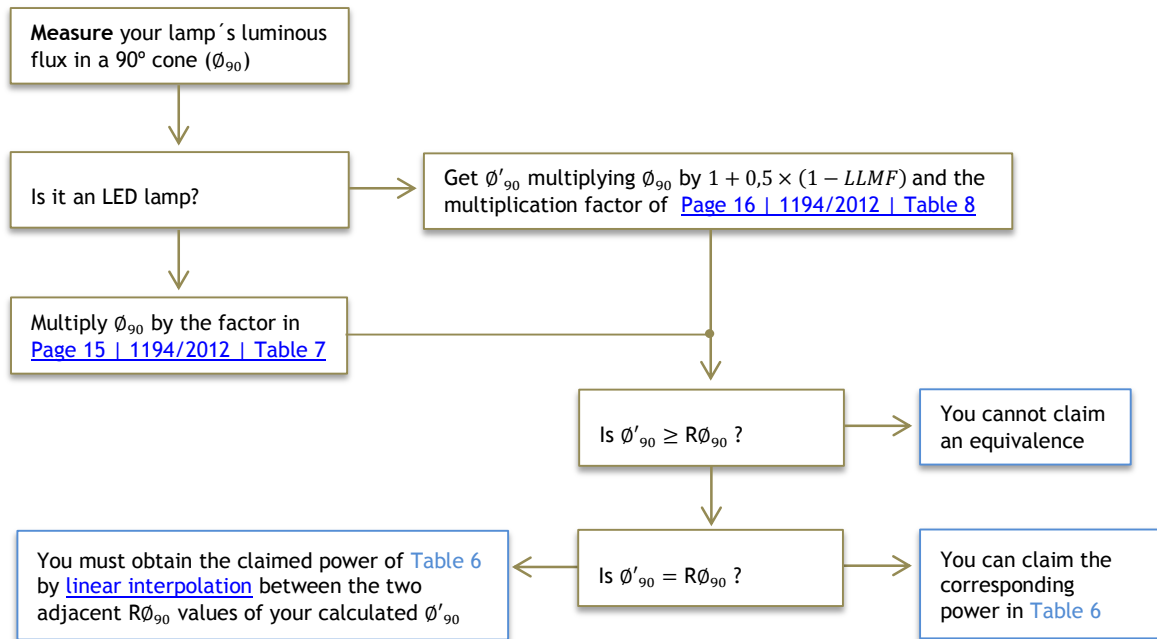
Page 15 | “displayed to end-users”

If the product is placed on the market, the following information should be clearly indicated on the **packaging**. It is up to the manufacturer as to how the information is displayed, whether text, graphs, drawings and/or symbols:

- Nominal useful **luminous flux** displayed in a font at least twice as large as any display of the nominal lamp power;
- Nominal **lifetime** of the lamp in hours (no longer than the rated life time);
- **Colour temperature**, as a value in Kelvins and also expressed graphically or in words;
- **Number of switching cycles** before premature failure;
- **Warm-up time** up to 60 % of the full light output (may be indicated as ‘instant full light’ if less than 1 second);
- A **warning if the lamp cannot be dimmed**, or can be dimmed only on specific dimmers. If so, a list of compatible dimmers shall be also provided on the manufacturer's website;
- If the product is designed for optimum use in non-standard conditions (such as ambient temperature $T_a \neq 25\text{ }^\circ\text{C}$ or specific necessary thermal management), then the manufacturer must provide **information on those specific conditions**;
- **Lamp dimensions** in millimetres (length and largest diameter);
- **Nominal beam angle** in degrees;
- A **warning that the lamp is not suitable for accent lighting**, if the lamp's beam angle is $\geq 90^\circ$ and its useful luminous flux is to be measured in a 120° cone;
- A **drawing comparing the lamp's dimensions** to the ones of the filament lamp(s) it replaces, if they are different and the lamp cap is a standardised type also used with filament lamps;
- An **indication of the lamp's type** (e.g. MR, AR, R, PAR), may be displayed according to the following:



- An **equivalence claim** with the **power** of a lamp type being replaced may only be displayed if the lamp type is listed in [Page 14 | Annex III of 1194/2012 | Table 6](#) according to the following:



If the lamp contains mercury:

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

Page 15 | “available on websites”

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

- All the information specified in the previous table;
- Rated power (0,1 W precision);
- Rated useful luminous flux;
- Rated lamp lifetime;
- Lamp power factor;
- Lumen maintenance factor at the end of the nominal life (except for filament lamps);
- Starting time (as X,X seconds);
- Colour rendering;
- Colour consistency (only for LEDs);
- Rated peak intensity in candela (cd);
- Rated beam angle;
- If intended for use in outdoor or industrial applications, an indication to this effect;
- Spectral power distribution in the range 180-800 nm (preferably graphically with wavelength on the x-axis and the spectral power on the y-axis).

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 the end of its life for recycling in line with Directive 2012/19/EU of the European Parliament and of the Council.

Page 15 | “LED lamp to replace fluorescent lamps without integrated ballast”

Claim that an LED lamp can in fact replace a fluorescent lamp without integrated ballast can only be made if:

- the **luminous intensity** in any direction around the tube axis does not deviate by more than 25% from the average luminous intensity around the tube.
- the **luminous flux** of the LED is not lower than the luminous flux of the fluorescent lamp (ϕ_{FL}) of the claimed wattage W_c .

$$\phi_{FL} = W_c \times E_{FL}$$

E_{FL} is the minimum luminous efficacy (lm/W) value of the fluorescent lamp obtained through the scheme in [3.2.4. Fluorescent Lamps w/out integrated ballast | Efficacy Requirements](#).

- $W_{LED} \leq W_{FL}$, that is, LED’s lamp wattage is not higher than fluorescent lamp’s wattage that is being replaced.

The [technical documentation file](#) shall provide the data to support such claims.

Page 16 | “compatibility requirements”

A lamp is compatible with a luminaire if:

- The lamp can be fitted inside the luminaire without any change of the luminaire construction
- The lamp can be operated without any malfunction both when operated and/or regulated (like flickering, noise, overheating, and so on);
- The safety is not impaired and the evaluation shall be done according to the safety standards available.

Page 17 | “Refer to compatibility”

The manufacturer can for instance:

- Refer any limitation arising from lamp cap type or dimming capability.
- Introduce a proper marking on the luminaire and / or mounting instruction sheet will complete the information on this respect. A single combination is enough to justify the declaration of compatibility. The combination with lamps of the declared classes is demonstrated by adding the necessary documentation to the technical document file.

Minimum efficiency for ballasts for high intensity discharge lamps — Stage 2

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

Minimum efficiency for ballasts for high intensity discharge lamps — Stage 3

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

Energy efficiency index requirements for non-dimmable ballasts for fluorescent lamps

LAMP DATA					BALLAST EFFICIENCY (Plamp/Pinput)				
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 %
TC-L	36	FSD-36-E-2G11	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
TCF	18	FSS-18-E-2G10	18	16	87,7 %	84,2 %	76,2 %	71,3 %	65,8 %
TCF	24	FSS-24-E-2G10	24	22	90,7 %	88,0 %	81,5 %	76,0 %	71,3 %
TCF	36	FSS-36-E-2G10	36	32	91,4 %	88,9 %	84,2 %	83,4 %	79,5 %
TC-D / DE	10	FSQ-10-E-G24q=1 FSQ-10-I-G24d=1	10	9,5	89,4 %	86,4 %	73,1 %	67,9 %	59,4 %
TC-D / DE	13	FSQ-13-E-G24q=1 FSQ-13-I-G24d=1	13	12,5	91,7 %	89,3 %	78,1 %	72,6 %	65,0 %
TC-D / DE	18	FSQ-18-E-G24q=2 FSQ-18-I-G24d=2	18	16,5	89,8 %	86,8 %	78,6 %	71,3 %	65,8 %
TC-D / DE	26	FSQ-26-E-G24q=3 FSQ-26-I-G24d=3	26	24	91,4 %	88,9 %	82,8 %	77,2 %	72,6 %
TC-T / TE	13	FSM-13-E-GX24q=1 FSM-13-I-GX24d=1	13	12,5	91,7 %	89,3 %	78,1 %	72,6 %	65,0 %
TC-T / TE	18	FSM-18-E-GX24q=2 FSM-18-I-GX24d=2	18	16,5	89,8 %	86,8 %	78,6 %	71,3 %	65,8 %
TC-T / TC-TE	26	FSM-26-E-GX24q=3 FSM-26-I-GX24d=3	26,5	24	91,4 %	88,9 %	82,8 %	77,5 %	73,0 %
TC-DD / DDE	10	FSS-10-E-GR10q FSS-10-L/P/H-GR10q	10,5	9,5	86,4 %	82,6 %	70,4 %	68,8 %	60,5 %
TC-DD / DDE	16	FSS-16-E-GR10q FSS-16-I-GR8 FSS-16-L/P/H-GR10q	16	15	87,0 %	83,3 %	75,0 %	72,4 %	66,1 %
TC-DD / DDE	21	FSS-21-E-GR10q FSS-21-L/P/H-GR10q	21	19,5	89,7 %	86,7 %	78,0 %	73,9 %	68,8 %
TC-DD / DDE	28	FSS-28-E-GR10q FSS-28-I-GR8 FSS-28-L/P/H-GR10q	28	24,5	89,1 %	86,0 %	80,3 %	78,2 %	73,9 %
TC-DD / DDE	38	FSS-38-E-GR10q FSS-38-L/P/H-GR10q	38,5	34,5	92,0 %	89,6 %	85,2 %	84,1 %	80,4 %
TC	5	FSD-5-I-G23 FSD-5-E-2G7	5,4	5	72,7 %	66,7 %	58,8 %	49,3 %	41,4 %
TC	7	FSD-7-I-G23 FSD-7-E-2G7	7,1	6,5	77,6 %	72,2 %	65,0 %	55,7 %	47,8 %

TC	9	FSD-9-I-G23 FSD-9-E-2G7	8,7	8	78,0 %	72,7 %	66,7 %	60,3 %	52,6 %
TC	11	FSD-11-I-G23 FSD-11-E-2G7	11,8	11	83,0 %	78,6 %	73,3 %	66,7 %	59,6 %
T5	4	FD-4-E-G5-16/150	4,5	3,6	64,9 %	58,1 %	50,0 %	45,0 %	37,2 %
T5	6	FD-6-E-G5-16/225	6	5,4	71,3 %	65,1 %	58,1 %	51,8 %	43,8 %
T5	8	FD-8-E-G5-16/300	7,1	7,5	69,9 %	63,6 %	58,6 %	48,9 %	42,7 %
T5	13	FD-13-E-G5-16/525	13	12,8	84,2 %	80,0 %	75,3 %	72,6 %	65,0 %
T9-C	22	FSC-22-E-G10q-29/200	22	19	89,4 %	86,4 %	79,2 %	74,6 %	69,7 %
T9-C	32	FSC-32-E-G10q-29/300	32	30	88,9 %	85,7 %	81,1 %	80,0 %	76,0 %
T9-C	40	FSC-40-E-G10q-29/400	40	32	89,5 %	86,5 %	82,1 %	82,6 %	79,2 %
T2	6	FDH-6-L/P-W4,3x8,5d-7/220		5	72,7 %	66,7 %	58,8 %		
T2	8	FDH-8-L/P-W4,3x8,5d-7/320		7,8	76,5 %	70,9 %	65,0 %		
T2	11	FDH-11-L/P-W4,3x8,5d-7/420		10,8	81,8 %	77,1 %	72,0 %		
T2	13	FDH-13-L/P-W4,3x8,5d-7/520		13,3	84,7 %	80,6 %	76,0 %		
T2	21	FDH-21-L/P-W4,3x8,5d-7/		21	88,9 %	85,7 %	79,2 %		
T2	23	FDH-23-L/P-W4,3x8,5d-7/		23	89,8 %	86,8 %	80,7 %		
T5-E	14	FDH-14-G5-L/P-16/550		13,7	84,7 %	80,6 %	72,1 %		
T5-E	21	FDH-21-G5-L/P-16/850		20,7	89,3 %	86,3 %	79,6 %		
T5-E	24	FDH-24-G5-L/P-16/550		22,5	89,6 %	86,5 %	80,4 %		
T5-E	28	FDH-28-G5-L/P-16/1150		27,8	89,8 %	86,9 %	81,8 %		
T5-E	35	FDH-35-G5-L/P-16/1450		34,7	91,5 %	89,0 %	82,6 %		
T5-E	39	FDH-39-G5-L/P-16/850		38	91,0 %	88,4 %	82,6 %		
T5-E	49	FDH-49-G5-L/P-16/1450		49,3	91,6 %	89,2 %	84,6 %		
T5-E	54	FDH-54-G5-L/P-16/1150		53,8	92,0 %	89,7 %	85,4 %		
T5-E	80	FDH-80-G5-L/P-16/1150		80	93,0 %	90,9 %	87,0 %		
T5-E	95	FDH-95-G5-L/P-16/1150		95	92,7 %	90,5 %	84,1 %		
T5-E	120	FDH-120-G5-L/P-16/1450		120	92,5 %	90,2 %	84,5 %		
T5-C	22	FSCH-22-L/P-2GX13-16/225		22,3	88,1 %	84,8 %	78,8 %		
T5-C	40	FSCH-40-L/P-2GX13-16/300		39,9	91,4 %	88,9 %	83,3 %		
T5-C	55	FSCH-55-L/P-2GX13-16/300		55	92,4 %	90,2 %	84,6 %		
T5-C	60	FSCH-60-L/P-2GX13-16/375		60	93,0 %	90,9 %	85,7 %		
TC-LE	40	FSDH-40-L/P-2G11		40	91,4 %	88,9 %	83,3 %		
TC-LE	55	FSDH-55-L/P-2G11		55	92,4 %	90,2 %	84,6 %		
TC-LE	80	FSDH-80-L/P-2G11		80	93,0 %	90,9 %	87,0 %		
TC-TE	32	FSMH-32-L/P-2GX24q=3		32	91,4 %	88,9 %	82,1 %		
TC-TE	42	FSMH-42-L/P-2GX24q=4		43	93,5 %	91,5 %	86,0 %		
TC-TE	57	FSM6H-57-L/P-2GX24q=5 FSM8H-57-L/P-2GX24q=5		56	91,4 %	88,9 %	83,6 %		
TC-TE	70	FSM6H-70-L/P-2GX24q=6 FSM8H-70-L/P-2GX24q=6		70	93,0 %	90,9 %	85,4 %		
TC-TE	60	FSM6H-60-L/P-2G8=1		63	92,3 %	90,0 %	84,0 %		
TC-TE	62	FSM8H-62-L/P-2G8=2		62	92,2 %	89,9 %	83,8 %		
TC-TE	82	FSM8H-82-L/P-2G8=2		82	92,4 %	90,1 %	83,7 %		
TC-TE	85	FSM6H-85-L/P-2G8=1		87	92,8 %	90,6 %	84,5 %		
TC-TE	120	FSM6H-120-L/P-2G8=1 FSM8H-120-L/P-2G8=1		122	92,6 %	90,4 %	84,7 %		
TC-DD	55	FSSH-55-L/P-GRY10q3		55	92,4 %	90,2 %	84,6 %		

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

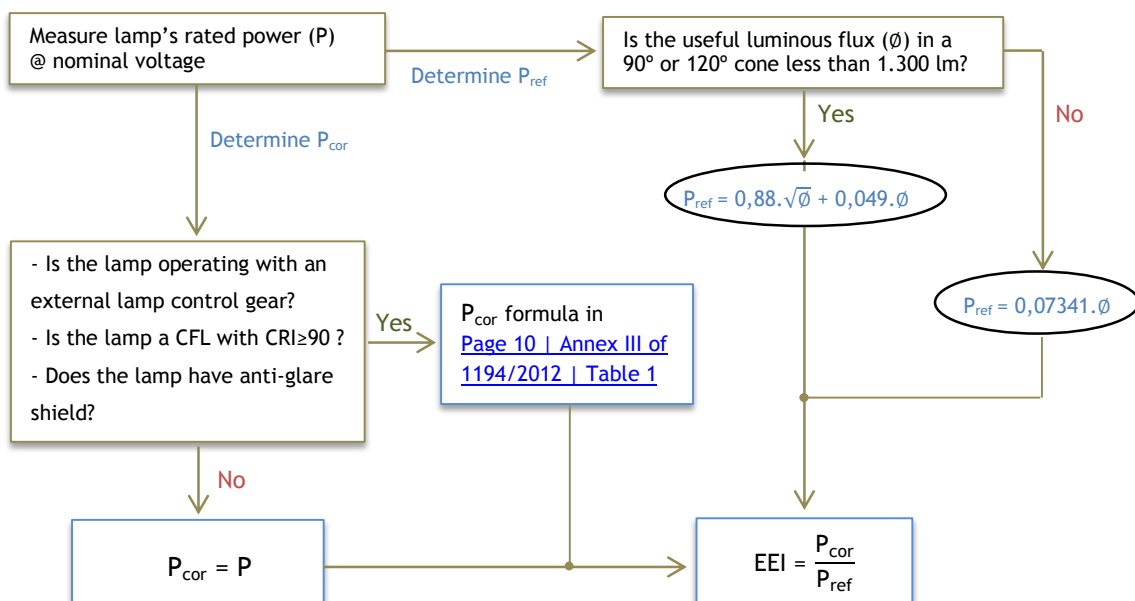
$\eta_{ballast}$	Energy Efficiency Index
$\geq 0,94 * Ebb_{FL}$	A3
$\geq Ebb_{FL}$	A2
$\geq 1-0,75*(1-Ebb_{FL})$	A2 BAT

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

‘No-load mode’ means the condition of a lamp control gear where it is connected to the supply voltage and where its output is disconnected in normal operation from all the primary loads by the switch intended for this purpose (a faulty or missing lamp, or a disconnection of the load by a safety switch is not normal operation).

‘Standby mode’ means a mode of lamp control gear where the lamps are switched off with the help of a control signal under normal operating conditions. It applies to lamp control gear with a built-in switching function and permanently connected to the supply voltage when in normal use.



Appendix 2

Page 1 | “incandescent traffic signalling lamps”

These are incandescent lamps with a rated voltage above 60V, and a failure rate of less than 2% during the first 1000 hours of operation.

Page 5 | “nominal”

A ‘nominal value’ is the value of a quantity used to designate and identify a product.

Page 5 | “efficacy requirements of Stage 4”

All filament lamps, besides incandescent lamps with S14, S15 or S19 caps which are exempted from the efficacy requirements until Stage 4, must comply with the following efficacy requirements:

Application date	Maximum rated power (P_{max}) for a given rated luminous flux (Φ) (W)	
	Clear lamps	Non-clear lamps
Stages 1 to 5	$0,8 * (0,88\sqrt{\Phi} + 0,049\Phi)$	$0,24\sqrt{\Phi} + 0,0103\Phi$

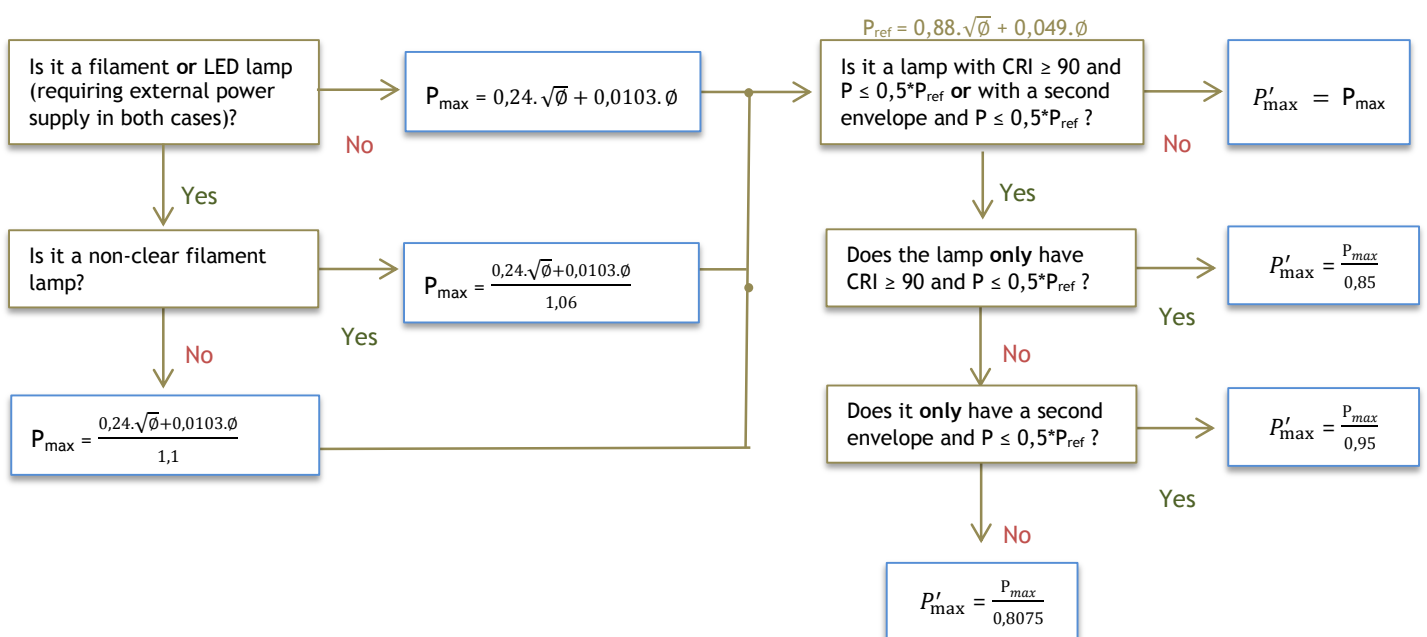
↓

Except for $60 \text{ lm} \leq \Phi \leq 950 \text{ lm}$
which will be $P_{max} = 1,1 * (0,88\sqrt{\Phi} + 0,049\Phi)$

Correction factors

Scope of the correction	Maximum rated power (W)
filament lamp requiring external power supply	$P_{max}/1,06$

Page 6 | “non-clear lamps in Stage 1”



The manufacturer should provide, as applicable, the following:

- information from the designer relating to the manufacturing process;
- information for consumers on the significant environmental characteristics and performance of a product, to allow consumers to compare these aspects between products;
- information for consumers on how to install, use and maintain the product in order to minimise its impact on the environment and to ensure optimal life expectancy;
- information on how to return the product at end-of-life, and, where appropriate, information on the period of availability of spare parts and the possibilities of upgrading products;
- information for treatment facilities concerning disassembly, recycling, or disposal at end-of-life.

Information should be given on the product itself wherever possible.

Page 17 | “smallest reference luminous flux”

To calculate the smallest reference luminous flux you must take the reference luminous flux (right column of [Page 14 | Annex III of 1194/2012 | Table 6](#)) that corresponds to the smallest power (centre column) of your lamp type (left column). Then you must apply a correction factor ([Page 15 | Annex III of 1194/2012 | Table 7](#)) concerning the lumen maintenance of the lamp technology. If it is LED technology we are dealing with, a further multiplication factor ([Page 16 | Annex III of 1194/2012 | Table 8](#)) is needed. Here is an example for a PAR16 LED lamp with 36° beam angle, a luminous flux of 180 lm and an LLMF of 0,7:

Type	Power (W)	Reference Φ_{90° (lm)
PAR16	20	90
	25	125
	35	200
	50	300

→ smallest reference luminous flux in a light cone less than 90° ($SR\phi_{90}$)

Lamp type	Luminous flux multiplication factor
LED lamps	$1 + 0,5 \times (1 - LLMF)$ where LLMF is the lumen maintenance factor at the end of the nominal life

↓ apply the correction factor for LED lamps

$$SR\phi'_{90} = 1 + 0,5 \times (1 - 0,7) = 1,15$$

LED lamp beam angle	Luminous flux multiplication factor
$20^\circ \leq$ beam angle	1

↓ and the multiplication factor

$$SR\phi'_{90} = 1,15 \times 1 = 1,15$$

Thus you have the smallest reference luminous flux for an LED PAR16 lamp:

$$SR\phi_{90} = 90 \times SR\phi'_{90} = 90 \times 1,15 = 103,5$$

Reference luminous flux for equivalence claims

Extra-low voltage reflector type		
Type	Power (W)	Reference Φ_{90° (lm)
MR11 GU4	20	160
	35	300
MR16 GU 5.3	20	180
	35	300
	50	540
AR111	35	250
	50	390
	75	640
	100	785
Mains-voltage blown glass reflector type		
Type	Power (W)	Reference Φ_{90° (lm)
R50/NR50	25	90
	40	170
R63/NR63	40	180
	60	300
R80/NR80	60	300
	75	350
	100	580
R95/NR95	75	350
	100	540
R125	100	580
	150	1 000

Mains-voltage pressed glass reflector type

Type	Power (W)	Reference Φ_{90° (lm)
PAR16	20	90
	25	125
	35	200
	50	300
PAR20	35	200
	50	300
	75	500
PAR25	50	350
	75	550
PAR30S	50	350
	75	550
	100	750
PAR36	50	350
	75	550
	100	720
PAR38	60	400
	75	555
	80	600
	100	760
	120	900

Page 18 | Page 15 | Annex III of 1194/2012 | Table 7

Multiplication factors for lumen maintenance

Lamp type	Luminous flux multiplication factor
Halogen lamps	1
Compact fluorescent lamps	1,08
LED lamps	$1 + 0,5 \times (1 - LLMF)$ where LLMF is the lumen maintenance factor at the end of the nominal life

Multiplication factors for LED lamps

LED lamp beam angle	Luminous flux multiplication factor
$20^\circ \leq \text{beam angle}$	1
$15^\circ \leq \text{beam angle} < 20^\circ$	0,9
$10^\circ \leq \text{beam angle} < 15^\circ$	0,85
beam angle $< 10^\circ$	0,80

Page 18 | “linear interpolation”

To perform a linear interpolation, consider the values in the “Power” column in [Page 14 | 1194/2012 | Table 6](#) as x_0 (for the adjacent smaller) and x_1 (for the adjacent higher); values of the Reference ϕ_{90} column as y_0 (for the adjacent smaller) and y_1 (for the adjacent higher); the number of measured lumens of your lamp type as y , and the power to be claimed as equivalent as x .

To find x you can either use an online linear interpolation tool (www.johndcook.com/interpolator.html) or you can solve the following equation:

$$x = x_0 + (x_1 - x_0) \frac{(y - y_0)}{(y_1 - y_0)}$$